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NATIONAL SAFETY CONGRESS

Transactions
ATLANTIC CITY
OCTOBER 16-20, 1939

NATIONAL SAFETY COUNCIL, INC.

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Council Purpos

The National Safety Council is a non-profit, cooperative association whose objective is the elimination of accidents. To achieve this objective the Council advocates the following program of safety activities:

1. CREATING INTEREST IN SAFETY. People will try to prevent accidents only when they are convinced of three things: (a) that accidents are really a serious problem, threatening personal happiness, industrial efficiency and economic security; (b) that accidents don't "just happen," but that each one has definite, ascertainable causes; (c) that accidents can be prevented. The basic requirement in a national safety program, therefore, is a dramatic and effective presentation of these facts to more and more people.

2. FINDING ACCIDENT CAUSES. Accident causes are not the same in any two plants, in any two cities, in any two schools. They are not the same from one time to another. Every industrial plant, every city, every school and every other public or private organization, therefore, must study the causes of accidents in its own group, so that prevention efforts always will be directed at the things really responsible for accidents.

3. MAINTAINING INTEREST IN SAFETY. People retain interest in very few things of which they are not continuously reminded. Therefore, it is the task of the newspaper, the radio, the magazine, the school, the public speaker and every other educational influence to keep reminding the worker, the driver, the pedestrian, the housewife and the school child that freedom from accidents depends on personal caution, and that the safe way is the right way and the best way—from the standpoint not only of human satisfaction, but of social efficiency and economy.

4. ENGINEERING IMPROVEMENT. Many accidents occur because equipment is faulty. The punch press is unguarded, the automobile brakes are worn, the stairway is crudely built, the propeller is defective, the stop sign is obscured. The avoidance of accidents, therefore, requires that safety be built into every piece of machinery, every home, every school building, every high

Occupational Disease Control

THURSDAY MORNING SESSION

October 19, 1939

sound unit operating on a strip film projector may not be associated to the sound recordings of the film. The opaque projector, a slide unit and the may be readily adapted.

For the basic governing principle presented. Pictures of the audience or the situation in which it is to be used.

For housing and substitution.

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portability is more and is governed almost entirely by the projection power and to portability. I prefer a projector lamp below 200 watts.

My preference is for a projector bulb of from 150 to 200 watts. In projectors larger than 300 watts draft ventilation wise damage to the projected is almost the bulb itself may heat.

The session planned for the discussion of problems in industrial occupational disease control was called to order by A. S. Johnson, Assistant to the Manager, Engineering Department, American Mutual Liability Insurance Company, Boston, Mass., who presided. The problems were presented as a panel discussion, and Chairman Johnson introduced the members of the panel, as follows:

Roy S. Bonsib, Chief Safety Inspector, Standard Oil Company of New Jersey, New York City.

Warren A. Cook, Division of Industrial Hygiene and Engineering Research, Zurich General Accident & Liability Insurance Company, Chicago.

Dr. A. G. Cranch, Industrial Toxicology Department, Union Carbide Company, New York City.

Dr. Leonard Greenburg, Executive Director, Division of Industrial Hygiene, New York State Department of Labor, New York City.

Willis G. Hazard, Personnel Division, Owens-Illinois Glass Company, Toledo, O.

Dr. E. G. Meiter, Director, Industrial Hygiene Laboratory, Employers Mutual Liability Insurance Company, Wausau, Wis.

Dr. O. A. Sander, Milwaukee, Wis.

The Discussion Plan

CHAIRMAN JOHNSON: We have agreed to have a working base from which we will talk. This working base from which we will try to develop our opinions is what I choose to call a triangle of responsibility, visualizing what may be called the three A. B. C.'s of an equilateral triangle.

At the top of this triangle is management of an industrial enterprise, the man who has to pay the bills, the man who hires the labor, the man who worries about

their health. On the left base is the medical side. They are the group employed to carry out the medical part of industrial management's responsibility. And on the lower right is the third base of this triangle where we find the engineers or industrial hygienists, who have to develop and prepare for the operating group the controls of occupational disease, as far as engineering is concerned with controlling them.

Now, there is a strong tie between the medical and the engineering phases through that base line of the triangle. What we hope to do in discussing each topic is to develop that tie, which we will call the balance of opinion between the medical phases developed by the doctors on my left, and the engineering phases developed by the engineers on my right.

I would like to ask this panel a question. For a great many years occupational hazards have been studied in one industry or another. Would this panel feel, let us say, sanguine that any industrial enterprise is now ready, by employing proper personnel, by searching out the answers wherever they may be found, to solve an occupational disease problem if they have one, and by the proper solution maintain the safety and health of the employees? Put another way, are we still groping in the dark on some of these hazards by reason of conflict of opinion, conflict of experimental data and theoretical expression by folks who find the theoretical hazard in exposure because it is suggested in the book? Will Dr. E. G. Cranch talk briefly along this line of suggestion?

DR. CRANCH: This question is a broad one: Is any industry satisfied that it is in a position to solve an occupational disease on the basis of present information? I would say, absolutely yes, for the majority of occupational disease problems are sufficiently understood to adopt efficient measures for control.

CHAIRMAN JOHNSON: Frequently I hear it said, "Well, why should I do anything about this until you folks come to terms on whether I ought to have two parts per million or two thousand parts per million?" Let us develop this farther and ask the opinion of Dr. E. G. Meiter, on the engineering side.

DR. MEITER: I agree with Dr. Cranch that there is enough known to solve these occupational disease hazards. If some employers are not willing to do anything at all until all possible information is available, I would say that they are never going to start.

In solving these occupational disease problems, we have a progressive solution. In the same way that the 1940 automobile could not have been built in 1920, just so are we progressing in all the branches of engineering, ventilation, ventilation equipment, and respiratory protective devices, and so I think adequate information is available.

A Basis for Truth

CHAIRMAN JOHNSON: I think we have a balance of opinion there. If you have an occupational disease hazard, there is enough knowledge stored somewhere in the books and brains to tackle it or solve it in progressive fashion. But we are cluttered up, I think, by a lot of crack-brained notions. I have read any quantity of literature in which somebody has ventured the opinion that because such and such materials are used, we must have a hazard that is just about ready to kill off the population of the plant.

Do we know enough about the hazards and control of benzol, silicosis, arsenic, phosphorus, radium, x-ray, and so forth, to sort out the truth and build upon solid fact an effective safety program? Will Dr. Leonard Greenburg develop that for a couple of minutes?

DR. GREENBURG: It seems to me that there is a definite body of evidence which is available on the more important occupational poisons and for the more important occupational diseases, that makes it possible to prevent and control these poisonings and these hazards with a great deal of certainty.

That holds for substances such as carbon monoxide and lead and chromium and

arsenic and benzol. The chief reason, it seems to me, why we still continue to have poisonings in industry is because the employer and the worker do not realize the gravity of these hazards and do not take the problem seriously enough to institute the necessary and proper means of prevention.

CHAIRMAN JOHNSON: Now I am going to switch to the engineering side and ask the same question. Let us visualize an industrial enterprise that is fearful, that has a notion that some exposure is a serious one, and wants to know if there is anything from an industrial engineering standpoint that will make it impossible or difficult to devise the proper instruments to measure the quantity of exposure, whether it be dust, gas or fume.

I am going to turn that over to Warren Cook.

MR. COOK: Today we have more methods available for finding out how much of the injurious materials a man is being exposed to than we have ever had in the past. Formerly it was a very laborious procedure in most cases to analyze the atmosphere inhaled by the worker. Today in connection with more and more of the injurious materials, we are having placed in our hands and are having developed methods which will quickly tell us how much of the injurious material is in the atmosphere breathed by the worker.

We have devices which will determine the concentration of carbon monoxide merely by reading a gauge. Similar equipment is being developed for other injurious materials. For vapors, about the best device is the Innerperometer, and we hope we will be able to get equipment of this kind manufactured in this country one of these days, but at the present time it is rather difficult to obtain.

Practically all of the injurious materials in industrial atmospheres can be determined. Some of the methods are more simple than others, but methods are being simplified all of the time so the safety engineer in the plant can avail himself of these methods.

CHAIRMAN JOHNSON: Now I am going to ask Roy Bonsib a rather critical question. In cases of doubt, where there has to be balanced with knowledge, would he think it advisable to attempt to develop a hazard in a plant without technical

measurement? That is, by visual inspection. Or does he feel that it is a question desirable to have the substance technically by industrial hygienists men trained to sample proper instruments?

MR. BONSBIB: I think the trouble in industry today is has been too much guess work going with insidious problems with new substances and some of the instances which have been introduced pretty hard to hang your hat on, and the average executive wants to know exactly what is going on, you cannot know that without evidence. You have got to get information and data.

When once you know the truth, it can only be obtained through means and by experienced people give them something definite they can base definite conclusions which you can base your measures.

CHAIRMAN JOHNSON: I am assured that we can discuss so problems. We have our base agreement that there is no occupational disease hazard that is developed with, that there is no evidence to sort fact from fancy are instruments sufficient in a kind for proper engineering that there is no need of guess.

Let us start now an occupational disease control program. We have the management at the top, my hazard, if any. Control it. I am setting up a medical department setting up engineering hygienists. I want you fellows to program so that my operation can install the necessary whatever they may be, and as there will be no emergence of reason of these exposures."

The Medical Program

Let us build first the medical program. Of what does it consist, Dr. O. A. Sander?

DR. SANDER: I am glad to see the need of a medical program in occupational disease control with the engineering examination of all workers.

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chief reason, it still continues to be because they do not realize the hazards and do not try enough to use proper means of

ON: Now I am on the engineering side. Let us visualize that is fearful. The exposure is a problem. I do not know if there is a problem in industrial engineering. It is impossible to use proper instruments of exposure, or time.

over to Warren

we have more finding out how materials a man is have ever had was a very laborious cases to analyze. The worker. The more and more we are having are having de will quickly tell serious material is by the worker. It will determine carbon monoxide. Similar equipment for other injuries, about the best, and we hope equipment of this country one of recent time it is

serious materials can be determined. Methods are being so the safety can avail himself of

ON: Now I am a rather critical point, where fear knowledge, would attempt to design without technical

measurement? That is, by visual observation. Or does he feel that it is beyond all question desirable to have the survey made technically by industrial hygienists or by men trained to sample properly with proper instruments?

MR. BONSBIB: I think the greatest trouble in industry today is that there has been too much guess work. In dealing with insidious problems such as the new substances and some of the old substances which have been introduced, it is pretty hard to hang your hat on everything, and the average executive today wants to know exactly what is what, and you cannot know that without concrete evidence. You have got to get definite information and data.

When once you know the facts, which can only be obtained through technical means and by experienced people, you can give them something definite on which they can base definite conclusions and on which you can base your preventive measures.

CHAIRMAN JOHNSON: Now I feel assured that we can discuss some detailed problems. We have our base. We are in agreement that there is no ordinary occupational disease hazard that cannot be coped with, that there is sufficient evidence to sort fact from fancy, that there are instruments sufficient in quantity and kind for proper engineering analysis, and that there is no need of guessing.

Let us start now an occupational disease control program. We have Plant X. The management at the top says, "Find my hazard, if any. Control it, if need be. I am setting up a medical department; I am setting up engineering occupational hygienists. I want you fellows to work out a program so that my operating department can install the necessary safeguards, whatever they may be, and assure me that there will be no emergence of disability by reason of these exposures."

The Medical Program

Let us build first the medical half of that program. Of what does it generally consist, Dr. O. A. Sander?

DR. SANDER: I am glad you emphasized the need of a medical program in an occupational disease control program. Along with the engineering control. An initial examination of all workers exposed

to a particular occupational hazard is as necessary as is the exact determination of a hazard by engineering methods.

The appearance or the findings in any group of workers exposed to a particular dust, or what have you, gives an accurate picture of the hazard which has existed over a period of years. That picture is one which the engineers cannot give you, because their dust counts or other determinations may be only temporary or may vary from day to day. It may have changed considerably in the past few years; the hazard may have been for example, ten times as great two years before as it was on the day the dust counts were made. So no occupational disease control is adequate without initial examination of all employees.

CHAIRMAN JOHNSON: Dr. Sander has developed the need for the medical examination as a survey question to determine whether conditions as they have existed have produced any pathology in the men. Let us assume that, and install our program of control. Dr. Greenburg, what do you feel about the need for periodicity in the examination program?

DR. GREENBURG: That would largely depend on what particular hazards were present in the plant itself. In certain cases it would be desirable to examine workers very frequently, perhaps even as often as once a month; and in other instances it might be very satisfactory to examine them once a year, depending on just what particular substances the workers were exposed to in their daily occupation and how satisfactory the technical means of control were.

For example, in the case of benzol, it might be satisfactory to examine workers every three months. I believe in the case of tetraethyl lead, the du Pont Company examines its employees about once a month, though I am not quite sure about that. In the case of sand blasters, it might be desirable to examine them and x-ray them every six months; whereas in the case of foundrymen it might be perfectly satisfactory if the men are engaged in ordinary foundry work to examine them once a year and x-ray them once a year or once every year and a half.

It would be largely a question of judgment, depending on the particular occu-

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position and the particular substances employed.

CHAIRMAN JOHNSON: I would like to ask Dr. Greenburg to amplify just one point. If the survey about which Dr. Sander spoke discloses no specific occupational disease hazard as having caused any pathology—and that is the situation that obtains in most plants—but still there may be some moderate exposures to this or to that, and the management wants to be perfectly sure, how often as a general thing should those men come up for re-examination?

Understand, this survey has disclosed no pathology, no damage, nothing you can put your teeth in or hang your hat on as indicating a great need for engineering changes in current methods of control.

Re-examination Periods

DR. GREENBURG: That would largely depend on whether there were any hazardous materials being used in the plant. If the condition of the men at the time of the initial examination was quite negative and no hazardous material is being used in the plant, I should say the decision as to whether or not you are going to have physical examinations is largely an open one, and a matter of wide judgment.

For example, in the case of a department store's employees, where young women act as salesladies, under ordinary conditions, it might not be necessary or desirable to give them physical examinations more than once in five years, perhaps not even then.

If, on the other hand, the physical examinations were quite negative, and yet toxic materials are being employed, the decision would depend on how toxic those materials are and what the analysis of the plant atmosphere shows.

It seems to me that the answer to the question is a matter of judgment which must be based on a comparison of the relative hazards of the exposure as compared with the cost and desirability of continuing intensive physical examination, and only by knowing the detailed facts can one arrive at a sound decision in a particular given instance.

CHAIRMAN JOHNSON: I think that it is very important for you all to

consider carefully the opinion expressed there. You will observe that he has placed the burden upon his own profession, by careful discussion, of course, with the management that is to pay the bill, but the decision must rest with the doctor upon the evidence as presented by the conditions of the plant and the employees themselves.

There is no cook book formula which says you must put employees through the mill at standard intervals. But the making of medical examinations is another thing. It always presents problems, because men frequently are frightened when they know they are being examined to see if there is anything the matter with them, not just being examined to see if they are all right. They are always fearful that some dire calamity may overtake them soon. It is a real personnel problem, one that has to be handled with judgment.

I am going to ask Dr. Cranch if, in his long experience of examining a great many employees for operating exposures that might not be hazardous, he has always been able to keep those employees calm and collected and quiet and quite content with what things were found.

DR. CRANCH: Physical examination programs for occupational disease control can hardly be divorced from a physical examination program aimed at general health conservation. Where it is possible to have a medical service, where the physician is in daily contact with the man, physical examination presents far fewer difficulties than where it is done only for the sake of occupational disease control.

If an outside physician comes in to examine certain groups of men at intervals of from one month to two years, men logically have a right to expect that there may be something going wrong with those who are called in frequently, and that leads to considerable nervousness on their part as to what will be found.

There is a matter of psychology and practice in carrying out such a program of examinations. It is much simpler, where it is possible to arrange it, to have reasonably frequent examinations for general health conservation, and these examinations, then, will be included in the regular procedure and help to determine the effects of an occupational disease exposure.

As Dr. Greenburg said, we do tempt as a rule a routine examination at a fixed interval of a year, we do. The periodicity of our re-examination determined largely by several factors: first, the possible exposure to occupational disease hazards; second, what we know in connection with that man's health; and third, how the days go by.

Our supervisory force is usually instructed to send in any man who seems a little under the weather, who seems to be doing well, who seems to be slipping a little. From their recollections often we pick up cases that require examination which otherwise would easily have been overlooked.

Another thing which we have to bear in mind is that many symptoms are not only occupational diseases but are incident to life in general. The medical program for the control of occupational disease is therefore very important in that the contact must be established with the men to determine what changes are going on and what the origin is.

CHAIRMAN JOHNSON: A very important point to me is that you drag in a physician from the outside who is a total stranger to your problem because he is an expert toxicologist, he knows something else, and ask him to do a medical examination or control for about a week, and then depart.

Hire him to consult with your physician, but let your own physician fold the occupational disease problem into the general health conservation program, that the findings of the one augment and support the findings of the other.

Now I am going to talk to the doctor and assume that a survey has been made in which we have discovered a sufficiently dangerous so that, in the doctor's opinion, something ought to be done about it. I am not assuming that it is gone so far as to kill men, but it is festering itself either in moderate earaches or some actual demonstration of pathology in a few.

I want to ask this group of doctors, what do you want the medical men to do? What do they want to do? What do they want to do in their own work in connection with this problem?

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toms or some actual demonstrable pa-
thology in a few.

I want to ask this group of engineers
what they want the medical men to tell
them, which they may use to utmost ad-
vantage in their own work in connection

with surveying to locate and find the
hazard that they want to control.

Will Willis Hazard discuss that one?

MR. HAZARD: It seems to me that
the most important thing that the doctor
can tell the engineer is what his findings
are from the physical examination. That
more or less determines how serious the
hazard is; it often isolates it to certain in-
dividuals in the plant, and that points the
way to places that should come under en-
gineering control in that regard.

CHAIRMAN JOHNSON: Perhaps
you have already visualized what I am
leading to. I want Mr. Bonsib to develop
that a little farther. Here we have the
medical examination installed to disclose
what is wrong, if anything. I want him
to develop the engineering control method.
What fact and what data does he need to
go about his business?

Engineering Control

MR. BONSIB: Since the amount of
damage to the human mechanism depends
upon the exposure and the concentration,
the engineer should know the maximum
allowable concentration to which he would
have to maintain the working atmosphere
or the working condition, and as an en-
gineer that is something that the medical
profession must give so that the engineer
will have something to which to work.

I think the answer to the question, then,
is that it is very essential that the thresh-
old or maximum allowable concentration
permissible be known.

CHAIRMAN JOHNSON: I do not
think we will quarrel about that. I am
certain no engineering group will stick
out its neck far enough to define for the
medical profession what constitutes the
safe threshold limit. It is not quite the
answer to the question I had in mind,
however.

For a great many years, you know, the
medical profession has been conducting
its work successfully in industry, main-
taining the greatest degree of confidence
between the employees and the doctor
through the fact that the doctor never
revealed what was the matter with the
man if there was anything wrong. He
grades the men in a general way, employ-
able, or employable subject to medical

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service, or employable in limited exposures.

I think I have blown open a question here: Can the doctor inform the engineer of a sufficient number of facts about the hazard to which these men have been exposed without weakening that professional confidence which he has established in the workmen whom he is examining?

What I want this group of engineers to develop is: Can they use adequately mass information, or information about the group, without having to know that Mike Dambrowski is about one month from emerging with a disability? Will you develop that, Mr. Hazard?

MR. HAZARD: It seems to me it is entirely possible for the engineer to use the medical results in a purely statistical manner. He does not have to know who is sick or whether it is Mike Dambrowski or somebody else. It is extremely important that he know the number of people who are showing the same ailment and the number of people who are working in the department or the plant as a whole.

MR. BONSIB: I do not see how you can protect against something unless you know what it is going to do; and I do not see how you can provide necessary protective measures without knowing to what extent you have to go on them. You must know the threshold limit to which the substance or the material, whether it is gas, fume or dust, is causing the trouble. If you do not know what the toxic limit is, that is, the amount it takes to make people sick or how much the human mechanism can stand, making due allowance for the idiosyncrasies of the susceptible, I do not see how the engineer can provide the necessary measures.

Therefore, I still maintain that the threshold limit is the essential thing for the engineer to know. That gives him something to shoot at. In other words, he must reduce that concentration to the point below which it will not make anyone sick, and the length of exposure necessary to which that person must be exposed.

MR. COOK: An instance might be cited where other factors than threshold limits have been utilized. For example, in the gypsum industry, in certain plants there is what is known as a sanded plaster manufacturing operation where there is

much dust. It had been shown that gypsum dust itself does not cause silicosis or injury to the lungs. Where there is silica sand, we look for that injury to the lungs and the development of fibrosis and silicosis where the exposure is high and continued over a long period of time.

Consequently, where about half of the material used in this operation was silica sand, it was the guess of the engineer that here was a condition which had to be controlled effectively to keep the dust concentration down to very low levels.

To everyone's surprise, the x-ray examinations of workers who had been exposed to these operations for a number of years, showed that there was no development of fibrosis.

Further engineering data was collected, and it was found that two things happened. In the first place, the grain size of the sand was rather uniformly large and well washed. There was no abrasive action to produce a great number of fine particles. In the air itself, the concentration of free silica was not 50 per cent, or what it was in the main material, but only one or two per cent. Finally, laboratory examination showed that where you get quartz dust falling, or where you would get gypsum dust settling out of the air fairly rapidly, the quartz dust settled out more rapidly; and the combination of quartz and gypsum settled out even more rapidly than either one alone, due to the fact that the gypsum dust caused agglomerations with the silica dust, and you had large groups of particles which caused this more rapid settling.

Now, the data obtained through the medical examination and the x-ray was what gave the hint that the cost and the completeness of the control at that operation was not as great as it would normally be thought to be by the engineer walking into the situation.

CHAIRMAN JOHNSON: I think that illustration binds together these various points.

I have watched that particular study developed with a great deal of interest, and, for a fact, the engineers did not know, or did not have to know, anything about the men as individuals; the doctor kept that

Now I am summarizing for just a moment, to where we have arrived. We

have the doctors and the two bases of our tripartite sanguine that hazards we know enough, the edge in the aggregate. We say that the need gram is as vital as the engineering program; it is to be the plant doctor, specialists as he needs set with him; that amount of factual information must turn over to the engineer for his use as for man, and that should tell the engineer how the hazard must be reasonably safe; the perfectly willing and hazard in some fashion things; and the permission to find out whether did a job or not depends as the doctor finishes in the men themselves.

Of course, the engineer continue to use the information to check their own records.

Now I am going to program and explorations suggested there cuss phases of exhaust in the engineering describing machinery to make it possible design an exhaust system. He needs it? thinks he needs it? trade, glorified vacuum market to pick one and install it in the to produce results?

Dr. Meiter, will thoughts on present tailor-made exhaust engineering design fit the individual plant?

Exhaust

DR. MEITER: I not available ready-made equipment. They can select from a catalog your problems has in the progress of the

By that I mean that men will have, say they call him in:

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shown that cause silicosis where there is injury to the of fibrosis and is high and of time.

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have the doctors and the engineers as the two bases of our triangle. Our panel feels sanguine that hazards can be controlled. We know enough, there is enough knowl- edge in the aggregate to control them. We say that the need for a medical pro- gram is as vital as the need for an en- gineering program; that the doctor ought to be the plant doctor, augmented by such specialists as he needs to employ to coun- sel with him; that they have a certain amount of factual information that they must turn over to the hygienist or en- gineer for his use as a check for his per- formances, and that the medical crowd should tell the engineering crowd how low the hazard must be taken to consider it reasonably safe; that the engineers are perfectly willing and able to tackle the hazard in some fashion if they know those things; and the periodicity of the exami- nation to find out whether the engineers did a job or not depends upon the condi- tions as the doctor finds the record written in the men themselves.

Of course, the engineers are going to continue to use the instruments of survey to check their own results.

Now I am going down to our printed program and explore some of the ques- tions suggested there. The panel will dis- cuss phases of exhaust systems. Are there in the engineering catalogues, data de- scribing machinery of one kind or another to make it possible for the engineer to design an exhaust system if he wants it, or thinks he needs it? Are there enough high grade, glorified vacuum cleaners on the market to pick one out of the catalogue and install it in the plant, and expect it to produce results?

Dr. Meiter, will you develop your thoughts on present market conditions of tailor-made exhaust systems as against engineering design of exhaust systems to fit the individual plant circumstances?

Exhaust Systems

DR. MEITER: In my opinion, there is not available ready-made exhaust ventila- tion equipment. The assumption that you can select from a catalogue and ventilate four problems has been a great drawback in the progress of this work.

By that I mean this: Oftentimes a com- pany will have, say, a local tin worker. They call him in and he, without know-

ing what the requirements are of the State Code, without knowing the limits to which the gas, dust or fume has to be exhausted, immediately sets about and de- signs a hood.

Then, without even knowing how much air can be handled by that hood, he looks into the classified section of the telephone book and calls up the fan company. The fan company has a salesman, but he is not in, so the office girl looks up the technical data, and the company ships the fan.

When this ventilating system is finally installed, the sheet metal worker says, "Well, the sheet metal work portion of it is all right, and that is all I guarantee."

Then the fan company, on the other hand, says that the fan delivers a certain volume of air at the speed shown in their catalogue, so they wash their hands of it. And finally, when the whole thing is in, it does not work and a job has been poorly done. So the point I wish to make is that ventilation, no matter how simple, requires technical knowledge and technical instru- ments to determine when the system is really working.

CHAIRMAN JOHNSON: I think Dr. Meiter has put his finger on a very critical point. When I speak about engineering control, I mean engineering control, and I do not mean tinsmith control. Let me illustrate.

Sander talked about the metal fume fever, zinc shakes. Visualize, if you will, the problem of a shipyard building de- stroyers for the United States Navy of galvanized sheet plate, with a great deal of electrical welding work to be done in confined spaces, in the little tanks and cells of which the ship is constructed.

There is a plant set up in the field, you might say, lying for nearly a year at its fitting-out basin, a little plant about 325 feet long and 30 feet wide, 25 to 30 feet molded depth and heaven only knows how many tanks in it (they get down to pretty small sizes) with welding to be done in most. In those confined spaces welding, steam-fitting and electrical work must be done. Can you imagine a tailor-made ven- tilating system being used there?

Now let us go to the next question, pro- tective creams and lotions. Let us have clearly in mind that a cream or a lotion is smeared on the skin for a purpose, and

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usually the purpose is to prevent the moderate amounts of something or other from coming into contact with the skin.

These creams and lotions are of two kinds, those that are water soluble for use in oily exposures, and those which are oil soluble for use in aqueous exposures. This use of cream, I declare arbitrarily, as Chairman of this party, is not in lieu of any other control. These creams are used because controls cannot be made absolute, and because there are sensitive skins to be taken care of.

Dr. Cranch, would you like to discuss the effectiveness and the use of creams, from the viewpoint of the doctor who has a cock-eyed purchasing agent who buys an oil soluble when he wants a water soluble, and vice versa?

Protective Creams and Lotions

DR. CRANCH: I think you have started something. Protective creams certainly have a field in the protection of skin from various irritant substances. I would put far ahead of the use of protective creams, however, good personal hygiene and thorough cleanliness on the part of the worker. Where that is obtained, the question of protective creams is of lesser importance; sometimes negative importance.

There are certain exposures, however, where no amount of personal hygiene or cleanliness is enough to protect from possible harm. Therefore, we do have a place for protective creams of the two classes Mr. Johnson has just mentioned.

Primary in the consideration and selection of any cream, of course, is the nature of the exposure. If it is on an oily substance, we must use a water soluble cream which will form a coating over the skin and resist the penetration of the oily material.

And, on the other hand, if it is a water soluble substance from which we must have protection, we must have an oily base in the protective cream.

The first consideration, then, is that the cream itself shall not contain an irritant. That incidentally opens up the whole field of allergy. There are many people sensitive to certain of the common ingredients used in many of these protective coatings. They can probably only be discovered by

means of a patch test or by actual experience in the use of the cream. In that case, some other means of protection must be adopted, or the man assigned to other work.

The great proportion of creams now on the market appear to be reasonably free from any irritants or substances that are particularly likely to bring about an allergic reaction. The main thing is to select the one designed for the type of protection required.

These creams, we have found, are often considerably abused. Men seem to think, in many places, that the cream has to be applied in a coating that by its mechanical thickness to the naked eye will protect the skin. I have seen a man put on a quarter of a pound where half an inch squeezed out of a tube would probably have answered the purpose.

In that case, they often run into other difficulties. Many of these creams which protect from oil substances, are creams which have a soap base; the men are simply running around in a soap poultice, and they work up an irritation which is as great or in some cases greater than that which would have resulted from the exposure they sought to prevent.

In the oily cream preparations which protect from water soluble substances, they offer us very queer mixtures. Lanoline as a base, I think, is the thing of choice for that type of protection, rather than a petrolatum. It works a little further into the skin, I believe, and will protect in a more thorough manner than the petrolatum base preparations which just smear over the surface and are more easily rubbed off and fail in their protection.

Another thing to consider is, that the last word has certainly not been said on protective creams; they are in the process of rather rapid development. I believe there are commercially available many suitable types of protective creams, and, on the other hand, they can be made up for a specific purpose very satisfactorily on the advice of your physician. You can get a very satisfactory cream that can be produced in bulk for your own use.

Respiratory Protection

CHAIRMAN JOHNSON: We will continue the discussion of respira-

tory protection. In our examination of thousands of men, Dr. Sander has examined thousands which they know what they all mean. He has found that some of the men are protected by exhaust systems, the men are protected by protection, either filters of respiration.

I interpret respiratory mean the kind of respiration that you stick onto the face. Dr. Sander would examine whether or not he has examined the men the type of respirator has will actually protect the

DR. SANDER: Be blast, undoubtedly it met affords almost 100% for the prevention of silicosis if the helmet is kept in good condition and provided the air pressure the helmet is satisfactory.

In the observation of blast, in a seven-year yet to see the first one who had worked only with a helmet. Also, I have seen stage cases develop a silicosis during that time case has been kept at been shifted.

We feel that a satisfactory modern helmet is better than anyone else in the foundry, and there is certainly shifting him out onto his piece of respiratory giving him more dust at his sand blasting job.

As far as the other are concerned, of course, it is visible to exhaust which are a few occupations, exhausted satisfactorily, sand clumping, and must be done, it is advisable to wear the filter over, even there it is a other method of cleaning that is all that is feasible. Washing with high water and sand, and With ordinary stan-

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tory protection. In connection with the examination of thousands of foundry-men, Dr. Sander has explored the operations which they conduct so that he knows what they all mean. He of course has found that some of the men are protected by exhaust systems, and some of the men are protected by personal body protection, either filters or the airline type of respiration.

I interpret respiratory protection to mean the kind of respiratory protection that you stick onto the man. Of course, it is all respiratory protection, but I wonder if Dr. Sander would like to discuss whether or not he has found by the actual examination of men that the satisfactory type of respirator has been found which will actually protect the men.

DR. SANDER: Beginning with sand blasters, undoubtedly the modern air helmet affords almost 100 per cent protection for the prevention of silicosis, provided the helmet is kept in good working condition, and provided the air pressure coming into the helmet is satisfactory.

In the observation of about 300 sand blasters in a seven-year period I have yet to see the first one develop silicosis who had worked only with the modern helmet. Also, I have seen no so-called first-stage cases develop a second stage silicosis during that interval. A first-stage case has been kept at work; he has not been shifted.

We feel that a sand blaster with a modern helmet is breathing less dust than anyone else in the foundry as a matter of fact, and there is certainly no point in shifting him out onto the floor, removing his piece of respiratory protection and giving him more dust than he is getting at his sand blasting job.

As far as the other foundry operations are concerned, of course it is always advisable to exhaust when possible. There are a few occupations that cannot be exhausted satisfactorily. One of these is sand chipping, and where sand chipping must be done, it is advisable for the chipper to wear the filter respirators. However, even there it is advisable to try some other method of cleaning the casting if that is all that is feasible—for instance, washing with high pressure combined water and sand, and so forth.

With ordinary stand grinding, there is

no need of respiratory protection, provided an exhaust system is used and is in proper working condition.

The exhaust ventilation for swing grinders is a little more difficult, but it has been accomplished. There are very few swing grinders in Wisconsin that are exhausted, however. It has been our experience that swing grinders have not developed as much silicosis as was at first believed, and the reason probably is that by the time they get the castings there is no more molding sand on them. It has all been removed first in the grinding wheels with all the artificial abrasive, so the only silica the swing grinder is breathing is generally plant dust.

Molders and core makers need no special respiratory protection, in my opinion. A molder just could not do the job very well if he were required to wear a respirator from morning until night.

I do not think I would depend on a respirator for the protection of the man with the tuberculous scar. I would rather move him to some other job, or move his job somewhere else, or localize his job in a separate room and ventilate it.

I see no reason why we should worry about a sand blaster today, even with a tuberculous scar. We feel they are not going to develop silicosis, and therefore we think that what little dust there may be will have no effect on such a tuberculous scar. We have not permitted sand blasters with tuberculous scars to continue working on that job, but I think we should permit them to do so today, knowing that the hazard of sand blasting is controlled provided, of course, the equipment is kept in working condition.

CHAIRMAN JOHNSON: That dissertation answers beautifully the question of respiratory protection as far as it applies to the foundry, and I think direct analogy will carry that opinion over into almost any other exposure that you choose to carry it into.

In order to play absolutely fair with everyone in the audience, I am going to start on the questions that have come to me, and there are quite a number.

Here is the first question: Assuming that the development of adequate engin-

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engineering and medical departments is essential to properly control dust hazards, how can the smaller plants, those having 100 or 200 employees, cope with this problem and determine whether or not they have a hazardous dust condition or any other occupational disease condition? It would be impossible in many cases for these small plants to set up elaborate and expensive control departments.

To lead the answer in a definite direction, I am going to suggest that perhaps the answer lies in the recent development in almost every industrial state, divisions of occupational disease hygiene, either in the Department of Labor or the Department of Health. I am sure Dr. Leonard Greenburg would like to answer that question.

The Small Plant Problem

DR. GREENBURG: There are two things that the smaller plant may do: one is to make use of its insurance company to the fullest extent; and the second is to make use of such facilities as the state has at its disposal, either the Department of Labor or the Department of Health.

In approximately 30 states in the Union, there are divisions of industrial hygiene in either the Department of Labor or the Department of Health, and in a few cases in both, and they are always prepared and eager to help the smaller plant, particularly with such problems as this.

Many of the insurance companies have developed divisions of hygiene and have experts on their staff who are also prepared and able to render service along these lines. It seems to me that the biggest problem is to get the small plant management to recognize that the stumbling block is management itself. Once that recognition has been achieved, it is a relatively simple thing to obtain practically free service from either of these two organizations in an effort to really do constructive preventive work.

CHAIRMAN JOHNSON: Let me add one thought to that answer. I am familiar with most of those divisions. In none of them is there anybody carrying a big stick to browbeat or to hammer into shape the small plants that want help. They are already giving help in an advisory fashion.

There has been fear, at times, that you

could not let a state man into the plant without expecting him to change a recommendation into an order overnight. I have not seen that in this treatment of the occupational disease problem. I am not telling you that it does not exist; I say I have not seen it.

I have here a question for our engineers. Yesterday they were talking about welding metal and fume fever, and so forth. Here is the question: Does an exhaust system from electrical welding affect the type of weld?

As I view this question, it means this: When you weld with an electric welding process using a coated electrode, the fluxing of the coating produces an umbrella or tent over the weld arc itself and thereby excludes the air from the arc and prevents oxidation of the steel which is being cast into the hole being filled up, and prevents oxidation of any of the material or metal that is in the fused state.

Now the question is, if you stick a heavy exhaust there and pull away that vapor which provides the protection, do you ruin your weld? Is the control for health at the expense of the weld, or would it be better to forget that and limit the time of the welding?

Does anybody here want to answer that?

MR. BONSIB: I think that if you have general ventilation there would be very little danger of destroying that umbrella that Mr. Johnson has mentioned. Of course, it is advisable to remove those fumes as near the source of origin as possible. You have to get within eight inches, and not more than that, to really get efficient results, and being that close you do not require more than 100 or 200 lineal feet per million.

I do not think there is enough cooling action to do damage. As a matter of fact, some tests we were interested in making seemed to indicate that there was no damage done. However, you come where the damage would be done if you exceed that, but I do not think you need to exceed 100 or 200 lineal feet per million. If you have general ample ventilation, then you do not have any danger, in my opinion.

CHAIRMAN JOHNSON: That seems to be a logical conclusion. It is certainly an opinion based upon observation of the

sort of problem. Ti

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In other words, its refractory proper and its plasticity on descending order of the fire brick on through plastic chair on the other?

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MR. HAZARD: a medical question, fire bricks which a and certain others none or a negligible have a range there called a dangerous where you are prac exists.

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sort of problem. The next question is:

"Is there enough silica in the average fire brick to affect workers seriously?"

In other words, if we explore clay for its refractory property on the one hand, and its plasticity on the other, is there a descending order of silicosis hazard from the fire brick on the one side, down through plastic china clay or paper clay on the other?

Mr. Hazard, the questioner wants you to talk about the amount of hazard in the fire clay, and for want of a better definition let us leave out the Ganister brick which is a brick the sand of which we know to be pretty close to 100 per cent silica.

MR. HAZARD: I think this is really a medical question. But there are certain fire bricks which are very high in silica, and certain others which have practically none or a negligible amount in them. You have a range there from what might be called a dangerous condition, down to one where you are practically sure no danger exists.

It seems to me that if you had a fire brick with very high silica content, with the chipping and knocking of the brick-layer against the brick, it might stir up considerable dust and might be a silicosis hazard, but I would like to hear the medical side on that question.

CHAIRMAN JOHNSON: Will either of the doctors discuss the inherent toxicity of the fire clays as they are normally handled in the manufacture of brick?

DR. GREENBURG: It seems to me the Chairman ought to tell us what the percentage of free silica is in the fire clay. He has talked around the question, but he has not told us the crux of the whole problem.

CHAIRMAN JOHNSON: The problem seems to me to be related to the notion that maybe these mixtures are so mixed that other things beside the silica produce an alleviating or an ameliorating effect to prevent what silica there is from causing silicosis.

Clays do not seem to produce silicosis. It is the dry-grinding of all kinds of things that produces enormous quantities of dust some of which contain silica, and I cannot remember at this moment just what the amount of silica is in the ordinary

run of fire clays; but I am not giving the medical answer. It is my thought, that the hazard produced in the clay products is not an inherent one, but one thrown in by violent agitation due to dry grinding operations.

Let us go on to another interesting question: "To what extent are the industries with which this panel are familiar providing washing facilities, and what are the advantages of washing in showers, and so forth, accruing to the employees on the one hand, and the employer on the other, and how is the thing paid for?"

Well, we know that in some states, washing facilities are required by law in certain types of industries, and in others they are put in.

I can visualize the need to develop this question in two ways; one for the control of a serious occupational disease exposure such as lead; and the other, the general industrial hygiene, to get folks to wash on the developed fact that by careful washing a great many of the dermatitis problems solve themselves.

Will Dr. Cranch talk about the provision of washing facilities?

DR. CRANCH: Washing facilities are most desirable things in any plant, large or small. As the Chairman has said, it is the most important factor in the prevention of occupational dermatitis, to say nothing of general hygiene to the workmen.

The vicissitudes of trying to establish any adequate washing facilities in industry are great. My first experience occurred over forty years ago as a workman. In that plant there was no water available, although it was a large plant, and unless you sneaked from the job and went around to a faucet which was used for sprinkling the front lawn, you had no water available. It was not expected that hands should be washed. A man worked at his job, ate his lunch, worked all day and went home so black as a rule you could not tell his race.

Later I became much interested in the development of washing facilities. I remember in one very large plant we put in excellent washing facilities, and it was surprising to see how they were abused even to the point where in some cases we had to discontinue service in other or-

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ganizations, an attempt on the part of the management to furnish good washing facilities met with consistent refusal on the part of the workmen to cooperate with them in the use of these things; even where the workmen were given time out at full pay on company time to wash, they would not do it.

Fortunately, these conditions have changed, and the men themselves now appreciate those facilities where they are put in, and they generally demand them where they are not put in.

I think washing facilities are a most important feature in the control of occupational diseases, and a number of occupational conditions aside from dermatitis. There are a number of occupations where complete showers are furnished and those facilities are very largely a measure of prevention of occupational disease; and at the beginning of the day's work the men change to working clothes, where previously that was not done.

Oil Dermatitis

CHAIRMAN JOHNSON: Here is another question:

"Is it not an accepted fact that oil dermatitis is more of a mechanical breakdown of the skin than it is a toxic problem? How would you overcome the desire of the employees to use abrasive cleansers on the hands?"

Cutting oils and other oils produce dermatitis, and represent three hazards. One produces a plucking of the hair follicles, which is largely a mechanical thing of rubbing oil and dirt, or what have you, into the skin.

Then we have what I think the doctors call heterothema, which is probably a chemical burn, an irritation of the skin which is another type of dermatitis. Then there is a third one, which produces blood poisoning or boils where the oil has been supporting an infective medium bacteria of some sort.

Can we solve that oil contact problem by handling the washing of men in a satisfactory manner through washing facilities, and the discouragement of the use of harsh abrasive soaps, or doesn't it make any difference?

May we have a development of that question from Dr. Greenburg?

DR. GREENBURG: In dealing with the whole problem of dermatitis due to the use of cutting oil, you are dealing with several different factors which may produce different types of skin lesions. The cure for all of these, it seems to me, lies in the use of proper protective ointment before the men start work in the morning, and the washing up at the end of each shift with the proper type of non-irritating soap.

The easiest way to get the men to use a non-irritating soap is to supply one so they will not purchase an irritating soap themselves. If you leave it to them, they may purchase one which seems to work rapidly, but which may have irritating properties.

On the other hand, if the management supplies it, they can purchase one of suitable quality which in general may be of a more satisfactory type.

The whole problem of oil folliculitis and oil dermatitis can be handled and is handled in many plants on a very satisfactory basis, by these simple means, and so far as I can see does not present any insurmountable difficulties whatsoever. The usual defect in the system seems to be that the plant does not pay any attention to the problem until many of the men become infected and many of them have skins which are more or less ruined by an accumulation of oil and foreign matter in the pores of the skin.

At that time, preventive measures are no longer sufficient. It then becomes necessary really to cleanse the skin thoroughly and repeatedly so as to once again bring it back to its normal clean condition.

CHAIRMAN JOHNSON: Let us go over to the engineering side and talk on the industrialist who manufactures oils to provide himself a meal ticket and tries to prevent just this hazard from causing trouble.

MR. BONSIB: I agree with much that the doctor has said about getting good oil in the first place.

I think that one of the big causes (and we have studied this problem a lot for the reason that you hear many stories of injuries due to cutting oils) is that the oil

is not kept clean. In the case checked the trouble has been use of dirty oil, or using oil again that is filled with small metal. These cause small injuries to the skin, and that in turn brings further damage. So if you keep it clean, I do not think you will have it.

I think the practice of not cleaning the oil and using the oil again has caused much more of the so-called paraffin acne.

CHAIRMAN JOHNSON: The question is this: "Should working in departments subject to occupational disease hazard be acknowledged and informed of these hazards and ignorance of them?"

DR. SANDER: Undoubtedly employees should be informed of to which they are exposed, and they should be informed also of the foundation. Anyone going to his work for any reason whatsoever, without what was found. In the same way, a plant doctor going to a plant does not know what was found. He is not for the examination, but the difference, he is still a human being, he is interested in his own health, future years of fruitful employment.

The practice in Wisconsin examinations has been to give a duplicate copy of the report to the employer receives. The Wisconsin Commission recently declared of principles on examinations in industry which interested in this problem should that it is specifically requested that it is given a copy of the report the employer receives.

That is not a complete record, it is merely a statement of important defects. I believe it is wrong to give employees reports as it is to give them a blood pressure reading was today; he is merely interested in whether or not it is significant and that is all he cares about.

CHAIRMAN JOHNSON: Anybody else on the panel want to discuss the question?

MR. BONSIB: I think it is more unrest through fear.

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I think the practice of men spitting in the oil and using the oil over and over again has caused much more damage than the so-called paraffin acne.

CHAIRMAN JOHNSON: The next question is this: "Should employees working in departments subject to occupational disease hazard be acquainted with and informed of these hazards, or kept in ignorance of them?"

DR. SANDER: Undoubtedly, employees should be informed of every hazard to which they are exposed, and they should be informed also of the findings on examination. Anyone going to his doctor, for any reason whatsoever, wants to know what was found. In the same way, an employee going to a plant doctor wants to know what was found. He is not paying for the examination, but that makes no difference, he is still a human being who is interested in his own health and his future years of gainful employment.

The practice in Wisconsin with physical examinations has been to give employees a duplicate copy of the report which the employer receives. The Wisconsin Industrial Commission recently published a declaration of principles on physical examinations in industry which everyone interested in this problem should see. In that it is specifically requested that employees be given a copy of the report which the employer receives.

That is not a complete record or report; it is merely a statement or listing of the important defects. I believe that it is as wrong to give employees complete reports as it is to give them nothing at all. A worker is not interested in what his blood pressure reading was yesterday or is today; he is merely interested in knowing whether or not it is significantly high, and that is all he cares about.

CHAIRMAN JOHNSON: Is there anybody else on the panel who would like to discuss the question?

MR. BONSBIE: I think you can cause a lot of unrest through fear of failure to

tell the man, than in any other way. He may imagine he has something, and he worries and worries, and finally becomes a victim of what is known as autohypnosis, whatever that is.

I think by relieving his mind and telling him exactly what is what, you lift that worry from him and you ease his mind, all of which makes a better man of him.

CHAIRMAN JOHNSON: Now let us tackle another question: "Processing of a certain cellulose product involves overnight soaking in a solution of .5 per cent formaldehyde, and subsequently considerable formaldehyde odor is given off during the drying of which those in the vicinity often complain. How much formaldehyde would represent toxic proportions? And how could the quantity present in the air best be determined?"

Dr. Meiter, would you like to tackle that problem?

DR. MEITER: In my own experience, formaldehyde is irritating enough so that you would not require refined technical instruments to make determinations, because it is very easily noticeable in low concentrations. I think proper engineering methods could be devised for eliminating the fumes without using technical instruments, because it is necessary to keep the fumes down to very low concentration, otherwise a dermatitis may develop and also sore eyes.

CHAIRMAN JOHNSON: Does the medical side of our panel wish to develop that any farther?

DR. CRANCH: I think that question illustrates one of the phases where it is not necessary to have engineering help in order to determine whether or not you have reached a point of safety.

Formaldehyde vapors are not likely to be toxic, since in a concentrated form it is so irritating that just for comfort some relief would be demanded, so that we need not be particularly concerned about what concentration is obtained.

There are a number of chemicals of that sort, where the immediate effects are so irritating that toxic exposure would usually be avoided in the course of ordinary good practice in handling the material.

CHAIRMAN JOHNSON: Warren Cook says another thing.

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MR. COOK: The literature does contain some information concerning the development of irritative actions, and we are wondering in Connecticut whether the concentrations which were listed in the literature and the irritative action was associated with a tolerable amount of irritation, or whether it was in the higher degrees of irritation.

We ran some analyses on some formaldehyde gas in an operation where formaldehyde was being used in the manufacture of synthetic resin. The method we used was the bubbling of the air of the plant through water, with two bubblings in a series, and tested with Schiff's reagent, the regular method for the determination of formaldehyde; and we got results that were in the area of the breathing zone of less than 20 parts per million, which is usually suggested as a satisfactory concentration.

At one point we ran it up to 90 or 100 parts per million, and at that point I found I could keep my nose there for thirty seconds before I decided to back away from it.

But I do agree with Dr. Cranch and Dr. Meiter that where the irritation does get excessive, then the irritative gas can be taken as the determining factor even though with most of the materials the irritation is not the safe way to determine whether a gas condition is or is not safe.

CHAIRMAN JOHNSON: Here is another question:

"Is sulphur dioxide gas in concentrations as low as 10 parts per million for prolonged exposure considered hazardous to the health?"

Going to the medical side, will either Dr. Greenburg or Dr. Cranch tell us if sulphur dioxide in such low concentration represents a hazard for continuous exposure?

DR. GREENBURG: I cannot say off-hand. It is just about on the borderline, I think.

CHAIRMAN JOHNSON: Now, if an employee upon examination shows a very slight increase of lead content above normal after sixteen years of exposure, would you change his occupation?

I do not know what a "very slight" amount of lead is. I think presumably this means a few stipple cells, or some-

thing like that. If an employee upon examination shows a very slight increase of lead content above normal after sixteen years' exposure, would you change his occupation?

DR. GREENBURG: I would want to know where he showed it, and how.

CHAIRMAN JOHNSON: If I may answer the question, it seems logical that if there is lead showing up, it came from somewhere, and having explored that you can determine the engineering phase of the control, and perhaps he can stay on the job after you have controlled the lead fumes.

Mr. Cook, won't you answer the following question? "What instruments are there on the market which are reasonable in cost for small shops to purchase which can be used to check atmospheres in metal spray work for zinc, iron and other harmful fumes? Must several instruments be used where many types of metals are sprayed during a working day?"

Metal Spraying Equipment

MR. COOK: On metal spraying, there are several angles. No. 1, a booth, a ventilated booth should be used where possible. Secondly, the man should in most cases be given a positive pressure air supply.

Now, assuming that the particular operation is one in which the man may be spraying brass, there are various methods using the ventilated booth. Let us assume for the moment that he is provided with no respiratory protection. If a man is spraying zinc and the booth is providing adequate exhaust so there is not much of a cloud of zinc and he does not get metal fume fever, it is probable that it is not necessary to make any determination for zinc. If during the course of the day the man is spraying some lead and some cadmium, I would feel very definitely that it would be well to run an electrical precipitator sample, analyze the sample, and obtain the electric precipitation for lead and also for cadmium which would be a routine chemical procedure, and the concentration of both of those should be kept below the suggested toxic limit in order to assure that you are on the safe side.

I would feel that it would not be necessary to analyze for zinc under those con-

ditions, or for other of the metals. There is some additional one that is particularly toxic. But particularly you do have lead or cadmium, an examination should be made for them based upon those determinations. Get an idea on the basis of the duration of spraying of those metals what the exposure is.

DR. MEITER: I agree with you and I believe the solution of this is first, the use of a properly ventilated booth so as to eliminate the exposure of the other workmen in the vicinity.

The second item is the use of a pressure airline respirator to the operator. I think that conducting operations all over the shop without adequate equipment, where such metals as lead are sprayed, going to produce occupational disease. I believe the proper thing to do is right with the proper type of equipment by providing the booth and protection man, and you will then not need sampling devices.

CHAIRMAN JOHNSON: A specific answer to the question

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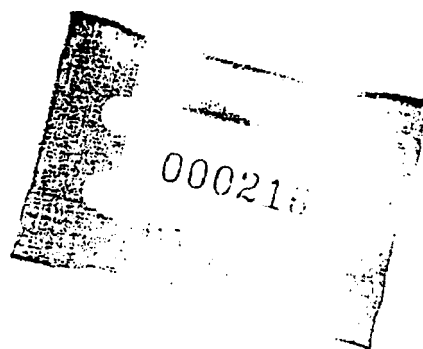
CHAIRMAN JOHNSON: Then the
specific answer to the question seems to

be the lead precipitator as the one gadget
that will be most useful, and the sample
should be analyzed quantitatively in the
chemical laboratory.

I want to ask the doctor a question in
connection with pre-employment medical
examinations. The exposure is something
that may cause dermatitis. I take it from
the question that the problem of allergy
arises. Do you recommend patch tests in
conjunction with pre-employment exami-
nations to determine an employee's pos-
sible allergy to the exposure?

DR. CRANCH: In general, I would
say you would hardly be warranted in con-
ducting patch tests on all applicants for
employment. Where we have a known
material to which the employee is being
exposed that very commonly produces an
allergy reaction, it might be advisable to
use such a filter. Patch tests are not 100
per cent infallible, and they are not alto-
gether simple. They have to be very care-
fully given and very carefully interpreted.
For that reason, they are not an integral
part of an average preliminary agreement
upon examination. They might be quite
misleading.

ADJOURNMENT



NEWS

no facilities were built into the original aircraft—are now the technique of international flying. They are basic to 171,871,000 over-water passengers without a fatal accident.

safety record of transoceanic continental air transport did not be the result of deliberate care-taking care, of endless research. Air travel, as we know it today, is a concept of this generation to make its way, from the competition with the matured forms of the older forms of transport to struggle with the principles of danger inherent in any type of travel—and we have the best known to man. But, because very reasons, more effort has been continuously and forcefully exerted to the standard of airline safety in any similar period of time on any other means of travel.

is extraordinary effort has not come from within the industry itself. The amazing results are, in a real sense, the tireless cooperation which the transport industry has received from agencies such as the National Committee for Aeronautics, the government's great research organization and the Civil Aeronautics Administration. The diligent efforts to effect the safety stand out as a signal of their first full year in operation, all having to do with aviation in the early recognition by the transport industry, of its responsibility to the public in the matter of safety. The combined elements all combine as ever today in their common support offers the promise that aviation can even be the safest form of travel.

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D. L. ROYER, Ocean Accident & Guarantee Corp., New York, N. Y.
R. E. SANFORD, General Electric Co., Schenectady, N. Y.
J. S. SHAW, Hercules Powder Co., Wilmington, Del.
C. W. SMITH, Standard Oil Co. (Ind.), Chicago, Ill.
H. S. SMITH, Union Carbide & Carbon Corp., New York, N. Y.
Z. F. THALNER, Buick Motor Co., Flint, Mich.
E. F. WHITING, Liberty Mutual Insurance Co., Boston, Mass.
PHILIP WILLIAMS, E. I. du Pont de Nemours & Co., Buffalo, N. Y. (Niagara Frontier Chapter)
WILLIAM P. YANT, Mine Safety Appliances Co., Pittsburgh, Pa.
President General Chairman

Officers 1939-1940

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Vice-Chairman—H. J. GRIFFITH, Jones & Laughlin Steel Corp., Pittsburgh, Pa.

Vice-Chairman—WILLS MACLACHLAN, Hydro Electric Power Commission, Toronto, Ont., Canada.

Secretary—W. DEAN KEEFER, National Safety Council, Inc., Chicago, Ill.

Members at Large—

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- CYRIL AINSWORTH, American Standards Association, New York, N. Y.
- J. L. BANASH, Consulting Engineer, Chicago, Ill.
- E. W. BECK, United States Rubber Co., New York, N. Y.
- H. R. BINLER, Union Carbide Co., New York, N. Y.
- C. B. BOULET, Wisconsin Public Service Corp., Milwaukee, Wis.
- E. W. BULLARD, E. D. Bullard Co., San Francisco, Calif. (San Francisco Chapter.)
- GEORGE M. BURNS, Kansas City Safety Council, Kansas City, Mo. (Kansas City Chapter.)
- FRANK J. CONROY, Union Carbide Co., Niagara Falls, N. Y. (Niagara Frontier Chapter.)
- THOS. R. DONOGHUE, Pittsburgh Plate Glass Co., Creighton, Pa. (Western Pennsylvania Safety Council Chapter.)
- R. E. DONOVAN, Standard Oil Co. of California, San Francisco, Calif.
- J. A. DOWNEY, JR., Sloss-Sheffield Steel & Iron Co., Birmingham, Ala. (Alabama Chapter.)
- CHARLES D. FARLIN, Consolidated Edison Co. of N. Y., New York, N. Y. (Metropolitan Chapter.)
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- ROY M. GODWIN, Philadelphia Electric Co., Philadelphia, Pa. (Philadelphia Chapter.)
- C. L. HIGHTOWER, United Gas Pipe Line Co., Houston, Texas (Gulf Coast Chapter.)
- R. McA. KEOWN, Industrial Commission of Wisconsin, Madison, Wis.
- EVERETT F. KING, Lever Brothers Co., Cambridge, Mass. (Boston Chapter.)
- THOMAS E. LIGHTFOOT, The Koppers Coal Co., Pittsburgh, Pa.
- M. G. LLOYD, National Bureau of Standards, Washington, D. C.
- J. E. LONG, The Delaware & Hudson Railroad Corp., Albany, N. Y.
- W. S. PAINE, Actna Casualty & Surety Co., Hartford, Conn.
- A. S. REGULA, Industrial Relations Counselors, Inc., New York, N. Y.
- A. V. ROHWEDER, Duluth, Missabe & Iron Range Railway Co., Duluth, Minn.
- D. L. ROYER, Ocean Accident & Guarantee Corp., New York, N. Y.
- G. E. SANFORD, General Electric Co., Schenectady, N. Y.
- J. S. SHAW, Hercules Powder Co., Wilmington, Del.
- C. W. SMITH, Standard Oil Co. (Ind.), Chicago, Ill.
- H. S. SMITH, Union Carbide Co., New York, N. Y.
- R. F. THALNER, Buick Motor Co., Flint, Mich.
- C. W. VAN WAGONER, Teachers & General Insurance Co., Dallas, Texas (Southwest Chapter.)
- S. E. WHITING, Liberty Mutual Insurance Co., Boston, Mass.
- WILLIAM P. YANT, Mine Safety Appliances Co., Pittsburgh, Pa.

*Past General Chairman

WEDNESDAY LUNCHEON SESSION

October 18, 1939

The Annual Meeting of the A.S.S.E.-Engineering Section of the National Safety Council followed a luncheon held in the Renaissance Room of the Ambassa-

dor Hotel. General Chairman R. E. Donovan, Chief Safety Engineer, Standard Oil Company of California, San Francisco, Calif., presided. Mimeographed copies of

committee reports were distributed to the assembled delegates.

The report of the Nominating Committee was presented by C. B. Boulet. Other members of the Nominating Committee were D. L. Royer, J. A. Downey, Jr., S. E. Whiting, and C. W. Van Wagoner. The names of the men elected

Detection of

Secretary, May

From the standpoint of safety, the concern is proving that important defects from physical defects or flaws that might cause failure.

In any discussion of flaws or defects, consideration must be given to the conditions surrounding the part in service, whether it is a newly made part or in service.

In new parts defects may exist in the metal itself in the form of laminations or slag. On the other hand, a metal free from such imperfections may be ruined by improper forging, grinding, heat treating and other manufacturing operations.

These defects may readily be detected at the mill or plant and it is, therefore, to prevent such parts from going into service.

Used parts present a different type of defect usually suspected in the form of a crack. The nature of the surface, or one extending to the surface well down in the body of the metal, commonly termed a crack.

This crack may be of such a nature as to defy detection by the ordinary methods of inspection. It is a most dangerous type of defect in that such a part is permitted to go into service, failure is likely to result.

Cracks in used parts are usually the result of faulty design or poor workmanship. They are more likely the result of excessive stresses.

It is a known fact that any serious crack in a body is considered a failure, regardless of depth, it is the point of excess stress.

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Cement and Quarry Section

Officers 1938-1939

General Chairman—FRED B. HUNT, Dewey Portland Cement Co., Davenport, Iowa.
Vice-Chairman—P. N. BUSHNELL, Missouri Portland Cement Co., St. Louis, Mo.
Vice-Chairman—TH. AVNSOE, Lone Star Cement Corp., New York, N. Y.
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News Letter Editor—JACK DEMESTER, Canada Cement Co., Ltd., Montreal, P. Q., Canada.
Engineering Committee Chairman—WM. MOELLER, Lone Star Cement Corp., Dallas, Texas.
Highway Committee Chairman—M. A. KOFFMAN, Southwestern Portland Cement Co., Los Angeles, Calif.
Membership Committee Chairman—*H. A. REXINGER, Lehigh Portland Cement Co., Allentown, Pa.
Patent Committee Chairman—H. F. YOTTER, The General Crushed Stone Co., Easton, Pa.
Program Committee Chairman—W. M. POWELL, Medusa Portland Cement Co., Cleveland, Ohio.
Publicity Committee Chairman—M. P. GREER, Marquette Cement Manufacturing Co., Cape Girardeau, Mo.
Statistics Committee Chairman—W. W. ADAMS, U. S. Bureau of Mines, Washington, D. C.
Members at Large—
 V. P. AHEARN, National Sand & Gravel Assn., Washington, D. C.
 *WM. H. BAKER, J. E. Baker Co., York, Pa.
 E. D. BARRY, Universal Atlas Cement Co., Chicago, Ill.
 J. R. BOYD, National Crushed Stone Assn., Inc., Washington, D. C.
 *R. B. FORTIN, Pennsylvania-Dixie Cement Corp., Nazareth, Pa.
 *ALEXANDER FOSTER, Jr., Warner Co., Philadelphia, Pa.
 O. M. GRAVES, The General Crushed Stone Co., Easton, Pa.
 E. POSSELT, Lone Star Cement Corp., New York, N. Y.
 S. W. STAUFFER, National Lime Assn., Washington, D. C.
 *F. E. TOWN, Medusa Portland Cement Co., Manitowoc, Wis.
 *A. L. WORTHEN, The New Haven Trap Rock Co., New Haven, Conn.
 J. B. ZOOK, Great Lakes Portland Cement Corp., Buffalo, N. Y.
Past General Chairman

Officers 1939-1940

General Chairman—P. N. BUSHNELL, Missouri Portland Cement Co., St. Louis, Mo.
Vice-Chairman—R. A. FETTMAR, Universal Atlas Cement Co., Hudson, N. Y.
Vice-Chairman—O. M. GRAVES, The General Crushed Stone Co., Easton, Pa.
Secretary—A. J. R. CURTIS, Portland Cement Assn., Chicago, Ill.
News Letter Editor—JACK DEMESTER, Canada Cement Co., Ltd., Montreal, P. Q., Canada.
Engineering Committee Chairman—J. B. ZOOK, Great Lakes Portland Cement Corp., Buffalo, N. Y.
Membership Committee Chairman—*HENRY A. REXINGER, Lehigh Portland Cement Co., Allentown, Pa.
Patent Committee Chairman—H. F. YOTTER, The General Crushed Stone Co., Easton, Pa.
Publicity Committee Chairman—DAVID ADAMS, Lawrence Portland Cement Co., Norristown, Pa.
Statistics Committee Chairman—W. W. ADAMS, U. S. Bureau of Mines, Washington, D. C.

Members at Large—

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 *W. H. BAKER, J. E. Baker Co., York, Pa.
 E. D. BARRY, Universal Mills Cement Co., New York, N. Y.
 J. R. BOYD, National Crushed Stone Assn., Inc., Washington, D. C.
 *R. B. FORTUN, Pennsylvania-Lixie Cement Corp., Nazareth, Pa.
 *ALEXANDER FOSTER JR., Warner Co., Philadelphia, Pa.
 *F. B. HUNT, Dewey Portland Cement Co., Davenport, Iowa
 S. W. STAUFFER, National Lime Assn., Washington, D. C.
 *F. E. TOWN, Medusa Portland Cement Co., Manitowoc, Wis.
 *A. L. WORTHEN, The New Haven Trap Rock Co., New Haven, Conn.
 Past General Chairman

TUESDAY AFTERNOON SESSION

October 17, 1939

The opening session of the Cement and Quarry Section was called to order by P. N. Bushnell, Missouri Portland Cement Company, St. Louis, Mo., and Vice-Chairman of the Section, who presided. Mr. Bushnell

made a brief report upon activities of the Section during the year, and then proceeded with the election of officers, a list of which is given above. The Chairman then introduced the first speaker.

Analysis of Cement and Quarry Accident Experience

By I. F. LE GORE

Safety Engineer, Portland Cement Association, Chicago

There seems to be no question that 1939 will be the safest year in cement industry history. And there is reason to believe that the new low accident frequency rate will keep Cement in the position it has held for the past two years as the second safest among 30 industries reporting to the National Safety Council.

The cement industry "got on the pressure" during the first half with gratifying results, and saw the accident trend continue the downward course which has been uninterrupted since late in 1936. The accident frequency rate, or score, for the first half of 1939 was 4.00 per million man hours; the severity rate was at the unprecedented low level of 1.42. This frequency rate was 13 per cent lower than the rate of 4.61 for the year 1938; the severity rate was 42 per cent lower than last year's rate of 2.44.

At the end of the third quarter the industry had slipped a bit. A new high for the year of 18 accidents was reported during August, and 19 injuries were reported in September.

With operations continuing about 18 per cent above last year, the average of accidents reported for 8 months had advanced to 14, exactly the same as the average for the first 8 months last year. This was for 130 plants, however, compared with 118 plants previously.

Greater mill activity appears not to have been responsible for the rising tide during the past two months, for August activity was only 3.5 per cent above production for the Campaign month of June, according to data from the U. S. Bureau of Mines. As yet there were 80 per cent more accidents in August and September than there were in June.

"Pressure" Was Applied

Most of you are familiar with the annual June No-Accident Campaign sponsored by the Portland Cement Association, which has contributed much to our industry's safety progress. The 1939 Campaign covered the 3-month period of April, May and June, and was the first time three months were responsible for

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Chemical Section

Officers 1938-1939

General Chairman—RALPH L. ROGERS, JR., Tennessee Eastman Corp., Kingsport, Tenn.
Vice-Chairman in Charge of Program—RALPH O. KEEFER, Aluminum Co. of America, Pittsburgh, Pa.
Secretary—F. W. DENNIS, Hooker Electrochemical Co., Niagara Falls, N. Y.
News Letter Editor—R. S. MACKIE, General Electric Co., Nela Park, Cleveland, Ohio.
Data Sheet Committee Chairman—S. WARZALA, The Calco Chemical Co., Inc., Bound Brook, N. J.
Engineering Committee Chairman—D. S. McEACHERN, American Cyanamid Co., New York, N. Y.
Health Committee Chairman—*DR. LEONARD GREENBURG, New York State Dept. of Labor, New York, N. Y.
Membership Committee Chairman—C. E. SEVRENS, Monsanto Chemical Co., Merrimac Div., Everett, Mass.
Poster Committee Chairman—H. R. BIXLER, Union Carbide Co., New York, N. Y.
Publicity Committee Chairman—S. D. KIRKPATRICK, Chemical & Metallurgical Engineering, New York, N. Y.
Safety Instruction Card Committee Chairman—E. F. KING, Lever Brothers Co., Cambridge, Mass.
Statistics & Contest Committee Chairman—R. C. STRATTON, The Travelers Insurance Co., Hartford, Conn.

Members at Large—

*A. L. ARMSTRONG, Eastman Kodak Co., Rochester, N. Y.
 O. C. CALLENDAR, Hiram Walker & Sons, Inc., Peoria, Ill.
 JOHN CLEMENTS, Michigan Alkali Co., Wyandotte, Mich.
 S. W. GURNEY, Liberty Mutual Insurance Co., Boston, Mass.
 W. L. HAMMERSLEY, Electric Storage Battery Co., Philadelphia, Pa.
 H. P. HECNER, The Flintkote Co., New York, N. Y.
 F. W. JETTER, The Westvaco Chlorine Products Corp., Carteret, N. J.
 *H. L. MIER, E. I. du Pont de Nemours & Co., Wilmington, Del.
 *JOHN ROACH, Deputy Commissioner of Labor, Jersey City, N. J.
 K. E. ROOF, Willard Storage Battery Co., Cleveland, Ohio.
 *U. S. SHAW, Hercules Powder Co., Wilmington, Del.
 *A. L. WATSON, Koppers United Co., Pittsburgh, Pa.
 *FREDERICK WHEELER, American Cyanamid Co., Linden, N. J.
 *S. E. WHITING, Liberty Mutual Insurance Co., Boston, Mass.
 *CAROL M. BROWN, Niagara Alkali Co., Niagara Falls, N. Y.
Past General Chairman

Officers 1939-1940

General Chairman—RALPH O. KEEFER, Aluminum Co. of America, Pittsburgh, Pa.
Vice-Chairman in Charge of Program—STANLEY WARZALA, The Calco Chemical Co., Inc., Bound Brook, N. J.
Secretary—F. W. DENNIS, Hooker Electrochemical Co., Niagara Falls, N. Y.
News Letter Editor—S. W. GURNEY (Chairman), Liberty Mutual Insurance Co., Boston, Mass.

- *A. L. ARMSTRONG, Eastman Kodak Co., Rochester, N. Y.
 *R. S. MACKIE, General Electric Co., Nela Park, Cleveland, Ohio.
 *P. V. TILDEN, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.
Engineering Committee—D. S. McEACHERN (Chairman), American Cyanamid Co., New York, N. Y.
 *F. W. JERICK, The Westvaco Chlorine Products Corp., Carteret, N. J.
 *S. E. WHITING, Liberty Mutual Insurance Co., Boston, Mass.
Data Sheet Committee—PLUMER WHEELER (Chairman), American Cyanamid Co., New York, N. Y.
 *S. M. MACCUTCHEON, The Dow Chemical Co., Midland, Mich.
Health Committee—DR. LEONARD GREENBURG (Chairman), New York State Department of Labor, New York, N. Y.
 *J. S. SHAW, Hercules Powder Co., Wilmington, Del.
Membership Committee—C. E. SEVRENS (Chairman), Monsanto Chemical Co., Meriden, Conn.
 *W. L. HAMMERLEY, Electric Storage Battery Co., Philadelphia, Pa.
Poster Committee—H. R. BIXLER (Chairman), Union Carbide Co., New York, N. Y.
 *JOHN CLEMENTS, Michigan Alkali Co., Wyandotte, Mich.
 *RALPH L. ROGERS, JR., Tennessee Eastman Corp., Kingsport, Tenn.
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 *JOHN ROACH, Deputy Commissioner of Labor, Jersey City, N. J.
 *K. E. ROOF, Willard Storage Battery Co., Cleveland, Ohio.
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 *H. L. MINER, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.
 *Past General Chairman

TUESDAY LUNCHEON SESSION

October 17, 1939

The opening session of the Chemical Section was a luncheon feature, presided over by General Chairman Ralph L. Rogers, Jr., Safety Director of the Tennessee Eastman

Corporation, Kingsport, Tenn. Chairman Rogers briefly introduced the speaker of the occasion, a celebrated hunter of African game.

Safety to Life in Africa

By M. NORMAN POWELL

Kenya Colony, British East Africa

(Editorial Note: Mr. Powell was born in Africa, from early boyhood has lived in the heart of the big game country. The natives were his playmates and his friends. He has learned their folklore, customs, and beliefs. He was initiated as a warrior into the Suk Tribe and has made many exten-

sive trips into the more primitive parts of Africa. He will tell of the protective methods and safeguards adopted not only by the white people, but also by the native and animals to safeguard life and prevent injury to themselves and others. The following is a summary of his talk.)

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 ...constructive thinki...
 ...and effective exer...
 ...whether or not the probi...
 ...adequate mechanical...
 ...protective equipmen...
 ...efficient operating...
 ...and supervising empl...
 ...they know how, and do...
 ...but not least, profiti...
 ...the lessons learned from sa...
 ...experience.

...constructive thinking then, in...
 ...experience, knowledge of...
 ...include, for untrained in...
 ...

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 ...be called a safety expert...
 ...of life which, since I...
 ...has been endangered by n...
 ...wards, I have learned the va...
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 ...an African wilderness, w...
 ...accident may result in d...
 ...ences, owing to the difficulty...
 ...help.

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 ...lanked on the shores of the A...
 ...ent. For month upon mon...
 ...battled unknown and storm...
 ...Therefore, in spite of the desc...
 ...this rocky coast presented, to...
 ...the Cape of Good Hope. Th...
 ...solders of His Majesty's Ar...
 ...through the Matebele, Zulu, an...
 ...because of their pioneering...
 ...stayed on when the conflicts...
 ...firm determination carried...
 ...into the hinterland. Not only...
 ...humanity, but because of the...
 ...facts that would shadow thei...
 ...could not afford to lose one m...
 ...were great, making them const...
 ...ers.

After the World War, my...
 ...to British East Africa, wher...
 ...to know and think with and lik...
 ...people.

My whole life, especially on...
 ...has depended on effective ex...
 ...ence with a buffalo or eleph...
 ...eldom get the chance to lo...

...devices and methods...
 ...can trucks are almost...
 ...from sad and costl...

000222

N. WHITING: Will any
some practical way of get-
ing of the union? I know
they have backed the safety
particular trades—and sit.

It is written into some of
between the union and the
safety is featured there. The
ing it in.

FER: Do they appoint
from their group?

N: Safety is handled just
her phases or conditions of
eral contracts (I reviewed
year that are published in
nt of Labor in Washington
riably one of the important
in them.

N. WHITING: Is it or
more than a name?

W: It is like everything else
v. 1. is taking root.

FER: Would you personally
Mr. Shaw, that a union at
an in its group perhaps to
agement on the question
—give him one responsibility.

W: Not any more than
him sit in with management
phases of management
safety out by itself. Let
ling conditions so that
ful and safe, and the
the rates of pay are all
cent. Some of the agree-
n's agreements and they
ame are signed, and
safety appears firm.

N. WHITING: Is
safety committee?

V: Yes, they will
friendly basis of

Construction Section

Officers 1938-1939

General Chairman—W. A. SNOW, Associated General Contractors of America, Inc., Wash-
ington, D. C.
Vice-Chairman for Heavy Construction—R. J. REIGELUTH, C. W. Blakeslee & Sons, New
Haven, Conn.
Vice-Chairman for Highway Construction—S. E. ANDERSON, Harrison Construction Co.,
Pittsburgh, Pa.
Vice-Chairman for U. S. Engineer Department—MAJOR H. B. VAUGHAN, JR., Corps of
Engineers, War Dept., Washington, D. C.
Vice-Chairman for Building Construction—C. H. BLACK, Stone & Webster Engineering
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Secretary—ROBERT MCKINLEY, General Accident Fire & Life Assurance Corp., Detroit,
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News Letter Editor—EDGAR N. GOLDSTEIN, 232-30th Ave., San Francisco, Calif.
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Membership Committee Chairman—F. J. CRANDELL, Liberty Mutual Insurance Co., Boston,
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Program Committee Chairman—JOHN RUSSELL, Public Service Electric & Gas Co.,
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Statistics Committee Chairman—THOMAS SABLE, Industrial Indemnity Exchange, San Fran-
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Visual Education Committee Chairman—S. M. LAUDERDALE, Civilian Conservation Corps,
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Past General Chairman

Officers 1939-1940

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Vice-Chairman for Highway Construction—S. E. ANDERSON, Harrison Construction Co.,
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Vice-Chairman for U. S. Engineer Department—MAJOR H. B. VAUGHAN, JR., Corps
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Vice-Chairman for Building Construction—E. PITOU, Chesbrough, Whitman Co., Inc., Los
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Secretary—W. A. SNOW, Associated General Contractors of America, Inc., Wash-
ington, D. C.
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Membership Committee Chairman—JOHN RUSSELL, Public Service Electric & Gas Co.,
Newark, N. J.
Statistics Committee Chairman—R. C. HAZARD, Koppers Co., Sanborn, Pa.

Visual Education Committee Chairman—S. M. LAUDERDALE, Civilian Conservation Corps, Washington, D. C.

Engineering Committee—C. H. BLACK (Chairman), Stone & Webster Engineering Corp., Boston, Mass.

JAMES A. BURBANK, The Travelers Insurance Co., Hartford, Conn.

F. J. CRANDELL, Liberty Mutual Insurance Co., Boston, Mass.

ROBERT MCKINLEY, General Accident Fire & Life Assurance Corp., Detroit, Mich.

THOMAS SOULE, Industrial Indemnity Exchange, San Francisco, Calif.

*Past General Chairman

TUESDAY AFTERNOON SESSION

October 17, 1939

The opening session of the Construction Section was called to order by R. J. Reigeluth, Vice-President, C. W. Blakeslee & Sons, New Haven, Conn., Vice-Chairman

of the Section, who presided. Chairman Reigeluth welcomed the assembled delegates and then introduced the speakers, as follows:

What Are Our Accident Statistics for 1938?

By THOMAS SOULE

Chief Engineer, Industrial Indemnity Exchange, San Francisco, Cal.

These facts and figures appear of interest in examining the 1938 accident rates in the Construction Industry as reported by members of the National Safety Council:

The Construction Industry Frequency Rate is..... 24.93
The Construction Industry Severity Rate is..... 3.24

These rates are about twice the average for National Safety Council members in 30 major industries reporting their experience.

Since 1925, the Construction Industry frequency rate was reduced 75 per cent; the Construction Industry severity rate was reduced 71 per cent; while the all industries frequency rate was reduced 68 per cent, and the all industries severity rate was reduced 44 per cent.

The respective reductions for the Construction Industry from 1937 to 1938 were 31 per cent and 6 per cent, as against 16 per cent and 5 per cent for all industries.

Credit for improvement in the Construction Industry's 1938 accident experience is due largely to the favorable experience in large organizations. They reduced both frequency and severity rates substantially,

whereas severity rates rose 35 per cent in small organizations.

The average frequency rate for large companies was 17.96, while that for small units was 49.80, the small unit being defined as having less than 100 employees. The smaller organizations had an average severity rate of 12.31 as against 2.64 for the large companies.

The best all time no injury records and the Honor Roll for 1938 in the National Safety Council Publication "Accident Facts in the Construction Industry 1938" contain the names of the construction departments of an oil company, several industrial plants, a public utility, as well as several districts of the U. S. Engineer Department engaged in river and harbor work and the Tennessee Valley Authority. Construction companies for the most part, are conspicuous by their absence. The honored organization provided about one-third of the man hours worked and very materially lowered the accident rate figures developed for the entire group. In one classification, as an illustration, the removal of the construction department from the industrial organization would doubtless have lowered the accident frequency for the balance of the group.

The lowest 1938 frequency rates were lowest in river and harbor work. Severity rates were lowest in construction, averaging 2.00. Rates were highest in lock construction and in steel erection of structural steel fire and severity 30.09.

In a series of 117 serious Construction Industry reports, these percentages were:

Agencies of Injury

Elevators and hoisting equipment
Machinery
Working surfaces (ladders, etc.)
Vehicles
Hand tools
Not otherwise specified

Type of Accidents

Falling, sliding, flying of objects in or between
Falls, one level to another
Exhaustion, absorption, stress (acute action)
Not otherwise classified

Mechanical Causes

Unsafe planning, work
Poor housekeeping, ...
Improper guarding
Ineffective agencies
Non-use of protective equipment
Mechanical cause

Personnel

Proper attitudes

Principal Engineering

The largest and most important part of the construction industry is the building of new construction of the operation of the work of dredging. Some of the

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Marine Section

Officers 1938-1939

General Chairman—BYRON O. PICKARD, Pacific Coast Marine Association, San Francisco, Calif.
Advisory Committee (Active Past General Chairmen)—E. C. HOLDEN, JR. (*Chairman*), United States P. & I. Agency, Inc., New York, N. Y.
 E. W. FISKE, JR., Socony-Vacuum Oil Co., Inc., New York, N. Y.
 FRANK H. COGAN, The Delaware, Lackawanna & Western R. R. Co., Hoboken, N. J.
 JOHN S. HUNTER, The Atlantic Refining Co., Philadelphia, Pa.
 ARTHUR M. TODD, Consulting Marine Engineer, New York, N. Y.
Chairman Atlantic District—J. P. RONEY, The Texas Co., New York, N. Y.
Vice-Chairman Atlantic District—WILLARD F. JONES, Gulf Oil Refining Co., New York, N. Y.
Chairman Pacific District (Editor, "Marine Safety")—HENRY BLACKSTONE, United States P. & I. Agency, Inc., San Francisco, Calif.
Vice-Chairman Pacific District—ALBERT O. PEGG, Union Oil Co. of Calif., Wilmington, Calif.
Chairman Gulf District—FRANK E. AMES, Lykes Bros. Steamship Co., New Orleans, La.
Vice-Chairman Gulf District—L. B. PATE, Mississippi Shipping Co., Inc., New Orleans, La.
Chairman Great Lakes District—W. C. GARRUTT, Pittsburgh Steamship Co., Cleveland, Ohio.
Vice-Chairman Great Lakes District—GEORGE MARTINSON, Pickands Mather & Co., Cleveland, Ohio.
Chairman Shipbuilding and Repair Division—H. C. HOUTATION, Bethlehem Shipbuilding Co., Bethlehem, Pa.
Vice-Chairman (In Charge of Posters and Slides)—ROBERT F. HANB, Standard Oil Co. of N. J., New York, N. Y.
Vice-Chairman (In Charge of Programs)—LOGAN CHESAP, Ishmian Steamship Co., New York, N. Y.
Vice-Chairman (In Charge of Publicity)—HAROLD J. HARKING, Marine Progress, New York, N. Y.
Secretary—L. J. COUGHLIN, American Export Lines, New York, N. Y.
Membership Committee Chairman—CARL E. HOLMES, Mars' & McLennan, New York, N. Y.
Resolving Committee Chairman—JOHN W. McGRATH, John W. McGrath Corp., New York, N. Y.
Statistics Committee Chairman—BENJAMIN H. SELF, Travelers Insurance Co., New York, N. Y.
Engineering Committee Chairman—W. P. BIGGS, U. S. Navy Dept., Washington, D. C.
Members at Large—
Passenger & Cargo Lines—N. T. LAWRENCE (*Chairman*), United States Lines Co., New York, N. Y.
 ROBERT C. LEE, Moore & McCormack Lines, Inc., New York, N. Y.
 F. J. TONEY, United States Lines Co., New York, N. Y.
 N. S. STOUTEN, Lykes Bros. Steamship Co., New Orleans, La.
 J. E. HART, Mississippi Shipping Co., New Orleans, La.
 JOHN WILSON, American Export Lines, New York, N. Y.
 THOS. BLAIR, Grace Line, Inc., New York, N. Y.
 S. A. SCHWAB, Black Diamond Steamship Co., Wickawick.

Tanker Companies—J. G. JOHNSON (Chairman), Sinclair Navigation Co., New York, N. Y.

HENRY J. HEIDORN, Standard Oil Co. of N. J., Marine Dept., New York, N. Y.

R. K. KELLY, Tide Water Associated Oil Co., New York, N. Y.

A. M. MCKEAN, Pan-American Petroleum & Transport Co., New York, N. Y.

HENRY GILBERT, Oil Transfer Corp., New York, N. Y.

FRANK C. LAURIE, Lago Petroleum Corp., Maracaibo, Venezuela.

J. A. RUMSEY, Standard Oil Co. of Calif., Richmond, Calif.

A. O. WOLL, General Petroleum Corp. of Calif., Terminal Island, Calif.

Educational (Marine)—J. M. TOMB, New York State Merchant Marine Academy, New York, N. Y.

H. L. SEWARD, Yale University, New Haven, Conn.

Stevedores—JOHN W. McGRATH (Chairman), John W. McGrath Corp., New York, N. Y.

WILLIAM H. CLARK, John T. Clark & Son, New York, N. Y.

The Jarka Corp., New York, N. Y.

Shipbuilding and Ship Repair Companies—H. C. HOUGHTON (Chairman), Bethlehem Shipbuilding Co., Bethlehem, Pa.

J. H. LOVE, Federal Shipbuilding & Dry Dock Co., Kearny, N. J.

J. M. GRISER, Alabama Dry Dock & Shipbuilding Co., Mobile, Ala.

L. R. SORENSON, Newport News Shipbuilding & Dry Dock Co., Newport News, Va.

Marine Insurance—A. J. SMITH, Marine Office of America, New York, N. Y.

Railroads—FRANK H. COGAN (Chairman), The Delaware, Lackawanna & Western R. Co., Hoboken, N. J.

C. F. BLACKTON, Erie Railroad Co., Jersey City, N. J.

L. KELYEA, New York Central Lines, New York, N. Y.

Ship Classification Society—J. L. LUCKENBACH, American Bureau of Shipping, New York, N. Y.

Employers' Associations—F. C. GREGORY, Waterfront Employers' Assn., San Francisco, Calif.

U. S. Employees' Compensation Commission—E. P. HERGES, U. S. Employees' Compensation Commission, Washington, D. C.

U. S. Engineers—MAJOR H. B. VAUGHAN, JR., Corps of Engineers, War Dept., Washington, D. C.

Legal—CARL E. VANDER CLUTE, Admiralty Attorney, New York, N. Y.

Officers 1939-1940

General Chairman—BYRON O. PICKARD, Waterfront Employers' Association of the Pacific Coast, San Francisco, Calif.

Advisory Committee—F. C. HOLDEN, JR., United States P. & I. Agency, Inc., New York, N. Y.

E. W. FISKE, Inc., Socony-Vacuum Oil Co., Inc., New York, N. Y.

FRANK H. COGAN, The Delaware, Lackawanna & Western R. R. Co., Hoboken, N. J.

JOHN S. HUNTER, The Atlantic Refining Co., Philadelphia, Pa.

ARTHUR M. T. LE, Consulting Marine Eng., New York, N. Y.

Vice-General Chairman (Executive)—R. J. BAKER, American Merchant Marine Institute, Inc., New York, N. Y.

Vice-General Chairman (Membership)—T. E. BUCHANAN, The Texas Co., New York, N. Y.

Vice-General Chairman (Coordination)—HENRY J. HEIDORN, Standard Oil Co. of N. J., New York, N. Y.

Vice-General Chairman (Programs)—CARL E. HOLMES, H. H. Wagoner & McLeish, Inc., New York, N. Y.

Vice-General Chairman (Coastal Regions)—Rear Admiral R. H. WALKER, United States Coast Guard, Washington, D. C.

Editor, "Marine Safe"

Inc., San Francisco, Calif.

Secretary—W. P. DICK

Chairman, Atlantic L

Vice-Chairman, Atlan

Chairman, Pacific D

San Pedro, Calif.

Vice-Chairman, Pacif

Chairman, Gulf Distr

Vice-Chairman, Gulf

Chairman, Great Lak

Ohio.

Vice-Chairman, Great

land, Ohio.

Chairman, River Dis

Vice-Chairman, River

Pa.

Chairman, All Inland

Dept., Washington.

Chairman, Shipbuildi

Corp., Bethlehem, P.

Chairman, Committee

ress, New York, N.

Chairman, Committee

of the Port o

Chairman, Committee

U.S.N. (Retired), P.

Chairman, Committee

Office of America, N

Chairman, Statistics (

York, N. Y.

Chairman, Marine Ea

Conn.

Vice-Chairman, Marin

Association of San I

Chairman, Industrial

San Francisco, Calif

Chairman, Stevedorin

mission, Washington

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air Navigation Co., New York
me Dept., New York, N. Y.
k, N. Y.
port Co., New York, N. Y.

Venezuela.
alif.
ual Island, Calif.
Merchant Marine Academy, N.

McGrath Corp., New York, N. Y.

on (Chairman), Bethlehem S.

ny, N. J.
Mobile, Ala.
Dock Co., Newport News, Va.
New York, N. Y.
Lackawanna & Western R.

Bureau of Shipping, New York

Employers' Assn., San Francisco

es, U. S. Employees' Com-

(Engineers, War Dept., Wash-

York, N. Y.

ers' Association of the P.

& I. Agency, Inc., New York

k, N. Y.

ern R. R. Co., Hoboken, N. J.

Y.

n Merchant Marine

The Texas Co., New York

Standard Oil Co., New York

Sh & McLennan, New York

H. Walsome, New York

Editor, "Marine Safety" News Letter—HENRY BLACKSTONE, United States P. & I. Agency, Inc., San Francisco, Calif.

Secretary—W. P. BIGGS, U. S. Navy Dept., Washington, D. C.

Chairman, Atlantic District—J. P. RONEY, The Texas Co., New York, N. Y. (Retired)

Chairman, Atlantic District—WILLARD F. JONES, Gulf Oil Corp., New York, N. Y.

Chairman, Pacific District—FRANCIS J. MCGOWEN, Outer Harbor Dock & Wharf Co., San Pedro, Calif.

Chairman, Pacific District—GEORGE W. ALBIN, Ames Terminal Co., Seattle, Wash.

Chairman, Gulf District—FRANK E. AMES, Lykes Bros. Steamship Co., New Orleans, La.

Chairman, Gulf District—L. B. PATE, Mississippi Shipping Co., Inc., New Orleans, La.

Chairman, Great Lakes District—W. C. GARBUTT, Pittsburgh Steamship Co., Cleveland, Ohio.

Chairman, Great Lakes District—GEORGE MARTINSON, Pickands Mather & Co., Cleveland, Ohio.

Chairman, River Districts—G. O. GRIFFIN, Dravo Corp., Neville Island, Pittsburgh, Pa.

Chairman, River Districts—JOSEPH E. JACKMAN, McCrady-Rodgers Co., Pittsburgh, Pa.

Chairman, All Inland Waterways—MAJOR H. B. VAUGHAN, JR., Corps of Engineers, War Dept., Washington, D. C.

Chairman, Shipbuilding and Ship Repair Division—H. C. HOUGHTON, Bethlehem Steel Corp., Bethlehem, Pa.

Chairman, Committee on Publicity and Publications—HAROLD J. HARDING, Marine Progress, New York, N. Y.

Chairman, Committee on Maritime Associations—C. H. CALLAGHAN, The Maritime Association of the Port of New York, New York, N. Y.

Chairman, Committee on United States Government Bureaus—Commander R. S. Field, U. S. N. (Retired), Bureau of Marine Inspection and Navigation, Washington, D. C.

Chairman, Committee on Engineering and Minimum Standards—A. J. SMITH, Marine Office of America, New York, N. Y.

Chairman, Statistics Committee—BENJAMIN H. SELF, The Travelers Insurance Co., New York, N. Y.

Chairman, Marine Education Committee—H. L. SEWARD, Yale University, New Haven, Conn.

Chairman, Marine Education Committee—F. C. GREGORY, Waterfront Employers' Association of San Francisco, San Francisco, Calif.

Chairman, Industrial Relations Committee—R. E. DONOVAN, Standard Oil Co. of Calif., San Francisco, Calif.

Chairman, Stevedoring Committee—R. P. HERGES, U. S. Employees' Compensation Commission, Washington, D. C.

MONDAY AFTERNOON SESSION

October 16, 1939

The first session of the Marine Section was called to order by General Chairman D. D. Pickard, Chief Safety Engineer, Employers Association of the Coast, San Francisco. Chairman made a lengthy report of the activities of the Section during the past year, pointing out the advances of the Section, and

especially emphasizing the good work of various committee chairmen and other groups. Each of the sub-committee chairmen had provided a special report. After receiving the report of the Nominating Committee and formal election of officers for the current year, the Chairman introduced the first speaker.

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Metals Section

Officers 1938-1939

General Chairman—MELL E. TRAMMELL, Republic Steel Corp., Alabama City, Ala.
Vice-Chairman—H. J. GRIFFITH, Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Secretary and News Letter Editor—IRVIN A. BRINKMAN, Mackintosh-Hemphill Co., Pittsburgh, Pa.
Contest Committee Chairman—H. J. SPOERER, The Youngstown Sheet & Tube Co., East Chicago, Ind.
Engineering Committee Chairman—R. H. FERGUSON, Republic Steel Corp., Cleveland, Ohio.
Foundry Committee Chairman—J. A. COLTRIN, National Radiator Corp., Johnstown, Pa.
Health Committee Chairman—DR. A. G. KAMMER, Inland Steel Co., Indiana Harbor, Ind.
Membership Committee Chairman—H. H. HENRY, Otis Steel Co., Cleveland, Ohio.
Poster Committee Chairman—FRED E. WARR, Carnegie-Illinois Steel Corp., Pittsburgh, Pa.
Program Committee Chairman—JOHN P. O'ROURK, Bethlehem Steel Co., Sparrows Point, Md.
Publicity Committee Chairman—EARL FYLER, Carnegie-Illinois Steel Corp., Chicago, Ill.
Railway Car Builders Committee Chairman—P. J. BRAND, Pullman-Standard Car Mfg. Co., Pullman, Chicago, Ill.
Statistics Committee Chairman—N. B. MACHOSE, Bethlehem Steel Co., Lackawanna, N. Y.
Members at Large—
 J. C. M. ALLEN, The American Rolling Mill Co., Middletown, Ohio.
 F. G. BENNETT, The Buckeye Steel Castings Co., Columbus, Ohio.
 R. A. BEYER, Central Tube Co., Ambridge, Pa.
 C. A. BIANCHI, H. H. Robertson Co., Ambridge, Pa.
 E. F. BLANK, Jones & Laughlin Steel Corp., Pittsburgh, Pa.
 R. A. CHAFFIN, Continental Steel Corp., Kokomo, Ind.
 H. M. CROGHAN, Inland Steel Co., East Chicago, Ind.
 J. E. CULLINEY, Bethlehem Steel Co., Bethlehem, Pa.
 H. W. DARR, Bethlehem Steel Co., Johnstown, Pa.
 M. W. DUNDONE, Beloit Iron Works, Beloit, Wis.
 B. T. DYE, Republic Steel Corp., Warren, Ohio.
 JOHN P. EIB, American Steel & Wire Co., Chicago, Ill.
 E. A. ELLIS, Wheeling Steel Corp., Wheeling, W. Va.
 GEORGE T. FONDA, Weirton Steel Co., Weirton, W. Va.
 J. P. GATHERUM, Great Lakes Steel Corp., Ecorse, Mich.
 E. E. GREENE, Timken Roller Bearing Co., Canton, Ohio.
 S. E. HAWKES, Macawhite Co., Kenosha, Wis.
 H. G. HENSEL, The Youngstown Sheet & Tube Co., Chicago, Ill.
 W. J. HOOFF, Chase Brass & Copper Co., Cleveland, Ohio.
 W. A. JARVIS, Chase Brass & Copper Co., Waterbury, Conn.
 T. A. LAUERMAN, Republic Steel Corp., Chicago, Ill.
 BEN P. LEONARD, Blaw-Knox Co., Pittsburgh, Pa.
 D. V. MEDALIE, Interlake Iron Ore Corp., Chicago, Ill.
 R. McMAHON, Superior Steel Corp., Carnegie, Pa.
 A. NORTHWOOD, Bethlehem Steel Co., Sparrows Point, Md.
 A. OARTEL, Carnegie-Illinois Steel Corp., Pittsburgh, Pa.
 S. PHILLIPS, Revere Copper & Brass, Inc., Rome, N. Y.
 H. I. ROGERS, Sheffield Steel Corp., Kansas City, Mo.
 J. L. REDBASSIER, Wheeling Steel Corp., Wheeling, W. Va.

*ROBERT L. SCHMITT, Louisville Car Wheel & Railway Supply Co., Louisville, Ky.
 H. S. SIMPSON, Caterpillar Tractor Co., Peoria, Ill.
 *J. A. VOSS, Republic Steel Corp., Cleveland, Ohio.
 *Past General Chairman

Officers 1939-1940

General Chairman—H. J. GRIFFITH, Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Vice-Chairman—IRVIN A. BRINKMAN, Mackintosh-Hemphill Co., Pittsburgh, Pa.
Secretary and News Letter Editor—H. J. SPOERER, Youngstown Sheet & Tube Co., Chicago, Ind.
Contest Committee—N. B. MACHOSE (Chairman), Bethlehem Steel Co., Lackawanna, N. Y.
 T. O. ARMSTRONG, Westinghouse Electric & Mfg. Co., Springfield, Mass.
 F. J. CONROY, Union Carbide Co., Niagara Falls, N. Y.
Engineering Committee—R. A. BEYER (Chairman), Central Tube Co., Ambridge, Pa.
 B. T. DYE, Republic Steel Corp., Warren, Ohio
 W. A. JARVIS, Chase Brass & Copper Co., Waterbury, Conn.
Foundry Committee—J. H. HOLZBOG (Chairman), Chain Belt Co., Milwaukee, Wis.
 H. S. SIMPSON, Caterpillar Tractor Co., Peoria, Ill.
Health Committee—DR. A. G. KAMMER (Chairman), Inland Steel Co., Indiana Harbor, Ind.
 DR. J. H. CHIVERS, The Crane Co., Chicago, Ill.
 DR. T. LYLE HAZLETT, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
Membership Committee—E. A. ELLIS (Chairman), Wheeling Steel Corp., Wheeling, W. Va.
 C. A. BIANCHI, H. H. Robertson Co., Ambridge, Pa.
 J. M. BROOKS, Miehle Printing Press & Mfg. Co., Chicago, Ill.
Poster Committee—J. P. GATHERUM (Chairman), Great Lakes Steel Corp., Ecorse, Mich.
 C. D. DORWORTH, Alan Wood Steel Co., Conshohocken, Pa.
 JOHN P. LEONARD, Blaw-Knox Co., Pittsburgh, Pa.
Program Committee—EARL FYLER (Chairman), Carnegie-Illinois Steel Corp., Chicago, Ill.
 J. E. CULLINEY, Bethlehem Steel Co., Bethlehem, Pa.
 W. J. HOOFF, Chase Brass & Copper Co., Cleveland, Ohio.
 D. V. MEDARE, Interlake Iron Ore Corp., Chicago, Ill.
Publicity Committee—H. H. HENRY (Chairman), Otis Steel Co., Cleveland, Ohio.
 E. E. GREENE, Timken Roller Bearing Co., Canton, Ohio.
 J. A. COLTRIN, The National Radiator Co., Johnstown, Pa.
Railway Car Builders Committee—P. J. BRAND (Chairman), Pullman-Standard Car Co., Pullman, Chicago, Ill.
Statistics Committee—JOHN P. O'ROCK (Chairman), Bethlehem Steel Co., Sparrows Point, Md.
 C. S. PHILLIPS, Revere Copper & Brass, Inc., Rome, N. Y.
 H. L. ROGERS, Sheffield Steel Corp., Kansas City, Mo.
Members at Large—
 *C. M. ALLEN, The American Rolling Mill Co., Middletown, Ohio.
 *F. C. BENNETT, The Buckeye Steel Castings Co., Columbus, Ohio.
 *E. F. BLANK, Jones & Laughlin Steel Corp., Pittsburgh, Pa.
 *R. A. CHAFFIN, Continental Steel Corp., Kokomo, Ind.
 H. M. CROGAN, Inland Steel Co., East Chicago, Ind.
 *H. W. DARR, Bethlehem Steel Co., Johnstown, Pa.
 M. W. DUNDGE, Beloit Iron Works, Beloit, Wis.
 *JOHN P. EBY, American Steel & Wire Co., Chicago, Ill.
 R. H. FERGUSON, Republic Steel Corp., Cleveland, Ohio.
 *GEORGE T. FONDA, Weirton Steel Co., Weirton, W. Va.
 S. E. HAWKES, Macwhirter Co., Kenosha, Wis.
 *H. G. HENSEL, The Youngstown Sheet & Tube Co., Youngstown, Ohio.
 *E. A. LAUERMAN, Republic Steel Corp., Chicago, Ill.

*R. McMAHON
 *J. A. NORTHWOOD
 *J. A. OAKLEY, C.
 *J. L. REKASSIE
 *JACOB L. KIDING
 *ROBERT L. SCHY
 *MELL E. TRAMMELL
 *J. A. VOSS, Repu
 *FRED E. WARR, C
 *Past General Chair

The first session
 was called to order
 by E. Trammell,
 Vice Steel Corp.
 Indiana, who presi

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- Louisville, Ky.
 P. R. McMAHON, Superior Steel Corp., Carnegie, Pa.
 J. A. NORTHWOOD, Bethlehem Steel Co., Sparrows Point, Md.
 J. A. OARTEL, Carnegie-Illinois Steel Corp., Pittsburgh, Pa.
 H. L. KERRASSIER, Wheeling Steel Corp., Wheeling, W. Va.
 JACOB L. RIDINGER, Inland Steel Co., East Chicago, Ind.
 ROBERT L. SCHMITT, Louisville Car Wheel & Railway Supply Co., Louisville, Ky.
 MEL E. TRAMMELL, Republic Steel Corp., Alabama City, Ala.
 J. A. VOSS, Republic Steel Corp., Cleveland, Ohio.
 FRED E. WARR, Carnegie-Illinois Steel Corp., Pittsburgh, Pa.
 Past General Chairman

Pittsburgh, Pa.
 Pittsburgh, Pa.
 Steel & Tube Co., E.

Lackawanna, N.
 Mass.

Ambridge, Pa.

Waukegan, Wis.

Indiana Harbor, Ind.

Pittsburgh, Pa.
 Wheeling, W. Va.

Co., Scott, Mo.

Steel Corp., Chicago

and, Ohio.

Standard, W. Va.

Steel Co., W. Va.

MONDAY AFTERNOON SESSION

October 16, 1939

The first session of the Metals Section
 was called to order by General Chairman
 Mel E. Trammell, Safety Supervisor, Re-
 public Steel Corporation, Alabama City,
 Alabama, who presided. Chairman Tram-

mell made a report of Sectional activities
 during the past year, especially mentioning
 the work of the various committees, and
 then proceeded with the schedule of formal
 papers, as follows:

Coordination of Engineering and Safety

By J. M. HASSLER

District Chief Engineer, Republic Steel Corporation, Birmingham, Ala.

Engineering fundamentally is based on
 strengths of materials. Engineers have
 found that a square inch cross-section of
 certain analysis steel will support a definite
 load of certain fixed spans. As the span
 increases, the load that the member will
 support decreases.

Engineering today, other than research, is
 exact science. There is no guess-work
 whatsoever. Facts are known and if
 with discretion will keep one out of

After strengths of materials were thor-
 oughly proved and the exact load that a
 member would support was known, it was
 a bitter experience, that this was
 not enough. Thoughtless persons would
 load a member for a designed dead load and it
 would fail. This was not because of
 engineering, but because of thought-
 lessness of individual that was unfamiliar
 with the facts of engineering.

This was developed in the engine-
 ing of the origin of the m-

famous "Factor of Five." This simply
 means that if a load is 1,000 pounds, and
 for the span needed will require a 10 pound
 section steel member, then it should be built
 five times as strong or as big, to take care
 of the fools that will come along and place
 five times the load limit on it.

You have seen bridges that have signs
 on them "Safe Load Limit Five Tons." Stand
 by that same bridge for a while and watch.
 Soon a thoughtless, don't care, ignorant
 individual comes along with a load of prob-
 ably 15 tons and runs over the bridge. As a
 rule he gets safely across. The "Factor of Five"
 has saved his hide.

Basically engineering is correlated with
 safety. The very foundation and breadth
 of engineering success is based on safety.
 Engineers guard against failure with their
 knowledge—not by guess-work. They know
 positively what loads will be supported,
 what wind loads will come at certain
 velocities, what shock loads will do. They
 know what to do to make their structure

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Mining Section

Officers 1938-1939

General Chairman—L. C. CAMPBELL, The Koppers Coal Co., Pittsburgh, Pa.
Vice-Chairman—ANGUS D. CAMPBELL, McIntyre Porcupine Mines, Ltd., Schumacher, Ont., Canada.
Secretary—W. D. HASELTON, Pickands Mather & Co., Duluth, Minn.
Secretary and News Letter Editor—DANIEL HARRINGTON, U. S. Bureau of Mines, Washington, D. C.
Editor and Slide Committee Chairman—J. J. FORBES, U. S. Bureau of Mines, Pittsburgh, Pa.
Publicity Committee Chairman—M. R. BUDD, The Explosives Engineer, Wilmington, Del.
Statistics Committee Chairman—W. W. ADAMS, U. S. Bureau of Mines, Washington, D. C.
Members at Large—
 G. J. BARRETT, Oliver Iron Mining Co., Duluth, Minn.
 THOMAS ALLEN, State Inspector of Coal Mines, Denver, Colo.
 J. W. ALT, Calumet & Hecla Consolidated Copper Co., Calumet, Mich.
 E. M. ARTHUR, American Zinc Co. of Tenn., Mascot, Tenn.
 FRED E. BEDALE, Consolidated Coal Co., Inc., Fairmont, W. Va.
 JOHN L. BOARDMAN, Anaconda Copper Mining Co., Butte, Mont.
 W. H. COMINS, National Lead Co., Potosi, Mo.
 M. L. COULTER, Clearfield Bituminous Coal Corp., Indiana, Pa.
 C. M. FELLMAN, Montreal Mining Co., Montreal, Wis.
 C. W. GIBBS, Harwick Coal & Coke Co., Pittsburgh, Pa.
 E. DAWSON HALL, "Coal Age," McGraw-Hill Publishing Co., Inc., New York, N. Y.
 H. T. HARPER, Tennessee Copper Co., Copperhill, Tenn.
 W. C. HENRIE, Phelps Dodge Corp., Bisbee, Ariz.
 KENNETH N. HOSLER, Pennsylvania Compensation Insurance Rating & Inspection Bureau, Harrisburg, Pa.
 C. F. KECK, Jamison Coal & Coke Co., Latrobe, Pa.
 THOMAS E. LIGHTFOOT, The Koppers Coal Co., Pittsburgh, Pa.
 J. A. MARTINSON, Pickands Mather & Co., Cleveland, Ohio.
 WILLIAM G. METZGER, Hudson Coal Co., Scranton, Pa.
 D. MOFFAT, Utah Copper Co., Salt Lake City, Utah.
 G. MURRAY, The Union-Pacific Coal Co., Rock Springs, Wyo.
 R. T. RYAN, Mine Safety Appliances Co., Pittsburgh, Pa.
 E. P. RHINEHART, West Virginia State Dept. of Mines, Charleston, W. Va.
 E. H. SEIP, The New Jersey Zinc Co., Franklin, N. J.
 E. T. SICKA, St. Joseph Lead Co., Bonne Terre, Mo.
 G. V. SIMPSON, Alabama By-Products Corp., Flat Creek, Ala.
 E. TREWECK, Homestake Mining Co., Lead, S. D.
 EDWARD I. YOUNG, American Zinc Lead & Smelting Co., St. Louis, Mo.

Officers 1939-1940

General Chairman—ANGUS D. CAMPBELL, McIntyre Porcupine Mines, Ltd., Schumacher, Canada.
Vice-Chairman—CARL ALADER EVANS, JR., The Hudson Coal Co., Scranton, Pa.
Secretary—W. D. HASELTON, Pickands Mather & Co., Duluth, Minn.

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Vice-Chairman—*N. P. KRINEHART, West Virginia State Dept. of Mines, Charleston, W. Va.

Secretary and News Letter Editor—DANIEL HARRINGTON, U. S. Bureau of Mines, Washington, D. C.

Engineering Committee Chairman—JOHN TREWEEK, Homestake Mining Co., Lead, S. D.

Health Committee Chairman—P. M. ARTHUR, American Zinc Company of Tennessee, Mascot, Tenn.

Membership Committee Chairman—HEATH CLARK, Rochester & Pittsburgh Coal Co., Indiana, Pa.

Poster and Slide Committee Chairman—J. J. FORBES, U. S. Bureau of Mines, Pittsburgh, Pa.

Statistics Committee Chairman—W. W. ADAMS, U. S. Bureau of Mines, Washington, D. C.

Entertainment Committee Chairman—J. T. RYAN, Mine Safety Appliances Company, Pittsburgh, Pa.

Members at Large—

THOMAS ALLEN, State Inspector of Coal Mines, Denver, Colo.

*J. W. ALT, Calumet & Hecla Consolidated Copper Co., Calumet, Mich.

*G. J. BARRETT, Oliver Iron Mining Co., Duluth, Minn.

FRED E. BEDALE, Consolidation Coal Co., Inc., Fairmont, W. Va.

JOHN L. BOARDMAN, Anaconda Copper Mining Co., Butte, Mont.

*L. C. CAMPBELL, The Koppers Coal Co., Pittsburgh, Pa.

*W. H. GOMINS, National Lead Co., Potosi, Mo.

M. L. COULTER, Clearfield Bituminous Coal Corp., Indiana, Pa.

C. M. FELLMAN, Montreal Mining Co., Montreal, Wis.

*C. W. GIBBS, Harwick Coal & Coke Co., Pittsburgh, Pa.

*R. DAWSON HALL, "Coal Age," McGraw-Hill Publishing Co., Inc., New York, N. Y.

H. T. HARPER, Tennessee Copper Co., Copperhill, Tenn.

*H. C. HENRIE, Phelps Dodge Corp., Bisbee, Ariz.

C. F. KECK, Jamison Coal & Coke Co., Latrobe, Pa.

*THOMAS E. LIGHTFOOT, The Koppers Coal Co., Pittsburgh, Pa.

*GEO. MARTINSON, Pickands, Mather & Co., Cleveland, Ohio.

C. E. MCKNIGHT, Lake Shore Gold Mines, Ltd., Kirkland Lake, Ont., Canada.

*WILLIAM G. METZGER, Hudson Coal Co., Scranton, Pa.

D. D. MOFFAT, Utah Copper Co., Salt Lake City, Utah.

V. O. MURRAY, The Union Pacific Coal Co., Rock Springs, Wyoming.

R. H. SEIP, The New Jersey Zinc Co., Franklin, N. J.

L. T. SICKA, St. Joseph Lead Co., Bonne Terre, Mo.

O. V. SIMPSON, Koppers Coal Co., Pittsburgh, Pa.

*HOWARD I. YOUNG, American Zinc Lead & Smelting Co., St. Louis, Mo.

*Past General Chairman

MONDAY AFTERNOON SESSION

October 16, 1939

The first session of the Mining Section was called to order by General Chairman L. C. Campbell, Assistant to the Vice-President, The Koppers Coal Company, Pittsburgh, Pa., who presided. Chairman Campbell, in his opening remarks, briefly re-

viewed some of the activities of the section and its committees during the past year and then introduced the scheduled program as listed in the program. The general discussion in the various papers presented was followed by Executive View-

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Petroleum Section

Officers 1938-1939

our on-the-job accidents. A man say this morning for a large corporation in twenty-three states was 36 fatalities in among some 90,000 on-the-job accidents, whereas accidents they had 203 fatalities cost the company.

maker at the same session where a man was in an off-the-job accident no money to pay his \$75, and his company took paid it. Many of the men have done the same thing. Section might well be between this meeting and

proper committee for the night try to collect data on what our off-time accidents and what we can do about on a program of education lines, so that our men can practice safety on the job as well. We have records, check to see what those accidents

N CHANT: That is a good one of my own group by the off-the-job accidents. Tank tenders, a third hand mechanic. They were coming fifty miles down the road driving through a fog. We had a fatality in the but you can figure out that accident cost the company cost plenty to repair it cost plenty to repair

ER: Before we adjourn be in order for this Section vote of thanks to express one of the fine way in which our Chairman, has taken sessions on such very live. It was numerously sent and carried unanimously

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TUESDAY AFTERNOON SESSION

October 17, 1939

The opening session of the Petroleum Section was called to order by General Chairman J. H. Brown, Fire Protection Engineer, Tide Water Associated Oil Company, New York City, who presided. The first feature was a series of brief reports of sectional committee chairmen, as follows:

Sectional Activities, by General Chairman J. H. Brown.

For Pipelines, Chas. A. Miller, Vice Chairman, Petroleum Section, and Assistant Manager, The Texas Company, Houston, Texas.

For Production, C. J. Nohmann, Vice Chairman, Petroleum Section, and Manager, Shell Oil Company, Houston, Texas.

For Manufacturing, Petrol
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For Marketing
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Congress

R. JONES: Complete guarding of presses is all very well for the safety of people here who have large presses with good supervision and good insurance service. But I should like you to my shoes and take care of our 10,000 where they can't sell the work. See what you can do to get those presses guarded! I don't care whether it's a mile guard or what. Those fellows know anything about it. The operator sets his own guard. Those are the facts that I am trying to lick.

CHAIRMAN BERMAN: I'm afraid gentlemen do not attend National Congresses.

BORAKS: Mr. Jones really told a story that is absolutely true. I feel that when I come to National Congress meetings the bigger I get is the contact with safety people. You fellows have beautiful plants. Jones said. You are the last word. I tell you something ought to be about the small plants that haven't means or the inclination. Once I made a suggestion that every member of the committee bring with him somebody from a plant as a guest. It would be the first thing we ever did with this section. The company would bring an under to section in Chicago next year. Mr. Jones would make a lot of business and the insurance companies would little business.

JONES: I was in a plant last week in Connecticut and the superintendent it girls come in there for work and they refuse to go to work on a press with two sweep guards on it. He let out on the handcuff guard.

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Special Representative
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curately controlling time, temperatures and pressures. Sufficient mercury thermometers as well as recording thermometers are correctly placed and constantly checked to assure the maintenance of correct temperatures.

Each of these processing operations requires unusual care, extreme accuracy combined with adequate supervision and inspection to assure quality and safety of the product.

In spite of the utmost care, defects in workmanship and materials do occur in any manufactured article. These defects must be found before the article leaves the factory, therefore, it is necessary to minutely inspect each article, diligently searching for and rejecting defective merchandise. These inspectors, well trained, are paid a bonus for finding defects; however, as an added precaution, their workmanship in turn is checked by product quality inspectors to assure accuracy and efficiency.

The modern tire is only one important

accessory for the car of today. The same painstaking care in manufacture, the same high regard for quality, the same precautions to assure the consumers' safety is a major part of every piece of equipment that is manufactured into each car. Tires are safe and automobiles are safe—if the person behind the wheel and in control operates by thinking and driving safely.

Quality control work in any manufacturing industry involves two major safety functions. The first consideration is the safety of the employee, to see that the operator is performing his job with the maximum degree of safety to himself, that the materials he works with, his tools or machines have no apparent functional defects that may be hazardous to safety. The second consideration, safeguarding the safety of the consumer by seeing that each operation is being performed correctly, being constantly alert to insure the observance of specifications in order that uniformly high quality, safe merchandise is produced.

Dusts in the Rubber Industry

By P. A. DAVIS, M.D., F.A.P.H.A.

Goodyear Tire & Rubber Co., Akron, O.

Dusts may be classified in two main groups:

1. Harmful; 2. Not harmful or nuisance.

When we think of this classification, we undoubtedly think of some type of pneumoconiosis. However, I believe we must not base our conception of dusts on this basis, but assume that all dusts are detrimental to the human system as a whole when the concentrations are high enough. Whether the disability is due to a toxic condition or to a mechanical one, of course, depends entirely upon the nature of the dust. The conditions usually referred to as being of mechanical origin fall under that condition known as pneumoconiosis with its various sub-divisions of:

1. Silicosis.
2. Siderosis.
3. Anthracosis.
4. Asbestosis.
5. Chalcosis.
6. Chalicosis.

The method of contracting pneumoconiosis is by inhalation of the dust; however, all dusts do not cause pneumoconiosis. The higher the silica content of a dust the greater the possibility of developing a fibrosis and the higher the percentage of crystal content the greater the irritation. The diagnosis of the type of pneumoconiosis is based upon the following:

1. Past history and occupation.
2. Physical examination.
3. Clinical examination of sputum.
4. X-rays of lungs.

Since we have been studying the lungs of industrial workers by x-rays, there has developed an entity which should be termed the "Industrial Lung." This condition, I believe, should not be termed a pneumoconiosis because it reaches a certain stage, does not progress any further and after several months to a year improves. There are no symptoms nor decreased capacity of the lungs. It is diagnosed only by a series of x-rays taken over a period of years.

The other common soluble dusts—silica, and metallic dusts—under a specific poisoning is very inhalation of lead, throat irritation of insoluble dusts—mechanical. We dusts as: 1. Pneumoconiosis.

Some of the dusts used in industry are classified as: Pneumoconiosis.

1. Silicosis—(sand, earth, Stoughton, rotten stone, than 1/2 of 19)
2. Siderosis—iron sulphides
3. Anthracosis—
4. Asbestosis—
5. Chalcosis—
6. Chalicosis—

Non-Pneumoconiosis Harmful:

1. Lead dusts.
2. Arsenic dusts.
3. Chromium dusts.
4. Cadmium dusts.
5. Antimony dusts.
6. Radium dusts.
7. Alkali dusts.
8. Sulphur dusts.
9. Tellurium dusts.
10. Various color ultra marine chromate, etc.

Non-harmful but nuisance dusts:

1. Soapstone with
2. Zinc oxide and
3. Barium sulphate
4. Plaster of Paris
5. Paris white—
6. Talc.
7. Mica—may cause
8. Oxide of magnesia
9. Titanium dioxide

As we can see, classification of dusts is not necessarily a simple task and a complete classification of all dusts is not possible.

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of the car of today. The same care in manufacture, the same for quality, the same precaution the consumers' safety is a of every piece of equipment that tured into each car. Tires are automobiles are safe—if the per- the wheel and in control co- thinking and driving safely.

ontrol work in any manufacturing volves two major safety func- first consideration is the safety oylee, to see that the operator ng his job with the maximum afety to himself, that the mate- rks with, his tools or machines pparent functional defects that arduous to safety. The second n, safeguarding the safety of er by seeing that each operation rformed correctly, being con- to insure the observance of s in order that uniformly high e merchandise is produced.

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od of contracting pneumonoco- inhalation of the dust; however, o not cause pneumonocosis. the silica content of a dust the possibility of developing a fibro- higher the percentage of crystal e greater the irritation. The e type of pneumonocosis is the following:

istory and occupation.
al examination.
examination of sputum.
of lungs.

ave been studying the lungs of rkers by x-rays, there has de- ntity which should be termed "Lung." This condition. I did not be termed a pneumono- use it reaches a certain stage, egress any further and after tis to a year improves. There orts nor decreased capacity of e discovered only by a series sen over a period of years.

The other conditions caused by inhalations of soluble dusts, insoluble, but free from silica, and metallic dusts have to be discussed under a specific condition; for example, lead poisoning is very frequently caused by the inhalation of lead dust; and many nose and throat irritations are caused by inhalation of insoluble dusts whose action is strictly mechanical. We therefore may also classify dusts as: 1. Pneumonoconiotic; 2. Non-pneumonoconiotic.

Some of the principal dusts or materials used in industry which fall under these classifications are as follows:

Pneumonoconiotic:

1. Silicosis (sandstone, slate flour, fuller's earth, Stoughton earth, infusional earth, rotten stone, any other clay with more than 1/2 of 1% silica, ground glass).
2. Siderosis—iron ores, iron oxides (nat.), iron sulphides (nat.).
3. Anthracosis—coal and carbon dusts.
4. Asbestosis—powdered asbestos, asbestos ore.
5. Chalcosis—copper ore and copper dusts.
6. Chalicosis—stone dusts.

Non-Pneumonoconiotic - Harmful:

1. Lead dusts.
2. Arsenic dusts.
3. Chromium dusts.
4. Cadmium dusts.
5. Antimony dusts.
6. Radium compounds.
7. Alkali dusts.
8. Sulphur dusts.
9. Tellurium compounds.
10. Various colored compounds such as ultra marine blue, Prussian blue, lead chromate, etc.

Non-harmful but nuisance dusts:

1. Soapstone with 1/2% or less of free silica.
2. Zinc oxide and sulphide.
3. Barium sulphate.
4. Plaster of Paris.
5. Paris white—whiting.
6. Talc.
7. Mica—may cause a mechanical irritation.
8. Oxide of magnesia.
9. Titanium dioxide.

As we can see by this classification we necessarily must go back to our original classification of harmful and not harmful; and I am convinced that while silicosis is one of our predominant conditions due to

silica, there are many other conditions which are produced in the respiratory tract which are harmful to the individual.

The following are the most important materials used in the rubber industry which are in the form of a dust or powder and to which the individual is exposed. They are marked by the following letters—H, harmful; NH, not harmful; HT, harmful and toxic; HP, harmful and pneumonoco- niotic; NHN, not harmful but a nuisance dust.

1. Talc soapstone with 1/2 of 1% or less SiO₂—NHN.
2. Starch and potato flour—NHN.
3. Zinc oxide—NHN—see chest x-ray.
4. Lead oxide, metallic lead dusts, lead chromate, and the various powdered lead compounds—HT.
5. Carbon black—NHN.
6. Rubber dust—finely divided dust from buffing process—NHN.
7. Sulphur—H, sometimes irritates nose and throat and occasionally produces a dermatitis.
8. Whiting—NH.
9. Barytes—NH.
10. Asbestine—HP.
11. MgO, and MgCO₃—NH.
12. Lithopone—NHN.
13. Red lead—HT.
14. High grade clay—HP if over 1% of 1% silica and dust count is over 5,000,000.
15. Corn starch—NHN.
16. English vermilion—HT.
17. Graphite—NHN.
18. Chromium oxide—HT.
19. Ultramarine blue—HT.
20. Titanox—NT.
21. Thermatonic blue—NTN.
22. Zinc stearate—NHN.
23. Aluminum—NHN, occasionally causes a mechanical dermatitis and irritation of mucous membranes of nose and throat.
24. Hard rubber dust—NHN.
25. Lime—H caustic. Produces dermatitis.
26. Various alkali dusts—H caustic.
27. Various chromium and cadmium dusts—HT.
28. Mica—NH—sometimes causes me- chanical dermatitis.
29. Yellow oxide (Fe₂O₃)—NHN.
30. Black oxide (Fe₃O₄)—NHN.
31. Gypsum—NHN.
32. Casein—NH.
33. Wood flour—NH.
34. Prussian blue—HT.

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35. Soap powder—irritant NH. Sometimes causes dermatitis.

36. Captax—NH.

37. Phenyl—Beta Naphthylamine—HT, causes a dermatitis.

38. Soap bark—NH, sometimes causes a little erythema and conjunctivitis.

39. Cotton lint dust—NHN.

40. Bronze powder—HT—ac to copper and lead content.

41. Zinc sulphide—NHN.

42. Sand—HP.

43. Various clays having more than 1% of free silica—HP.

44. Antimony oxide—HT.

45. Titanium oxide—NH.

46. Various inorganic and organic chemical compounds in powdered form often produce dusts during their use and manufacturing. These must be considered individually as to their industrial hazard and toxicity and are not in the scope of this paper.

47. Wheat and potato flour—NHN.

The following procedure will be helpful in solving your problem of dust.

1. Make repeated dust counts of the working area at various levels.

2. Obtain some of the dust and send it to the laboratory for complete analysis including the determination of free SiO_2 .

3. Examine the workers, x-rays of the chest for those working in pneumoconiotic dusts.

4. Check the ventilation and increase it to produce non-hazardous atmospheres.

5. Differentiate between conditions caused by volatile substances and solvents, and those caused by dusts.

6. Protect the workers with proper clothing and protective respirators and masks.

7. Study the particular dusts from the mechanical and chemical nature and if the effects are unknown, resort to animal experimentation.

8. If dusts are toxic and harmful consider the possibility of a substitution for a non-harmful substance.

9. Examine and x-ray all employees who are being placed on jobs where there is a dust hazard. They should be examined periodically.

10. Make each dust problem an individual one, and in case of silicotic dusts, keep the count below 5 M. per cu. ft., if the free SiO_2 is more than 1%.

11. Select employees free from TB,

chronic bronchitis, post influenza infections, post pneumonic conditions, asthmatics, and persons with myocardial involvement for dusty operations.

I have found that there is x-ray evidence of tuberculosis in about 2 per cent of the cases but only 1% of 1 per cent active and of a permanent disability. Uncomplicated pneumoconiosis of a moderate degree is not disabling to a point of permanent disability.

I want to present to you a case which I think is a rare one. This employee has never worked in any dust before his employment on his present job. He has worked for 12½ years in zinc oxide dust and during our periodic examinations in 1938 the x-ray picture proved very interesting. He does not have a definite pneumoconiosis but he shows evidence of glandular fibrosis. What will develop in a few more years will be shown by x-ray examination only. He has no symptoms. If this man had been working in lead or similar toxic dusts, symptoms of that particular substance would have been present.

The dust counts on toxic dusts must be kept at a minimum, and much lower than that for silicotic dusts. In silicotic dusts the particles of 10 micron size or larger are of very little concern, but with toxic dusts the size of the particles is not so important as is the number of particles. The smaller the particles of dust the less the rate of settling and the greater the time of exposure, and this is the important item in toxic dusts. For example, the permissible amount of lead dust is approximately 15 mgs. per day of eight hours. There would be very little chance of any one ever developing a pneumoconiotic condition with this dust count, but if it is increased very little there is a chance for lead poisoning, and so it is with the various toxic dusts.

The question in most of your minds is, "What are you going to do about these conditions?" The answer is simple. You are going to correct them. It has been proved many times that it pays big financial returns, creates better working conditions, and the employees have a more efficient and appreciative attitude for the employer.

It is unnecessary for me to consider the methods of correcting the dust problems for this is in the realm of the ventilation engineer, but we must insist that the ven-

ilation be sufficient to a certain point and at that point.

You should periodically check according to the dust count and as a guide to a schedule which few years.

Silicosis or silicotic dusts including x-rays.

Non-silicotic and toxic dusts—every year.

Toxic dusts—for example, arsenic, antimony, phosphorus, and alkali and ammonia.

Nuisance dusts—every year only if indicated.

If you find any evidence to correct the conditions the employee elsewhere causes dissatisfaction. Such conditions can be corrected by cooperation between the employer and managing departments at present all dusts are compensable, employer to correct his dust to a point at which there

Conclusions

It is impossible to give a list of all the dusts.

Training

Employment Management

As we scan the history of the movement, we find that the emphasis has been placed on responsibility in accident prevention. Authorities seem to a large extent (and by foremen is no exception) are very large in the prevention of accidents.

How do these authorities reach their conclusions? Why must they assume the responsibility for accidents under their supervision?

When we tell our story we must accept the responsibility for accidents occurring in their

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post-influenzal infections, conditions, asthmatics, and myocardial involvements for

that there is x-ray evidence in about 2 per cent of the of 1 per cent active and disability. Uncomplicated of a moderate degree is to a point of permanent disa-

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counts on toxic dusts must be minimum, and much lower than siliceous dusts. In siliceous dusts the 10 micron size or larger are of concern, but with toxic dusts the particles is not so important as of particles. The smaller the dust the less the rate of settling water the time of exposure, and important item in toxic dusts, the permissible amount of lead approximately 15 mgs. per day. There would be very little any one ever developing a pneumoconiosis with this dust count. Increased very little there is lead poisoning, and so it is with toxic dusts.

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ilation be sufficient to reduce the dust count to a certain point and have it maintained at that point.

You should periodically examine your employees according to the type of dusts exposed to and as a suggestion the following is a schedule which I have used for a few years.

Silicosis or siliceous dusts—six months including x-rays.

Non-siliceous and non-silicotic or non-toxic dusts—every year, with x-rays.

Toxic dusts—for example lead, chromium, arsenic, antimony, phosphorus, chemical dusts, and alkali and caustic dusts—every month.

Nuisance dusts—every 1 to 1½ years—x-rays only if indicated.

If you find any evidence of trouble it is better to correct the cause than to transfer the employee elsewhere, for this often causes dissatisfaction and suspicion. All such conditions can be controlled if there is cooperation between the medical, engineering and managing departments. In most cases at present all conditions caused by dust are compensable, so it behooves the employer to correct his working conditions to a point at which there are no hazards.

Conclusion

It is impossible to give a detailed description of all the dusts used in the rubber

industry, for the siliceous dusts alone would require a volume to do them justice, but I want you to remember that there are just as many serious conditions which may develop from the inhalation of various toxic dusts.

These conditions are often more serious than pneumoconiosis and develop much faster and in a shorter period of time. For instance, a person may develop a lead poisoning in two months from inhalation of lead compounds and it might take five to ten years for a silicosis to develop in the same environment of silica dust.

There are on the market today many fine and efficient protective devices such as chemical protective masks, dust respirators, positive pressure masks, clothing and gloves which if used will give good results.

Instruction to the employees by the supervision in regard to their personal habits, their instruction concerning the type of dust they are exposed to, and why they have to use the protective appliances, will reduce the possibility of any trouble to a minimum.

All laboratory work must be done by a technician who has been trained in the various toxicological laboratory techniques and the interpretations must be made in conjunction with the past history of the individual. May I say in conclusion that it is much more profitable to correct a dusty operation than to declare it a hazard.

Training Supervision in Accident Prevention

By JOHN J. LOGE

Employment Manager, The General Tire & Rubber Company, Akron, Ohio

As we scan the history of the safety movement, we find that a great deal of emphasis has been placed on the foreman's responsibility in accident prevention work. Authorities seem to agree that foremen and by foremen is meant direct supervision are very largely responsible for prevention of accidents in industry.

How do these authorities arrive at their conclusions? Why must the foremen assume the responsibility for injuries to persons under their supervision?

When we ask our supervisors that they assume the responsibility for accidents occurring in their departments, we

must be prepared to state a few reasons. We ask a foreman for a report following an accident, and he has a right to a clear understanding as to the reason why he is called upon to explain when one of his workers is injured. There is nothing mysterious about the placing of responsibility for accidents. It isn't the case of management imposing a burden upon supervision that should belong elsewhere.

As soon as a person is placed in a supervisory capacity, a position where he has charge of the work of others, he becomes directly responsible for their conduct and

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that it would be to the advantage
gone to consider it from that point
not only in consideration of safety
but in every condition with which
foreman has to deal.

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Steam Railroad Section

Officers 1939-1940

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TUESDAY AFTERNOON SESSION

October 17, 1939

The opening session of Steam Railroad delegates was called to order by E. L. Henry, Assistant to the General Manager, Chicago & North Western Railway Company, Chicago, who presided. Chairman Henry welcomed the delegates, sketched the program of sessions briefly, and then introduced the first speaker.

Safety Today and Tomorrow on American Railroads

By CARL R. GRAY, JR.

Executive Vice President, Chicago, St. Paul, Minneapolis & Omaha Railway Company, St. Paul, Minn.

There is one thing in which I will not take a back seat for anyone, and that is the interest I have in "Safety." Perhaps it is only from inheritance that I gather my interest in this work—perhaps from the environment and association I have had with men who believe in safety, who preach it, and who practice it constantly. Perhaps it is from the standpoint of realization that it is one of the greatest factors in the solution of the transportation problem. But whether it is one or the other, or a part of both, I know that I am definitely, completely and wholeheartedly devoting a considerable portion of my life to the improvement—by

safety—of the lives of all of our people. Naturally I should be most interested in the safety performance of the Omaha Railroad; but one cannot be safety-minded and fail to recognize and be interested in and a part of safety as it is understood in the business world today. One has but to look at the program of this Congress to realize what a tremendous place safety has taken in the lives of the American people, for it permeates the very souls of so many of us. It is, and has been, a complete success.

I read all I can concerning early American railroading. Here is a clipping from an English newspaper of March 6, 1866, quot-

Textile Section

Officers 1938-1939

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Secretary and News Letter Editor—FRAZER PATTERSON, W. C. Bradley Interests, Columbus, Ga.
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B. R. BROWN, Columbia Mills, Inc., Chicago, Ill.
H. R. CORY, Beacon Manufacturing Co., Swannanoa, N. C.
*CHARLES H. EAMES, Lowell Textile Institute, Lowell, Mass.
RUSSELL T. FISHER, National Assn. of Cotton Manufacturers, Boston, Mass.
A. S. JOHNSON, American Mutual Liability Insurance Co., Boston, Mass.
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GILBERT R. MERRILL, Lowell Textile Institute, Lowell, Mass.
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B. G. STUMBERG, Tallassee Mills, Tallassee, Ala.
J. T. TROINGER, North American Rayon Corp., Elizabethton, Tenn.
R. B. WICKHAM, West Point Manufacturing Co., West Point, Ga.
*T. A. WILSON, North Carolina Industrial Commission, Raleigh, N. C.
*Past General Chairman

Officers 1939-1940

General Chairman—E. A. ROBERTS, American Mutual Liability Insurance Co., Atlanta, Ga.
Vice-Chairman—E. M. SALLEY, American Enka Corp., Enka, N. C.
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Safety Instruction Card Committee Chairman—THOMAS SHERRY, Potlatch Forests, Inc., Lewiston, Idaho.

Statistics Committee Chairman—WILL D. JENKINS, British Columbia Lumber & Shingle Manufacturers Assn., Vancouver, B. C., Canada.

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Members at Large—

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*F. W. BRAUN, Employers Mutuals, Wausau, Wis.

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*H. E. SEELY, The Brunswick-Balke Collender Co., Chicago, Ill.

*Past General Chairman

MONDAY AFTERNOON SESSION

October 16, 1939

The first session of the Wood Products Section was called to order by General Chairman J. H. Lee, Safety Engineer, Liberty Mutual Insurance Company, Rockford, Ill., who presided. In his opening remarks,

Chairman Lee sketched some of the activities of the Section during the past year, paid tribute to the Sectional Committees for their work, and then introduced the first speaker.

Health Hazards in the Woodworking Industry

By R. R. SAYERS

Senior Surgeon, Division of Industrial Hygiene, National Institute of Health, U. S. Public Health Service, Washington, D. C.

In 1935 there were 579,012 workers in the United States employed in industries in which wood in some form is the principal material. Of this number 283,309 were employed in the basic industries and 133,772 in the furniture and related industries. The remainder were in wood-reworking industries, wooden-container industries, and other allied industries.

Only limited data as to absenteeism due to all illness or to occupational diseases are available. However, in a survey of 1,487,224 workers employed in 16 indus-

try groups in 16 states the data given in the accompanying table showing exposures were obtained for the lumber and furniture industry.

The table shows that dusts and the chemicals involved in finishing and preserving wood constitute the major exposures which may cause illness or untoward symptoms.

Dust

Many processes in the wood industry (sawing, planing, boring, drilling, belt-

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Dust

in the wood industry
boring, drilling, belt-

Percent of Workers in the Lumber and Furniture Industries Exposed to Specified Materials

Materials	Workers Exposed
Number of workers surveyed	93,375
1. Organic dust	51.8
2. Silica dust	5.7
3. Dermatitis producers	5.3
4. Petroleum products	5.0
5. Lacquer and varnish	3.7
6. Organic solvents	3.6
7. Other metals	3.2
8. Silicate dust	2.8
9. Carbon monoxide	2.2
10. Paints and enamels	2.1

sanding, removal and utilization of waste) give rise to wood dust.

Smith, in reviewing the literature on the relationship of wood dust to respiratory disease, states that on the whole exposure to conditions of work incidental to the trade of woodworking carries with it an increased risk from respiratory disease.

Although there may be disagreement as to whether wood dust *per se* is responsible for an increased incidence of tuberculosis among woodworkers there is general agreement that organic dust in high enough concentrations may produce some irritation of the upper respiratory tract. The possibility has also been suggested that this type of dust may act as a carrier of the tubercle bacillus into the respiratory tract. In view of the fact that there is no conclusive evidence that pure wood dust is the cause of the increased incidence of tuberculosis and other respiratory infections among wood workers a more extensive investigation of the question than has yet been made would appear to be warranted.

The occurrence of asthma due to the inhalation of fungus spores should also be mentioned. Towey, Sweany and Huron carried out a clinical, roentgen and laboratory study on a series of 35 patients in the Upper Peninsula of Michigan. The symptoms were acute and typically asthmatic. These men were working where they came into contact with dust from maple logs cut for more than a year. The dust proved to be the spores of a fungus identified as *Coniosporium corticale* E. and E. in the authors' opinion, the condition was due to a local toxic

effect and foreign body reaction, combined with a delayed effect resembling protein sensitization in its clinical and certain immunologic effects. The authors recommended preventive measures which include the removal of affected patients from the environment of the spores as soon as they are detected, or exhaust ventilation of the saws during the working process.

Poisonous Woods. The fact that contact with certain woods and their dusts may produce an irritation of the skin, mucous membranes or symptoms of general poisoning is well recognized. The majority of cases of dermatitis and toxic symptoms from wood occur in those whose work brings them in contact with the dust and sawdust derived from these woods. However, eruptions have occurred from other types of contact such as proximity to the tree alone or while handling the wood in any way.

Woods of tropical origin are the more common offenders. However, the wood of numerous trees native to temperate climates has also been found to produce irritation. Among them are: birch, California sequoia, chestnut, hemlock spruce, Norway spruce, Japanese Tagayasan, cocobolo, Brazilian walnut, blackwood, satinwood, sabicu, mahogany, teakwood, ebony, boxwood, yew wood, red cedar, oak, and beech.

Few figures are available as to the incidence of dermatitis from contact with woods. Schwartz found dermatitis resulting from the dust of Brazilian walnut in 11 of 100 workers in a cabinet-making plant. He communicated with other firms using the wood, and 9 of 10 reported instances of eruptions apparently attributable to the Brazilian walnut, the number of workers affected in the different factories varying from one or two to a majority. One firm reported that it had discontinued the use of the wood because of the large number of workers affected. It is obvious, however, from the relative frequency of reports dealing with such woods as satinwood, that sensitivity occurs frequently with some, while the infrequent or single mention of other woods indicates that reactions to them are exceptional.

The precise nature of the toxic effect of

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woods has not been accurately determined. Some authorities believe that the toxic agents are free unsaturated acids; others, that they are resinous oils and alkaloids. Other types of chemicals are responsible in some cases.

The toxicity frequently varies with the habitat and in many varieties of wood, from one tree to another. Thus, it is reported that cocobolo wood from Panama can produce dermatitis, while that from Nicaragua appears to be harmless. The variation in toxicity from one tree to another is particularly marked in the case of satinwood.

The majority of woods are most toxic when freshly cut but a few become increasingly harmful as they age. Thus cases of dermatitis have been reported in persons who had sat on branches of the rengas which had been cut and dried for months. The use of this wood for the manufacture of furniture has practically ceased because of the production of symptoms by furniture which has been in use for years.

Local or general symptoms of poisoning usually appear within a few hours, days, or weeks following contact with an irritant wood. However, cases have been reported in which workers after years of immunity to a toxic wood have become susceptible to irritation by the material. In the case of some woods, tolerance may be established, but as a rule, sensitivity once established is persistent. In general, the eruptions present the usual picture of dermatitis venenata although a number of variations occur. Perspiration and seborrhea apparently increase the noxious action of practically all woods. The affection is considered by most observers to be allergic.

Patch tests with moist sawdust are usually sufficient to establish the diagnosis in cases of suspected wood dermatitis.

Paints, Lacquers, Varnishes

The paints, lacquers, varnishes and stains employed in the finishing of furniture and other wooden articles constitute a second major health hazard.

Chromates and bichromates which are used for staining and in polishing wooden articles favor the development of ulcers on the hands and feet, of conjunctivitis,

and dermatitis. Although perforation of the nasal septum has been reported, it is infrequent.

Prolonged work with stains containing methyl alcohol may cause optic neuritis. "Polishers' itch", an eczematous condition of the hands and arms, is common among wood polishers, the causative agent being either petroleum, shellac dissolved in wood alcohol, or in alcohol denatured with pyridine bases.

The use of the spray gun and dip tank for the application of paints and lacquers has largely replaced the hand brush in industry in painting operations. The adoption of these methods has resulted in a change in working conditions with resultant hazards of two types: those relating to toxicity and those relating to flammability.

The substitution of harmless pigments for toxic pigments has rendered many paints much less poisonous. Turpentine and benzol have been displaced by other solvents in many paints during the past 15 years.

A few years ago lacquers displaced paints in many finishing operations. The ordinary lacquer contains several basic ingredients such as nitrocellulose, solvents and diluents, gums or resins, softeners or plasticisers, and pigments. The volatile ingredients constitute about 75 percent by weight of an average lacquer.

The evaporation of the volatile fraction constitutes the major occupational disease hazard in the use of lacquer, although the vehicle, pigment and resinous compounds cannot be entirely eliminated from consideration as possible offenders inasmuch as the toxic properties of many of them are unknown. Among the pigments which may be toxic are those yellows, greens and oranges which contain lead chromate, the aniline derivatives and possibly those containing cadmium, antimony and barium.

Over 100 solvents are used in the lacquer industry alone. (15). Some of the more important solvents are the esters, such as the acetic acid esters of methyl, ethyl, propyl, butyl and amyl alcohol, and the ethers which include the alkyl ethers of ethylene glycol. The effect of alcohol, ether and massive doses (in excess of 1,000 p.p.m.) of the ester solvents is mainly narcotic and anesthetic. Some of them are also irritants of the skin and mucous mem-

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is containing optic neuritis. This condition is common among agents being dissolved in solvents saturated with

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branes. There is need of investigation to determine the effects of prolonged exposure and the maximum safe concentration for many of these compounds.

The important diluents (thinners) are the hydrocarbons which include benzol, toluol, xylol, naphtha, and the alcohols (methyl, ethyl, propyl, butyl and amyl alcohols and cyclohexanol). Air concentrations of greater than 50-75 p.p.m. of benzol and 100 p.p.m. of toluol or xylol may produce serious damage to the blood-forming organs of the body. The International Labour Office regards a concentration of 100 p.p.m. of methyl alcohol as the threshold of toxicity. However, concentrations of 200 p.p.m. in a New York factory were observed to give rise to comparatively slight intoxication in the personnel. Butyl alcohol in concentrations of 100 p.p.m. is reported to cause damage to the blood, liver and kidneys of experimental animals. The other alcohols are probably not very toxic in ordinary usage.

The most important route of absorption of volatile substances is through the lungs and consequently it is essential to keep the concentration of vapors in the atmosphere to be breathed at a minimum. Although some of the vapors have but little toxic action, any volatile material may produce narcosis or asphyxia if present in sufficiently high concentrations. The practice of some lacquer workers of indiscriminately using solvents to cleanse their hands should be discouraged since absorption through the skin may produce serious systemic damage and since the cracking of the skin which results from the removal of the fats and oils from the skin of the hands and forearms provides openings through which infection may be established.

The volatile materials present in lacquer constitute the principal fire hazard as well as the major health hazard although nitrocellulose adds another inflammable element.

Wood Preservatives

Persons engaged in the impregnation of wood for the purpose of rendering it weather-proof, water-proof, fire-repellent, and resistant to fungi may suffer from vesicular and other skin eruptions due to

the chemicals employed. Eczema of the skin and catarrhal conditions of the mucous membranes of the head are fairly common.

Creosote which is used for the preservation of wood to be used for outdoor construction purposes is a primary skin irritant and may also result in the development of occupational coal tar photosensitivity.

Although the creosoting process has largely replaced the use of chromated zinc chloride in the preservation of wood to be used outdoors, the latter is still used for wood intended for indoor construction. McCord and Kilker examined 17 workers employed in a wood preserving industry and found that of the four types of skin lesions presented, three were well known as incident to work in tar. Zinc chloride burns were the fourth type of lesion and were present in all patients, occurring on the fingers, hands, forearms, and occasionally on the legs and thighs.

In determining the causes of the lesions it was found that the strength of the zinc chloride solution in the treatment fluids was too dilute to produce skin lesions. However, during the period when the ties were left in the open air, following their removal from the treatment cylinder, evaporation of the water from the zinc chloride solution occurred so that the ties when handled in loading were sometimes covered with treating fluid in which the zinc chloride approximated saturation. Additional factors to be considered with respect to zinc chloride burns are: (1) antecedent injury to the skin appears to be necessary; (2) after the initial lesion, repeated exposure to the zinc chloride solution and irritation from the tar fraction of the treating solution are factors in the severity and progress of the lesion.

Experimental studies have shown that approximately one percent mixtures of phenyldichlorarsine in medium or heavy petroleum distillates are efficient wood preservatives. Although these mixtures have not yet received commercial use it should be kept in mind that tests have shown that marked initial vesiculation may occur in certain persons exposed to the action of phenyldichlorarsine.

Pentachlorophenol and tetrachlorophenol are also used as wood preservatives. In addition to being skin irritants

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they may also be absorbed through the skin in sufficient amounts to cause systemic poisoning.

Other chemicals which are used for impregnating wood include dinitrophenol, aniline, potassium bichromate, fluorine compounds and mercuric compounds. According to the literature, each of these chemicals possesses toxic properties when absorbed in sufficient quantity into the body. Ultimately, only careful medical examination in conjunction with the study of types and amounts of exposure will establish their importance as health hazards.

Engineering Control. The basic principle in dealing with a dust, gas or fume hazard is control at the point of origin, thus preventing dissemination into the atmosphere. Sometimes a process can be enclosed or isolated completely in a sealed room or compartment, but frequently the exhaust ventilation method is preferable. Water may be used to prevent the dispersal of dust and under certain conditions it may be advisable to combine the use of water with exhaust ventilation. Proper design, installation and maintenance of any mechanical device is essential if protection is to be adequate.

Individual types of respiratory protective devices such as masks or respirators should be used only where exposure is intermittent or brief, or where some unusual condition makes a more adequate control method impracticable.

In the case of materials producing external irritation, auxiliary protective measures may include the use of protective

clothing, gloves, goggles and aprons, as well as protective salves, ointments or other compounds to delay or diminish the irritant action. General rules for hygiene and good housekeeping should also be observed.

Safety education and the proper maintenance of equipment and safety devices are the important factors.

Medical Control. Medical control, through preemployment and periodic physical examination, is one of the most important factors in the prevention of industrial injuries and illness.

The preemployment examination serves to determine the employee's physical and mental fitness for work. The purpose of such examinations is not to eliminate or exclude an employee, but rather to direct his placement in work for which he is physically suited. The practice of preemployment examinations should also be extended to include executives and officials.

The purpose of periodic examinations is to secure and maintain physical fitness. Defects and disabilities which were not observed at the time of employment may be discovered on reexamination. In such cases, an occupational adjustment should be made to provide continued employment and remove the risk of permanent injury. Reexamination of employees also serves as a check on the efficacy of the engineering control methods already instituted, or as a measure of the need for new protective devices. The frequency of examinations should be determined by the medical director unless specified by law.

WEDNESDAY AFTERNOON SESSION

October 18, 1939

Use and Abuse of Circular Saws and Their Relation to Safety

By ALBERT L. UHL

Sales Engineer, Henry Disston & Sons, Inc., Tacony, Philadelphia, Pa.

Circular wood-cutting saws are divided into four classes, namely: cross-cut, rip, combination, and grooving. Each of these saws has its own use in the wood-working industry.

Circular cross-cut saws are manufactured in several patterns of teeth and on many spacings of teeth. Each one has certain peculiar work to do, but in all classes the teeth should be bevel filed to best save the

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Safety Exposition

Exhibition Hall—A. C. Auditorium

Alphabetical List of Exhibitors of Industrial Safety Equipment

- Acme Protection Equipment Co., Inc., Pittsburgh, Pa.
Gas Masks.
- American Book Co., New York, N. Y.
School Book Publishers.
- American Chain & Cable Co., Inc., Bridgeport, Conn.
Manufacturers of Wire Rope, Chains and Chain Products.
- American-LaFrance-Foamite Corp., Elmira, N. Y.
Fire Protection Equipment.
- American Optical Co., Southbridge, Mass.
Head and Eye Protection Products, Safety Clothing.
- Bausch & Lomb Optical Co., Rochester, N. Y.
Safety Goggles and Safety Lenses.
- Bear Manufacturing Co., Rock Island, Ill.
Vehicle Inspection and Correction Equipment.
- Bendix Products Division of Bendix Aviation Corp., South Bend, Ind.
Automotive Equipment, Steering Stabilizer, Brake Testing Equipment.
- Brown Shoe Co., St. Louis, Mo.
Men and Women's Safety Shoes.
- Stewart R. Browne Manufacturing Co., New York, N. Y.
Safety and Special Purpose Lights and Lamps.
- R. H. Buhrke Co., Chicago, Ill.
Safety Equipment for Construction and Maintenance.
- Burroughs Wellcome & Co., (U.S.A.) Inc., New York, N. Y.
First Aid Kits and Medical Equipment.
- Carbisulphoil Co., Dallas, Texas.
Foille for Burns and Industrial Wounds.
- H. Childs & Co., Inc., Pittsburgh, Pa.
Industrial Safety Shoes.
- The Cleveland Overall Co., Cleveland, Ohio.
Safe Industrial Work-Clothing and Uniforms.
- Coffing Hoist Co., Danville, Ill.
Coffing Hand and Electric Hoists.
- Columbus McKinnon Chain Corp., Tonawanda, N. Y.
Alloy Steel Sling Chains and Safety Hoists.
- H. S. Cover, South Bend, Ind.
Respirators and Rubber Safety Goggles.
- Craddock-Terry Shoe Corp., Lynchburg, Va.
Industrial Safety Shoes.
- Davis Emergency Equipment Co., Inc., New York, N. Y.
First Aid and Industrial Safety Equipment.
- C. H. Dockson Co., Detroit, Mich.
Head and Eye Protection Equipment.
- Dugas Engineering Corp., Chicago, Ill.
Fire Extinguishing Equipment.

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E. I. du Pont de Nemours & Co., Inc., Wilmington, Delaware.
Manufacturers of Neoprene Synthetic Rubber and Pro-Tek Hand Cream.
Eagle-Globe-Royal Indemnity Companies, New York, N. Y.
Safety Engineering, Automotive, Boiler and Machinery Service, Casualty Insurance.
Eagle Signal Corp., Moline, Ill.
Traffic Signals and Controllers.
Elliott Service Co., New York, N. Y.
Promotion of Efficiency and Safety.
Charles K. Ernst, Inc., Buffalo, N. Y.
Safety Barrel and Drum Handling Equipment.

Fairway Laboratories, Inc., St. Louis, Mo.
Salt Tablets and Dispensers.
Finnell System, Inc., Elkhart, Ind.
Electric Floor Maintenance Equipment and Compounds.
Franklin Research Co., Philadelphia, Pa.
Floor Maintenance Materials.

Harley-Davidson Motor Co., Milwaukee, Wis.
Police Motorcycles, Servi-Cars and Accessories.
Hoof Products Co., Chicago, Ill.
Motor Vehicle Speed Control Governors and Brake Eyes.
Hynson, Westcott & Dunning, Inc., Baltimore, Md.
Mercurochrome First Aid Antiseptic, Thantis Lozenges.

Indian Motorcycle Co., Springfield, Mass.
Police Motorcycles and Equipment.
Industrial Gloves Corp., Danville, Ill.
Industrial Safety Clothing.
Industrial Products Co., Philadelphia, Pa.
Industrial Safety Equipment.
Insto-Gas Corp., Detroit, Mich.
Gas Operated Torches and Furnaces.
International Chain & Manufacturing Co., York, Pa.
Lug-Reinforced Tire Chains.
International Shoe Co., St. Louis, Mo.
Hy-Test Safety Shoes.

Juvenile Wood Products, Inc., Fort Wayne, Ind.
Automobile Safety Seats for Children.

Kar-Tell Spot-O Parking Meter Co., Portland, Oregon.
Automatic, Car-Mounted Parking Meters.
Kent Co., Inc., Rome, N. Y.
Electric Floor Scrubbing and Cleaning Equipment.
Keystone View Co., Meadville, Pa.
Visual Safety Tests.
Walter Kidde & Co., Inc., New York, N. Y.
Fire Protection Equipment.
The Kimball Safety Products Co., Cleveland, Ohio.
Safety Clothing and Industrial Goggles.

Lehigh Safety Shoe Co., Allentown, Pa.
Leather and Rubber Safety Shoes.
Lightfoot Schultz Co., New York, N. Y.
Toilet Soaps for Industrial Washroom Use.

The Lima Co.
Non-Slip S
Lumbermen's
Automobil
Lyon Metal P
Showerwa

The Martinda
Stretcher C
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Rose Manufa
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