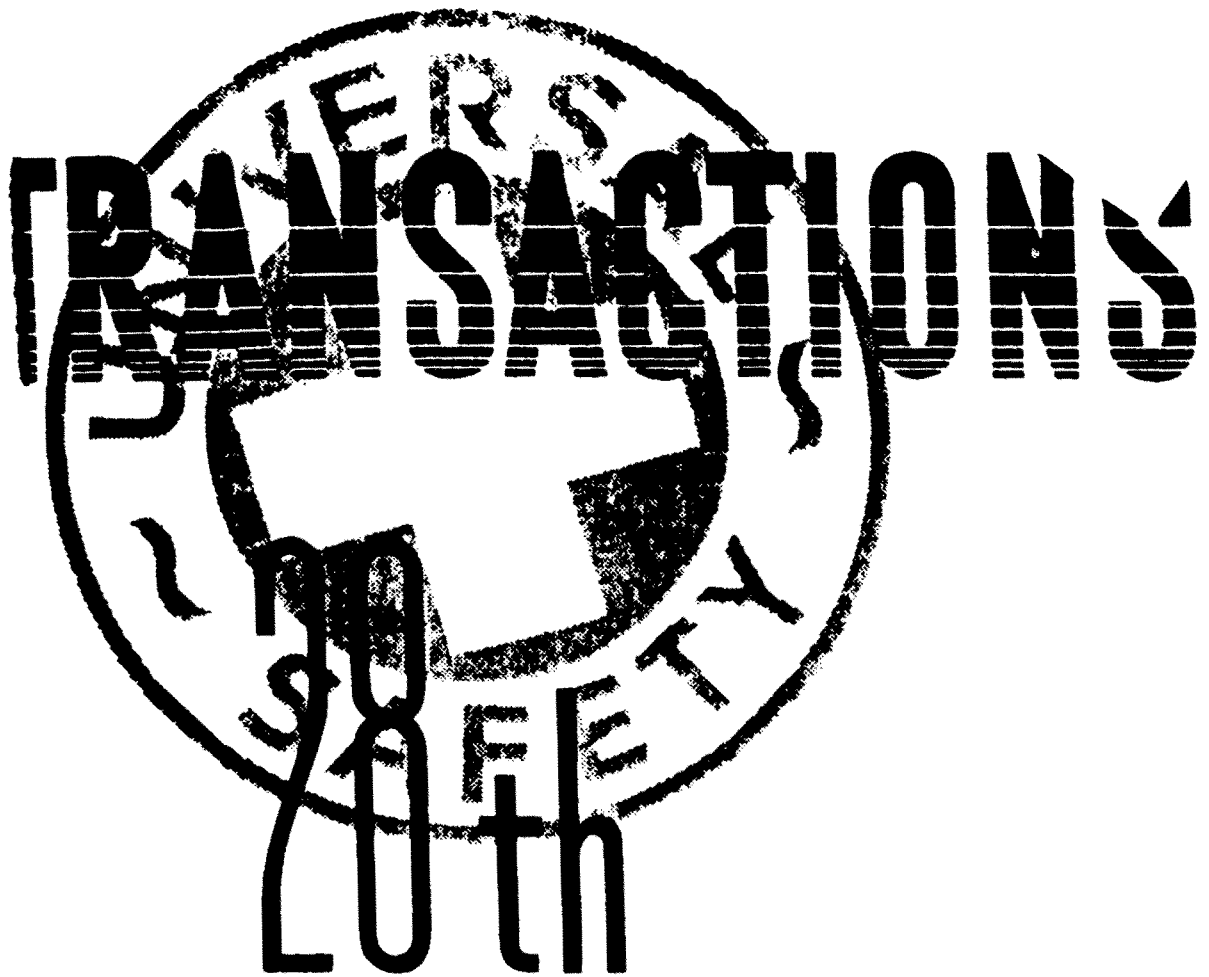




NATIONAL SAFETY CONGRESS

ATLANTIC CITY
OCTOBER 16-20, 1939



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Foreword

THE Transactions of the 28th National Safety Congress and Exposition of the National Safety Council, October 16-20, 1939, are published in two volumes. Volume I contains the general and subject sessions and the sessions of the various Industrial Sections. Volume II contains the Street and Highway Traffic, the Commercial Vehicle, the Transit, the Child Education, and the Home Safety sessions.

Volume I is distributed automatically to all industrial members of the Council. Volume II is sent to members who are believed to be interested chiefly in the sessions it contains. However, other Council members may obtain Volume II upon request.

Many members have found it of benefit to distribute copies of the Transactions volumes to both executives, foremen and supervisors, who have used the practical information they contain in safety programs and for general reference purposes. Extra copies of the Transactions may be obtained as follows: One to 10 copies of Vol. I, at \$2 each; 11 or more copies, \$1.75 each. Extra copies of Vol. II cost 75 cents each.

THE Transactions are a condensed record of the proceedings of the Congress. The papers and addresses have been edited to delete extraneous matter, abbreviate the less important portions, and emphasize what may be of particular usefulness in promoting effective safety organization and other accident prevention measures. These volumes, therefore, are a somewhat abridged version, compact, practical and of particular value to the student and executive interested in achieving more thorough accident prevention success. The original manuscripts are available for additional reference, if desired, in the files of the National Safety Council.

THE National Safety Council, at its Congresses, seeks to eliminate from discussion matters which are not pertinent to the aims of the Congress or which may be contrary to the Council's policies. It cannot accept responsibility, however, for all views expressed either in the papers which have been delivered or in the discussions based upon these papers.

NATIONAL SAFETY COUNCIL, Inc.
20 North Wacker Drive
Chicago

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Council Purposes and Program

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-

way. We must insist that the things we buy—whether a stepladder or a stop sign, a hand-saw or a blast furnace—be safe things. And we must be willing if necessary to pay a higher price because of this built-in safety factor, realizing that it is true economy to do so.

5. TRAINING FOR SAFETY. Many accidents occur because the injured person or some other person acts in an unsafe manner. This unsafe act often is committed because the person involved never has been taught how to do the job in the safe way. Therefore, boys and girls, men and women, must be taught how to work, how to drive, how to cross the street, how to live safely. This teaching and training is a joint responsibility of industry, of schools and colleges, of governmental groups and of parents in the home.

6. SUPERVISION FOR SAFETY. Many who know well the safe method of performing an act nevertheless are involved in accidents because, due to hurry, fatigue, thoughtlessness or some other reason, they do not perform the act in what they know is the safe way. Therefore, we need good foremen in industry, alert patrol boys in our schools, diligent police officers on our streets, thoughtful parents in our homes. These, through wise guidance of those under their supervision, can greatly minimize the chances of accident.

7. LEGISLATION FOR SAFETY. Avoidance of accidents requires the adoption and scientific enforcement of sound legislation—legislation on traffic, on industrial matters, on public transportation, on home construction and maintenance, and on many items of personal conduct. Such legislation provides a standard to which a large majority of people are willing to conform and thus live together harmoniously and safely. It also provides a basis for requiring the conformity of a small minority, who would not otherwise be willing to submerge their personal desires, for the sake of safety in the entire group.

8. SAFETY RESPONSIBILITY. Leadership in every walk of life should involve leadership in safety. Those who administer

an engine can be shut down entirely, all but major repairs effected, and placed back in operation again, with no appreciable difference in the airplane's flying ability. And engine failures account for 12.16 per cent of fatal airline accidents.

Large aircraft, too, are flown with a different technique. The flight deck on the trans-ocean clippers, for instance, is the same size as the passenger cabin on the largest of our present land transports. This flight deck is reserved for the flight crew. Instead of the usual pilot-copilot combination, these clippers are flown by a crew of five primary flight officers—with five reserve officers—under the direct command of a captain who graduated to this position of trust and of responsibility through a minimum of seven years of study and training. Under the captain, the primary flight functions normally handled by the pilot-copilot are divided into separate flight stations—administration, piloting, navigation, radio communication, engineering. Each of these posts is manned by a specialist, trained for that particular task. These flight officers stand watch and are relieved at regular periods, and return to their own living quarters aboard ship.

Though years of training, of study and actual experience, these multiple crews function as one man and make possible, for the first time in long distance transport aircraft, the achievement of scientific flight conduct—a system which, under the command of the Captain, provides for a triple check on all primary factors, which lessens strain without lessening responsibility, which is designed to effect the highest attainable level of personal efficiency. And personnel errors account for nearly 30 per cent of fatal airline accidents.

These factors, many of which are brought to their highest application for the first time on the trans-oceanic clippers

where the facilities were built into the design of the original aircraft—are incorporated in the technique of international over-water flying. They are basic to a record of 171,871,000 over-water passenger miles, without a fatal accident in flight.

The safety record of transoceanic and transcontinental air transport did not just grow. It is the result of deliberate effort, of painstaking care, of endless research and test. Air travel, as we know it today, is purely a concept of this generation. It has had to make its way, from the start, in competition with the matured safety records of the older forms of transport. It has had to struggle with the principles of increased danger inherent in any type of high-speed travel—and we have the fastest ever known to man. But, because of these very reasons, more effort has been continuously and forcefully exerted to raise the standard of airline safety than that lavished in any similar period of development on any other means of transport.

This extraordinary effort has not come alone from within the industry itself. The encouraging results are, in a real measure, due to the tireless cooperation which the air transport industry has received from outside agencies such as the National Advisory Committee for Aeronautics, our Government's great research organization, and the Civil Aeronautics Authority, whose diligent efforts to effect greater airline safety stand out as a signal achievement of their first full year in office. In fact, all having to do with aviation have shared in the early recognition, by the air transport industry, of its responsibility toward the public in the matter of safety. These combined elements all continue as active as ever today in their common goal. Their support offers the promising possibility that aviation can eventually be made the safest form of travel known to man.

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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

all committee reports were distributed to the assembled delegates.

The report of the Nominating Committee was presented by C. B. Boulet, Chairman. Other members of the Nominating Committee were D. L. Royer, A. S. Regula, S. E. Whiting, and C. W. Smith. A list of names of the men elected to various

positions, as recommended by the Nominating Committee, may be found in the section of the Congress Transactions.

After the regular business of the meeting was concluded, General Chairman E. Donovan introduced the speaker for the occasion, Mr. C. A. McCune whose address follows:

Detection of Flaws in Steel and Steel Parts

By C. A. McCUNE

Secretary, Magnaflux Corporation, New York City

From the standpoint of safety our chief concern is proving that important parts are free from physical defects or flaws of the type that might cause failure.

In any discussion of flaws or their detection, consideration must be given to the conditions surrounding the part under test; i.e., whether it is a newly made part or one in service.

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

These defects may readily be discovered in the mill or plant and it is, therefore, easy to prevent such parts from getting into service.

Used parts present a different aspect; the type of defect usually suspected is a separation of the surface, or one extending from the surface well down in the body of the metal, commonly termed a crack.

This crack may be of such an incipient nature as to defy detection by eye or by means of a high powered glass or by any of the ordinary methods of inspection. This is a most dangerous type of defect because if such a part is permitted to remain in service, failure is likely to result.

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

It is a known fact that any separation of the metallic body is considered a stress raiser and, regardless of depth, it takes little from the point of excess stress or in com-

bination with a vibratory stress to encourage these to assume relatively large proportions.

Where overstress is not a factor, fatigue cracks developed in service may be the result of sharp fillets, grooves from machining operations or accidental notches due to improper handling.

One noted authority concluded that there was nothing remarkable as to why cracks formed at such locations, the mystery is what delayed them.

The useful fatigue strength of otherwise sound metal is limited to these various forms of conditions which produce so-called stress raisers.

Despite the great advance in engineering design and metallurgical developments, steel and improved production methods directed toward the construction of what might be termed failure proof equipment there are so many unpredictable factors that periodic inspection of stressed parts in service is essential.

All parts found to contain shallow cracks need not be scrapped, as in a great majority of cases, particularly on heavy sections, a crack can be removed by dressing down the surface of the metal to a point below where the crack extends, then retesting to insure that the crack has been removed. Repairs can also be made by welding and the finished weld be just as easily inspected. We found to contain cracks can be chipped or rewelded and retested.

The starting of a crack is the origin of a very sharp notch. It is the sharpness of this notch and not the reduction of area of the metallic body which causes progressive failure. Therefore, to insure safety in

Automotive and Machine Shop Section

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TUESDAY AFTERNOON SESSION

October 17, 1939

The first session of the Automotive and Machine Shop Section was called to order by Vice-Chairman John C. Bower, Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pa., who presided

After proceeding with the formal election of officers for the current year, a list of these being given above, the Chairman introduced the first speaker on the scheduled program

General Machine Shop Hazards and Their Correction

By HARRY L. SAIN

Special Representative, Division of Safety and Hygiene, Industrial Commission of Ohio, Columbus, Ohio

Suppose I were to tell you that a fearful catastrophe has befallen Asbury Park, that beautiful little city on the coast of New Jersey. Suppose I were to tell you that of the 14,891 inhabitants of this community, only 887 came through the calamity unscathed. Suppose I were to tell you that

one of the unbridled forces of nature had caused death to 11 people, permanently disabled 50 others, put 1,168 in the hospitals and slightly injured 8,390 of the remaining inhabitants.

It is needless to say you would be interested. Yet at the risk of being deemed

heartless and unsympathetic, I ask you—Why should we be disturbed by the causes or the aftermath of a catastrophe with only 9,619 casualties, including a little thing like 11 lives sacrificed and 50 people maimed for life? Are we really concerned about such things?

It certainly should not deeply interest the machine shop owners and employees in Ohio, because the figures I have been quoting represent the toll levied against machine shop employees of the State of Ohio in 1938, and if anybody has been distressed about it no one has brought it very vividly to my attention. As a matter of fact, none of us has given more than a passing thought to this casualty list that has grown up in your own ranks within the space of one year.

The point is just this. We are all too prone to be impressed by the circumstances surrounding death and injury, rather than by the fact of death and injury and the tremendous influence these accidents exert upon productive capacity, economic standards and the lives and happiness of our industrial workers.

Causes

Our statistical records show that machine shop accidents, in the majority, year after year have the same six causes. Accidents are like fashions; some fashions go on year after year. What are the causes of machine shop accidents in Ohio?

1 Machinery	4,483 accidents
2 Handling Objects	1,183 accidents
3 Hand Tools	894 accidents
4 Flying Particles	820 accidents
5 Stepping upon or Striking against Objects....	741 accidents
6 Falls of Persons.....	449 accidents
Total number of days lost.....	117,407
Percent of days lost by the six major causes.....	89.1

These causes are closely related to other causes, namely, Faulty Environment and Faulty Human Behavior. These two may be further subdivided into mechanical and personal causes such as—

- (a) Improper guarding.
- (b) Defective substances and equipment.
- (c) Hazardous arrangement of machinery, tools and equipment.
- (d) Improper and poor illumination
- (e) Improper clothing or apparel.
- (f) Improper heating and ventilation

- (g) Physical or mental defect
- (h) Lack of knowledge or skill.
- (i) Wrong attitude.
- (j) Selection, direction and proper training of the workers.

It may seem silly for me to enumerate these causes; you know them well. You have heard them year after year and have said, "Oh well, it's the same old story." So you go back home and do nothing about it. You know the trouble is not with the problem, it is with you and me. If you ask a four year old boy, "What is the sum of 2 and 2?" and he tells you he does not know, the trouble is not with the problem, it is with the boy. He has not acquired sufficient knowledge.

I have given you the six main causes of accidents in the machine shops of Ohio. However, the second part of the subject assigned to me, "Their Correction" is apparently where we all fail. To sum this correction problem up in a few words, I might say, as Huxley once said: "Knowledge is not the main objective in life; it is action we need."

A Psychological Problem

While accident prevention effort is designed primarily to protect the physical welfare of the worker and cannot be too heavily emphasized in our safety work, there is, however, an important economic angle that should not be overlooked.

One of the problems confronting safety agencies is just how to place their finger upon definite proof that lives and money have been saved by their activities.

We who are constantly engaged in the work of gathering and analyzing accident statistics know that there is a certain fluctuation in accident trends. In some measure this is unaccountable, but if the records are given close scrutiny I believe you will find that epidemics of accidents can be easily traced to two sources; lack of safety methods, and a laxity in safe practices.

Too often, both industrial groups and individual concerns that take up accident prevention work are too easily disheartened by seeming futility of their efforts. They seem to expect that an adverse accident experience accumulated over a period of years can be wiped out by a few months of effort when, as a matter of fact, it is a long, uphill climb. To meet this long climb, it

line. The gasoline had spilled over the spot welder and burned him fatally.

There are two instances of lack of forethought in this accident—the first being that the seriousness of horseplay had not been properly brought home to the workmen; and secondly, lack of forethought by the person who had placed some gasoline in this fire pail and then left it around loose.

Recently a large plant had occasion to have a wall painted and hired an outside concern to do the job. It was only a one-man job and after he had set up a hanging scaffold and was about to start work, a foreman of this plant who had watched him purely out of personal curiosity, asked him whether he had a safety belt to use while on the scaffold. The man replied "No." The foreman then offered to let him use one which they had in the plant if the man cared to. The repair man said he would like to use it and he did. Within five minutes from the time he got up on the scaffold, something happened to cause the scaffold to fail and down it came. The man, however, was saved from a 35 foot fall by the safety belt.

Certainly here was advanced planning. Here was a foreman who had been trained to do a thinking job on each job. In fact "This Job of Safety" had been so well

brought home to him by his company's safety activities that he didn't stop with advance planning on his own work but even carried it to an outsider.

In conclusion—the main tool needed in advanced planning is our imagination. On our regular production line work where the operations are of a repetitive nature, get off in a corner somewhere for a half hour or an hour each week and watch, study, and analyze the actions and the way particular operations are performed by your employees. You may be astounded at the number of improvements which can simplify the production operations and tend to eliminate accidents which, after all, are merely outgrowths of inefficiency.

This advanced planning is the thinking through of the job details before the job is started, making sure that the probable accident hazards or incorrect ways of doing the job are recognized and corrected accordingly.

The correction phase of advance planning is best accomplished by personal contact between worker and boss. Make your plans of educating and training more on the individual and informal basis of man-to-man discussions about the right way of doing the specific job.

ADJOURNMENT

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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 whom 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 "put 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 119 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. And 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 so much to our industry's safety progress. The 1939 Campaign covered the 3-month period, April, May and June, and was in a large measure responsible for

safety progress made during the first half.

A model activities schedule for the campaign was prepared by the Association's Accident Prevention Bureau, and was intentionally made so full that no one plant could well follow it to the letter. The plan was such that almost any size program could be selected to meet individual needs. A valuable feature was a series of safety check lists used by members as yardsticks against which to measure safeguarding and safe practices standards. Emphasis was placed on the 4 danger spots which have been found to contribute so much to the severity of injuries.

Severity

You will recall that at last year's safety congress the results of an intensive study of injury severity were outlined. Declared to be the most arresting fact and the biggest safety problem facing the cement industry was the disproportionately high severity of injuries compared with the experience of comparable heavy industries. Over more than a quarter-century of organized safety work the number of accidents per million man hours was reduced 95 per cent. But reduction in severity of injuries has not kept pace.

The study showed that for years over 90 per cent of our industry's severity rate has been produced by the time charges for the three classes of injuries termed severe, namely, fatalities, permanent total and permanent partial disabilities. Analysis of severe injuries reported during the past five years indicated that four top danger spots in cement plants have contributed almost three-quarters of all fatalities and permanently crippling injuries. Last year the unusually large proportion of 90 per cent of such injuries were shown to be attributable to the four danger spots.

These producers of excessive injury severity are: moving machinery, high places (falling men and objects), electricity, and railroad. Last year moving machinery was responsible for almost half of all deaths and permanent injuries. High places accidents contributed almost one-fourth of them, electricity one-tenth and railroad more than 7 per cent.

The Committee on Accident Prevention and Insurance accepted the conclusion that each of the four danger spots represents

an environmental problem the solution which could reasonably be expected to be reached by engineering measures. It authorized continued research into the cause of excessive injury severity and suggested that safeguarding measures and safe practices be stepped up, with particular emphasis on the four chief causes.

This was done in the series of 21 regional safety meetings held in strategically located cities all over the United States attended by all but a handful of plant executives. It was done by means of a series of safety check lists prepared during the June Campaign. Additions and suggestions were included in the pages of the Monthly Accident Round Table and the monthly Clip Sheet of Safety Items of interest for use as discussion topics in plant safety meetings and in plant safety newspapers. Successive issues of Accident Prevention Magazine carried the story. A series of posters starring the cement industry's safety mascot, "Andy Seezit," further emphasized them at Campaign time.

Results Gratifying

What has been the result? It is not too early to evaluate properly the effect of this program to reduce injury severity other than to say that apparently we are on the right track. An estimated 42 per cent reduction in six months is no mean accomplishment; for severity largely determines the cost of accidents.

In the first 8 months of 1938, 15 cement men were killed or permanently injured in contact with moving machinery, only 6 less than were seriously hurt by machinery in the entire 12 months of 1937. In the first 8 months of 1939, however, only 10 cementmen were killed or permanently crippled by moving machinery. Five major moving machinery injuries have been averted although accidents from 11 more cement plants are represented in the data, and mill activity is 18 per cent above last year.

In the 8-month period ended in August six men have been injured seriously in falling from one level to another or being struck by something falling upon them from an upper level. This is one less such an injury than last year. Two have been killed in high places accidents whereas the lives of three were lost in the same period previously.

In the first eight months of last year two

Chemical Section

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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 natives and animals to safeguard life and prevent injury to themselves and others. The following is a summary of his talk.)

The prevention of personal injuries is the product of constructive thinking, purposeful planning, and effective execution. This is true whether or not the problem is one of providing adequate mechanical safeguards, or personal protective equipment for workers, preparing efficient operating procedures, educating and supervising employees to see that they know how, and do work safely. Last, but not least, profiting by, and applying the lessons learned from sad and costly experience.

Constructive thinking then, may be based upon experience, knowledge of hazards, and, may I include, for untrained natives, intuition.

In the true sense of the word, I could not be called a safety expert. But, in my type of life which, since I was a small child, has been endangered by many unusual hazards, I have learned the value of "constructive thinking." Risk cannot be taken in an African wilderness where even a minor accident may result in drastic consequences, owing to the difficulty in contacting help.

It was in 1800 that my ancestors first landed on the shores of the African continent. For month upon month they had battled unknown and storm ridden seas. Therefore, in spite of the desolation which this rocky coast presented, to them it was the Cape of Good Hope. They came as soldiers of His Majesty's Army, fighting through the Matebele, Zulu, and Boer wars. Because of their pioneering spirit, they stayed on when the conflicts were over. A grim determination carried them further into the hinterland. Not only because of humanity, but because of the hopeless aspects that would shadow their ideals, they could not afford to lose one man. The odds were great, making them constructive thinkers.

After the World War, my family moved to British East Africa, where I grew up to know and think with and like the African people.

My whole life, especially on hunting trips, has depended on effective execution. Fail once with a buffalo or elephant, and you seldom get the chance to learn from experience.

Safety devices and methods practiced by the African tribes are almost entirely those learned from sad and costly experience,

except for intuition. Now, of course, sat amongst them when working for us res from constructive thinking and plann effectively executed by them under guidance and compulsion.

They did not build impenetrable th fences around their homes until lion leopard had preyed upon their families flocks. They did not dig buffalo pits n the buffalo had ravaged their crops, a fire guards around their homes until great bush fires swept them away. T learned to wear leggings of banana lea and bark against the deadly strike snakes; to carry thin, flat stones on th heads, upon which angered tree sna struck in vain. So they went on learn until today they have effective methods safety.

The natives experience difficulty w modern machinery, and constantly requ direction and supervision. They must le through experience unless we use foresi and come forward to help them. This not difficult to understand, as even we called civilized people must, in the major of cases, learn this way, owing to our ability to listen to our advisors.

These African people have passed wa ings down to those who come after the so that they may benefit by others' ea experience. These are given in the fo of proverbs, in many cases closely connec with ours:—

"You will not be beaten when you thi before acting." (Look before you leap.)

"You can break a stick, but not a bundl (In unity there is strength.)

(Following this, Mr. Powell related se eral thrilling experiences while hunting e phant, and dealing with the natives, wh lack of constructive thinking and foresi resulted in very dangerous situations.)

Our animals have perhaps been the m fortunate in being endowed by nature w adequate protection. Because of their col ing so much resembling the regions in whi they live, they are difficult to detect. B they do not rely on protective colorin entirely, for during the heat of the d when they rest, you will usually find lone animal acting as a sentry.

I have not attempted to correlate t fundamental principles touched upon in n talk. But you, with your knowledge these fundamentals, can readily deduce t

little companies that have not been sold but they are coming to it very fast. The tide has turned and turned definitely, to flow on for years to come in favor of safer and more competent methods. The care of the worker today is given more thought; industrial relations are given more thought today than ever before; and it is growing on very stable ground.

W. C. SHAW (Proctor and Gamble, Cincinnati): We have factory inspection services in our various states. Why is it that the public schools and the vocational schools can get away with violating the safeguards and the rules that the states lay down?

CHAIRMAN WHITING: I suspect that money is in the picture. I don't know any college that has as much money as it would like to have to do a better job. About getting away with it, I don't know—they may not be subject to factory inspection.

MR. STRATTON: They are not subject to it.

MR. SHAW: They ought to be.

CHAIRMAN WHITING: But be sympathetic with our colleges. They haven't any experience on safety. We have to carry our experience to them under difficulties. Maybe they will come across in time, and maybe Mr. Warzala will have his dream come true. And it is the dream of all of us.

MR. ROGERS: I wonder if someone here could say a word or two about the attitude of the union group, where it exists in the chemical industry, towards the safety program. How are they falling in line, or do they have anybody who represents them, who helps to impress upon their group, through their own officers and meetings and what-not, that the union, as a union, is backing up the safety program?

CHAIRMAN WHITING: Will anybody volunteer some practical way of getting the backing of the union? I know cases where they have backed the safety movement in particular trades—and sincerely.

J. S. SHAW: It is written into some of the agreements between the union and the employer. Safety is featured there. The unions are writing it in.

MR. KEEFER: Do they appoint a representative from their group?

MR. SHAW: Safety is handled just like all the other phases or conditions of work. In several contracts (I reviewed a hundred last year that are published by the Department of Labor in Washington) safety is invariably one of the important things named in them.

CHAIRMAN WHITING: Is it carried out? Is it more than a name?

MR. SHAW: It is like everything else; it has to grow. It is taking root.

MR. KEEFER: Would you personally recommend, Mr. Shaw, that a union appoint one man in its group perhaps to sit in with management on the question of safety alone—give him one responsibility?

MR. SHAW: Not any more than I would have him sit in with management on any other phases of management. I wouldn't set safety out by itself. Let us have his working conditions so that they will be healthful and safe, and the hours of work and the rates of pay are all stated in the agreement. Some of the agreements are gentlemen's agreements and they are not signed; some are signed; and some are contracts. Safety appears frequently in them.

CHAIRMAN WHITING: Do unions cooperate in safety committee activities?

MR. SHAW: Yes, they will. After you get down to a friendly basis of work, they certainly will.

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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 1926, 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 41 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 Rates 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 figures for an industrial organization would double the average accident frequency rate for the balance of the group.

The lowest 1938 frequency rates were in river and harbor work, averaging 18.62. Severity rates were lowest for general building contractors, averaging 2.58. Both injury rates were highest in lock and dam construction and in steel erection. In the erection of structural steel frequency was 91.76 and severity 30.09.

In a series of 117 serious accidents in the Construction Industry reported to the Council, these percentages were developed:

Agencies of Injury

Elevators and hoisting equipment.....	17%
Machinery	14%
Working surfaces (ladders, scaffolds, etc.)	14%
Vehicles	13%
Hand tools	11%
Not otherwise specified	31%

Type of Accident

Falling, sliding, flying objects.....	40%
Caught in or between.....	25%
Falls, one level to another.....	13%
Inhalation, absorption, swallowing (acute action)	8%
Not otherwise classified.....	14%

Mechanical Cause

Unsafe planning, working methods, poor housekeeping, etc.....	38%
Improper guarding	23%
Defective agencies	21%
Non-use of protective equipment.....	4%
No mechanical cause	14%

Personal Cause

Improper attitudes	50%
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Unawareness of safe practices or lack of knowledge or skill 23%
Physical defects 3%
No personal cause 24%

The principal unsafe acts committed by employees in 60 serious injuries were:

1. Gripping, holding or lifting improperly
2. Standing under suspended loads or otherwise assuming an unsafe position
3. Unsafe use of tools and equipment
4. Starting, stopping, or otherwise moving without giving or getting the proper signal for failing to tag, lock, block or secure vehicles, switches, etc., against unexpected motion
5. Non-use of safe apparel or protective clothing, such as goggles and safety shoes.

In giving consideration to the figures, it should be recognized that they are taken from a very small sample, and are not therefore statistically representative of the entire industry.

The accident statistics of the Construction Industry as reported to the National Safety Council indicate that while very considerable improvements have been made in accident rates, there is still a great deal of pioneer work to be done, more especially among smaller contractors and on private work. Several government agencies are beginning to require the compilation of accident rates for private contractors on public work and are exerting an important favorable influence on accident experience. The slogan that should be broadcast throughout the construction industry and continually reiterated is:

The More You Hear of Safety, the Less You Hear of Accidents!

Safe Dredging Operations

By L. D. SHUMAN

Principal Engineer, in Charge of Dredging Operations, United States Engineer Office, Philadelphia, Pa.

The largest and most complex machines of the construction industry are not used in the building of modern skyscrapers nor the construction of tunnels and bridges, nor in the operation of mines. They are found on the work of dredging our harbors and our rivers. Some of them are capable of dredg-

ing 50,000 cubic yards of earth in a single work day.

Dredging has always been regarded as hazardous work. In fact, employers' liability rates on dredges, even in this day of safety-mindedness, average about \$10 per \$100 of payroll.

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MONDAY AFTERNOON SESSION

October 16, 1939

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

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

Precautionary Measures

Workmen unloading bulk lime from cars should wear close fitting goggles and a double band, dust tight respirator. The clothing at the neck, hands and feet should be close fitting.

Before handling the lime, all exposed parts of the body should first be treated with linseed oil or unguentine (Unguentine is better than linseed oil as it contains disinfectants to prevent infection).

Workmen engaged in slaking lime should wear goggles and tight fitting clothing at the neck, hands and feet.

A drinking fountain should be located near where the material is to be handled.

Quick action is required when the eye is burned. It should be thoroughly flushed with plenty of water. If a drinking fountain is available hold the eye open and flush thoroughly. Then use a 2 per cent solution of ammonium chloride as a neutralizer, continuing at half hour intervals for the first twenty-four hours.

The patient should be immediately placed in the care of an experienced physician.

The recent development of container cars for shipments of lime has made it possible to eliminate the hand unloading of the bulk product. Whenever the amount of lime consumed is of a large enough quantity, it is recommended that containers be used.

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- C. M. FELLMAN, Montreal Mining Co., Montreal, Wis.
- C. W. GIBBS, Hatwick 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. HENRI, Phelps Dodge Corp., Bisbee, Ariz.
- C. F. KICK, 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. SEIB, The New Jersey Zinc Co., Franklin, N. J.
- I. T. SICKS, St. Joseph Lead Co., Bonne Terre, Mo.
- C. L. STUBBS, The Koppers Coal Co., Pittsburgh, Pa.
- THOMAS J. TAYLOR, American Zinc Co., Mascot, Tenn.

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 speakers as listed in the program. The general theme for discussion in the various papers presented was, "The Executive Viewpoint

Safety Problems Faced in Bituminous Coal Mines

By HEATH S. CLARK

President, Rochester & Pittsburgh Coal Company, Indiana, Pa.

Necessarily, I approach this subject from the viewpoint of the office executive. That has been my entire experience in the bituminous coal industry and I would be presumptuous to discuss here the technical problems involved in safety in the bituminous mines.

The second point I want to stress is that this talk will deal with safety problems solely from the business aspect. I shall talk about safety in terms of dollars and cents, not because that is my only interest in it, but because, from the standpoint of the executive, it is the practical approach.

I do not want it to be said, however, that I, or this group, or the bituminous industry as a whole, is interested only in the commercial aspects. There is as much humanitarian spirit in the ranks of the bituminous industry as in any other—no more, perhaps, but certainly no less.

The bituminous coal industry is a hazardous industry. From the earliest days, the mining of coal has been attended by an appalling number of accidents. For far too long, this was accepted as a matter of course. One of the safety problems in our industry is to arouse those engaged in it, and particularly those in an executive capacity, to the fact that a high measure of safety in the bituminous mines can be attained, that most mining accidents are preventable and that the results therefrom will be reflected not only in the figures on the cost and loss statement but in many insurable ways that will make the industry more desirable and a better field in which to work.

While it is true that the safety problems faced in bituminous coal mines, and the answers to them, are known, it by no means follows that the problems and answers are simple. On the contrary, new methods of mining produce new problems, or variations of old ones, and new answers must be found. It is difficult to find these answers. It is not only the application of tried and true principles and sound common sense.

The mechanical loading of coal at the face is not new in some of the producing areas of this country, but in the Appa-

lachian field, which accounts for about 75 per cent of the country's production, it is relatively new and apparently on the increase. Each of the methods of mechanical loading brings certain variations of mining practices which call for new, or different, methods of operating. Variations in the width of headings and the length and width of rooms may be required. Roof control may require a different type of timbering than was used under hand loading. The installation of additional electrical apparatus at the face will constitute an additional hazard unless proper precautions are taken and the right kind of equipment used. There will be additional problems of ventilation and dust control.

These problems are known, and the answers to them are known or can be readily ascertained; and to prove that statement, I have only to refer to the publications which have been issued by the various Governmental agencies concerned with safety in the mines wherein are set forth the problems and their answers.

Inherently, the mechanical loading of coal will increase safety in bituminous mines. This is shown by the records made in fields where mechanical loading has been in vogue for many years and where some extremely good accident records have been established and maintained. There is need, however, to guard against a tendency to install and operate mechanical loading equipment without sufficient forethought as to the safety problems involved.

There has not been sufficient experience in the Appalachian region from which to draw definite conclusions from the statistics that are available but there seems to be an upward trend in the accident rate immediately following the installation of mechanical equipment and then a gradual downward trend until, eventually, a frequency is obtained lower than that prevailing under hand loading methods. If this is true, it must, in some measure at least, be attributed to a lack of proper appraisal of the safety problems involved and a lack of intelligent forethought and sound planning to meet the problems.

Paper and Pulp Section

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- General Chairman*—F. A. ROBINSON, Kimberly-Clark Corp., Neenah, Wis.
Vice-Chairman in Charge of Membership—D. B. CHANI, Ontario Pulp & Paper Makers' Safety Assn., Toronto, Ont., Canada.
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News Letter Editor—L. R. SIMPSON, The Brown Paper Mill Co., Inc., Monroe, La.
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 B. D. ROGERS, Bird & Son, Inc., East Walpole, Mass.
 F. H. ROSEBUSH, Nekoosa-Edwards Paper Co., Port Edwards, Wis.
Data Sheet Committee—R. G. MCGIVNEY (Chairman), Oswego Falls Corp., Fulton, N. Y.
 J. J. HASTINGS, Port Huron Sulphite & Paper Co., Port Huron, Mich.
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 JAMES W. TOWSON, West Virginia Pulp & Paper Co., New York, N. Y.
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 M. W. DUNDORF, Beloit Iron Works, Beloit, Wis.
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 C. O. HOLMER, Minnesota & Ontario Paper Co., Minneapolis, Minn.
 D. A. McALARY, Fraser Companies, Ltd., Edmundston, N. B., Canada.
 ROLAND W. RICHARDSON, The Gardner-Richardson Co., Lockland, Ohio.
Safety Instruction Card Committee—ERNEST AUGUSTUS (Chairman), The Mead Corp., Chillicothe, Ohio.
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 ARTHUR E. WINSLOW, Hollingsworth & Whitney Co., Waterville, Maine.
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 DON E. McDOWELL, Kalamazoo Vegetable Parchment Co., Parchment, Kalamazoo Co., Mich.
 WALTER E. STRONG, Marathon Paper Mills Co., Menasha, Wis.
 K. G. URFER, Hawley Pulp & Paper Co., Oregon City, Oregon.
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 ROBERT M. ALTMAN, Marathon Paper Mills Co., Rothschild, Wis.
 KENNETH L. FAIST, The Champion Paper & Fibre Co., Hamilton, Ohio.
 WALTER A. GLEASON, Hammermill Paper Co., Erie, Pa.
 E. E. GRANT, The Crystal Tissue Co., Middletown, Ohio.
 M. G. HOYMAN, Kimberly-Clark Corp., Neenah, Wis.
 G. W. PHILLIPS, The Champion Paper & Fibre Co., Canton, N. C.
 J. J. PIZAK, Consolidated Water Power & Paper Co., Wisconsin Rapids, Wis.

SAMUEL PRYNN, Finch, PLYNN & Co., Inc., Glens Falls, N. Y.
 S. E. SHAFER, Kimberly Clark Corp., Neenah, Wis.
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 L. R. SIMYSON, The Brown Paper Mill Co., Inc., Monroe, La.
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 GEORGE J. ADAMS, International Paper Co., Glens Falls, N. Y.
 ROBERT M. ALTMAN, Marathon Paper Mills Co., Rothschild, Wis.
 KENNETH L. FAIST, The Champion Paper & Fibre Co., Hamilton, Ohio.

WALTER A. GLEASON, Hammill Paper Co., Erie, Pa.
 E. E. GRANT, The Crystal Tissue Co., Middletown, Ohio.
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 G. W. PHILLIPS, The Champion Paper & Fibre Co., Canton, N. C.
 J. J. PIZAK, Consolidated Water Power & Paper Co., Wisconsin Rapids, Wis.
 SAMUEL PRYNN, Finch, PLYNN & Co., Inc., Glens Falls, N. Y.
 S. E. SHAFER, Kimberly Clark Corp., Neenah, Wis.
 GEORGE E. WILLIAMSON, Stillmore Paper Co., West Springfield, Mass.

MONDAY AFTERNOON SESSION

October 16, 1939

The opening session of the Paper and Pulp Section convened with Vice-Chairman D. B. Chant, Ontario Paper and Pulp Makers' Safety Association, Toronto, Canada, presiding.

CHAIRMAN CHANT: At this, our first session of the Congress, let us follow the practice, which I think is now two or three years old, of introducing ourselves to each other. This will help to make us all feel we are members together in this great organization, with a common

interest in our common safety problems.

(Each member present arose and stated his name and company affiliation.)

CHAIRMAN CHANT: We are happy to note a number of visitors with us this afternoon. I hope they will feel welcome, and will obtain something of interest and value from the discussion.

The first item on the program will be a report on the past year's progress and activities of the section.

Progress and Activities of the Section

By D. B. CHANT

Acting General Chairman, Paper and Pulp Section, N.S.C.

In attempting to review for you the various activities of our Section I shall try to tell the story briefly, and I ask you to remember that this duty has very recently devolved upon me.

In Memoriam—During the year our Section has suffered the loss of three of its staunchest supporters in the persons of Edward B. Fritz, Fred A. Robinson and Walter J. Brennan. The late Mr. Fritz had much to do with the inauguration several years ago of the Annual Safety Contests among mills of the Section. He always took a keen interest in our work and was a familiar figure at the Section luncheons where he derived deep satisfaction from personally awarding the major trophy to the successful company.

Fred Robinson's contribution to the progress of this Section was invaluable. His sincerity of purpose, sound judgment, great

ability and willingness to devote his time and energy in the service of his fellow-men marked him as a natural leader, while his splendid personality and sterling character won him a host of friends to whom his recent and unexpected death came as a terrible shock. As General Chairman for the current year he worked hard to promote the best interests of the Section and gave constant encouragement and wise counsel to all its committees and officers.

Walter J. Brennan's death occurred unexpectedly on October 4th, 1939, at Augusta, Maine. Formerly connected with the St. Croix Paper Company, Walter took an active part in the work of this Section until a few years ago and served as its General Chairman for 1930-31. Latterly, he has been Executive Secretary for the Associated Industries of Maine. His capacity for work, his wide experience and the conscientious

service to those in that end, if you will write to me as your General Chairman I will undertake to see if something can be done through the National Safety Council, to stimulate activity either in the Wood Products Section under which I believe it now comes, or, failing that, perhaps some movement can be started in the Paper and Pulp Section.

I see Scott Dowd agreeing with me. He is aware of that problem and has been for a number of years. Maybe we can get some rearrangement in the National Safety Council so that we can take care of this and give service to those in our woods work.

MR. ROSEBUSH: Would it be possible for this Section, through the National Safety Council, to get some pamphlets of instruction out which could be given to the foreman who is in contact with these men, pamphlets on how to protect themselves in the woods operations which would be supplementary to our mill safety program?

CHAIRMAN CHANT: I think it can be done, but as things stand now it is none of our business. The lumber operations and the logging operations come under the Wood Products Section, and so far as I have been able to find out, evidently a demand for this activity has not existed. That is not intended as criticism. Their work is mainly concerned with factory operations after the log gets to the saw-mill, and so on. They do a grand job of safety work in that connection, but they leave out entirely the poor wood chopper, and he is left out on a limb.

Maybe it will be necessary to arrange something in the Paper and Pulp Section. Perhaps we can get permission under our present rules to take in the woods operations of paper companies. Certainly in this great organization we ought to be able to get something done for the wood cutter who has a real problem on his hands.

MR. AUGUSTUS: I wonder how many of us in this Paper and Pulp Section are giving any thought to the off-the-job accidents and what they are costing our companies?

In our organization, I know that our off-the-job accidents, as far as severity and frequency are concerned, are three or four

times as great as our on-the-job accidents.

I heard a gentleman say this morning, a safety director for a large corporation employing men in twenty-three states, that his proportion was 36 fatalities in a five-year period among some 90,000 employees for on-the-job accidents, whereas for off-the-job accidents they had 203 fatalities.

Now, those 203 fatalities cost the company a lot of money.

Another speaker at the same session told of one instance where a man was seriously injured in an off-the-job accident. He had no money to pay his \$750 hospital bill, and his company took pity on him and paid it. Many of the rest of the companies have done the same thing, and I think our Section might well give thought to this between this meeting and the next.

I think the proper committee for that kind of thing might try to collect data and information on what our off-time accidents are costing us and what we can do as safety men to put on a program of education along those lines, so that our employees will not only practice safety in the plant but off the job as well.

If you fellows have records, check up on them and see what those accidents are costing you.

CHAIRMAN CHANT: That is a good thought. In one of my own group last year, one of the off-the-job accidents involved two back tenders, a third hand and a master mechanic. They were coming from a dance fifty miles down the road, and they were driving through a fog. Now, they have not had a fatality in the mill for five years, but you can figure out for yourself what that accident cost the company. It certainly cost plenty to train these men and it cost plenty to replace them.

MR. DRAPER: Before we adjourn, I think it would be in order for this Section to give a rising vote of thanks to express our appreciation of the fine way in which Mr. Chant, our Chairman, has taken the Chair at our sessions on such very short notice. I so move.

(The motion was numerous seconded put to a vote and carried unanimously.)

ADJOURNMENT

Petroleum Section

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 News Letter Editor—R. S. HUELMAN, Oklahoma Natural Gas Company, Tulsa, Okla.
 Engineering Committee Chairman—G. E. CARPENTER, Humble Oil & Refining Co., Houston, Texas.
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Fire Chairman for Marketing—F. R. McLEAN, White Star Div., Socony Vacuum Oil Co., Inc., Detroit, Mich.

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J. H. BROWN, Tide Water Associated Oil Co., New York, N. Y.

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G. O. LOCKWOOD, Continental Casualty Co., Tulsa, Okla.

GEO. I. PRESSING, Union Oil Co. of Calif., Los Angeles, Calif.

R. B. ROYER, Humble Oil & Refining Co., Houston, Texas.

E. I. SENNE, Socony Vacuum Oil Co., Inc., New York, N. Y.

C. W. SMITH, Standard Oil Co. (Ind.), Chicago, Ill.

D. I. WALLACE, Sinclair Prairie Oil Co., Tulsa, Okla.

Secretary—H. N. BEAKSELL, American Petroleum Institute, New York, N. Y.

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 to Manager, The Texas Company, Houston, Texas.

For Production, C. J. Nobmann, Vice-Chairman, Petroleum Section, and Manager, Safety Department, Shell Oil Company, Inc., San Francisco.

For Manufacturing, J. L. Risinger, Vice-Chairman, Petroleum Section, and Safety Director, Socony-Vacuum Oil Company, Inc., New York City.

For Marketing, F. R. McLean, Vice-Chairman, Petroleum Section, and Manager,

Safety & Insurance Department, White Star Division, Socony Vacuum Oil Company, Inc., Detroit.

General Chairman Brown then proceeded with the regularly scheduled list of formal papers, as follows:

Educational Problems in Manufacturing Plants

By WALTER B. RUST

Standard Oil Development Company, Bayway, N. J.

The educational problems existing in our refineries may be stated briefly as follows:

1. How to train the employees to know more about their jobs, both in practice and theory.

2. How to teach them enough about the business and its administration so that they understand things such as—

(a) Why they do what they do the way they do it.

(b) Why they are paid what they are paid, both for any particular job and considering the salary and wage scale as a whole.

(c) How they can better their own positions in their organization both in rank and in wages paid for their job.

(d) Why the various personnel plans are offered to them.

3. How to clearly interpret the personnel plans to the employees so that they may make the best use of them.

This brief statement sounds rather simple and obvious, but when we break these general problems down to more specific ones and then actually start to deal with those, we have something very complex. Experience has taught us that we shall probably never be able to solve these problems completely, but we know that we must do our best, if our companies are going to have efficient labor forces and if we are going to be able to live with our employees as friends rather than enemies. I feel that what industries in general can do on this matter will largely decide the success or failure of our capitalistic system.

Many types of problems are involved in dealing with the first problem cited, that of how to train our employees how to know more about their jobs, both practically and theoretically. From the practical end there

is job training, both that which teaches the employees their daily routines on specific jobs and the more general training, such as obtained in apprentice courses. Safety, of course, is stressed in this practical training. The theoretical training might not seem quite as necessary, since it does not teach a man how to better perform his specific job (other than for mental attitude perhaps), but it does inform him in the reasons behind what he is doing. This, in turn, makes him more flexible and trains him for greater responsibilities later.

The second general problem, how to teach employees more about the business and its administration, is receiving more attention every day. Recently I had occasion to review, somewhat in detail, three personnel publications: "Personnel," "Personnel Journal" and "Supervision." A central theme in all of them was that if employers wanted smooth industrial relations, they had to treat their employees as individuals with questioning minds and as individuals who were most willing to cooperate with management, if they could be sure that management really had their welfare at heart and would not take advantage of them, if given the opportunity. It is not easy to know how much an employee should be told and cares about being told regarding the administration of a business, but the concern which has learned the answer to this question and has an industrial relations program permitting frankness with their employees on these matters of vital interest to them, probably is in a very fortunate position.

As to personnel plans, most companies offer their employees a variety, including group insurance, annuity plans, thrift plans and the like. These companies are not getting the most from this policy, if their employees do not fully appreciate what they

Power Press Section

Officers 1938-1939

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Vice-Chairman and Secretary—G. H. BERRY, Western Electric Co., Chicago, Ill.
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 R. W. HOBSON, Gorham Manufacturing Co., Elmwood, Providence, R. I.
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 C. E. LEBBY, Scintilla Magneto Co., Inc., Sidney, N. Y.
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 J. G. FREDERICKSON, Chicago Hardware Foundry Co., North Chicago, Ill.
 C. J. KOER, Colonial Radio Corp., Buffalo, N. Y.
Notes at Large—
 J. D. BERMAN, Western Electric Co., Chicago, Ill.
 * B. GIBSON, Western Electric Co., Chicago, Ill.

- *H. C. Howsaw, Hubbard Spool Co., Chicago, Ill.
- *P. T. Hunter, Motor Wheel Corp., Lansing, Mich.
- *G. A. KUTCHENMASTER, Dominion Forge & Stamping Co., Walkerville, Ont., Canada
- *T. O. MEISNER, American Can Co., Chicago, Ill.
- *S. H. SEAYMAKER, Fairbanks Morse & Co., Beloit, Wis.
- *H. I. VITS, Aluminum Goods Mfg. Co., Manitowoc, Wis.
- *E. J. WALLMAN, Great Lakes Forge Co., Chicago, Ill.
- *Past General Chairman

Officers 1939-1940

- General Chairman*—M. R. ZIEGLER, Edison General Electric Appliance Co., Inc., Chicago, Ill.
- Vice Chairman*—G. H. BERRY, Western Electric Co., Chicago, Ill.
- Secretary and News Letter Editor*—O. C. BOULFAU, RCA Manufacturing Co., Inc., Camden, N. J.
- Engineering Committee*—LOUIS BORAKS (*Chairman*), Liberty Mutual Insurance Co., Boston, Mass.
- F. W. FISKE, The Brewster-Titchener Corp., Cortland, N. Y.
- Exhibit Committee*—E. C. WOODWARD (*Chairman*), Edison General Electric Appliance Co., Inc., Chicago, Ill.
- F. E. ARDREH, John Deere Harvester Works, Deere & Co., East Moline, Ill.
- F. G. FREDRICKSON, Chicago Hardware Foundry Co., North Chicago, Ill.
- C. J. KOHN, Colonial Radio Corp., Buffalo, N. Y.
- Health Committee*—DR. R. F. DEMOLLE (*Chairman*), Pullman Standard Car Manufacturing Co., Pullman, Chicago, Ill.
- F. E. GREENE, Timken Roller Bearing Co., Canton, Ohio.
- Industrial Data Sheet Committee*—W. J. GRAVES (*Chairman*), Michigan Mutual Liability Co., Detroit, Mich.
- W. C. BAKER, Whiting Corp., Harvey, Ill.
- R. W. HOBSON, Gorham Manufacturing Co., Elmwood, Providence, R. I.
- Membership Committee*—C. E. LIBBY (*Chairman*), Scintilla Magneto Div., Bendix Aviation Corp., Sudbury, N. Y.
- B. A. GRANSER, Bendix Products Div., Bendix Aviation Corp., South Bend, Ind.
- A. J. LAWRENCE, American Forging & Socket Co., Pontiac, Mich.
- Poster Committee*—N. V. B. ZIEGLER (*Chairman*), Aluminum Company of America, New Kensington Works, New Kensington, Pa.
- THOS. D. LAW, Oneida, Ltd., Oneida, N. Y.
- H. A. ZACHARI, Henry Vogt Machine Co., Louisville, Ky.
- Program Committee*—E. C. SCHULTES, JR. (*Chairman*), C. Hager & Sons Hinge Manufacturing Co., St. Louis, Mo.
- M. J. FREDMAN, General American Transportation Corp., Chicago, Ill.
- C. S. PHILLIPS, Revere Copper & Brass, Inc., Rome, N. Y.
- Publicity Committee*—G. R. TYBRING (*Chairman*), International Business Machines Corp., Endicott, N. Y.
- F. B. KARR, Fisher Body Cleveland Div., General Motors Corp., Cleveland, Ohio.
- H. A. McDONALD, Erie Forge Co., Erie, Pa.
- Safety Instruction Card Committee*—J. R. COX (*Chairman*), Fairbanks Morse Co., Beloit, Wis.
- C. A. DEMOLLE, Kelsey-Hayes Wheel Co., Detroit, Mich.
- A. H. PFEIFFER, Harnischfeger Corp., Milwaukee, Wis.
- Statistics Committee*—P. L. BRAND (*Chairman*), Pullman-Standard Car Manufacturing Co., Pullman, Chicago, Ill.
- B. F. HISE, Scovill Manufacturing Co., Waterbury, Conn.
- Members at Large*
- F. D. BERMAN, Western Electric Co., Chicago, Ill.
- *H. C. Howsaw, Hubbard Spool Co., Chicago, Ill.

WEDNESDAY AFTERNOON SESSION

October 18, 1939

Joint Meeting with the Automotive and Machine Shop Section

(The Report of this Session will be found on Page 252 of this Volume)

THURSDAY AFTERNOON SESSION

October 19, 1939

Power Press Safety—Panel Discussion

The session was called to order by General Chairman B. E. Rockhoff, Development Department, Detroit Steel Products Company, who presided while the report of the Nominating Committee of the Section was presented and officers elected for the coming year. A list of these, with active committees, is given elsewhere in this record.

Chairman Rockhoff also made a brief report of activities of the Section and of Committee Chairman during the past year. He then turned the meeting over to Mr. J. D. Berman, Director of Safety and Health of the Western Electric Company, Inc., Hawthorne Works, Chicago, who presided during the Panel Discussion, to which the remainder of the session was devoted.

Chairman Berman introduced the members of the Panel, as follows:

- T. O. Meisner, American Can Company, Chicago.
- G. R. Tybring, International Business Machines Corporation, Endicott, N. Y.

F. J. Riegel, Western Electric Company, Chicago.

Louis Boraks, Liberty Mutual Insurance Company, Boston.

N. V. B. Ziegler, Aluminum Company of America, New Kensington, Pa.

J. C. Bower, Westinghouse Electric & Manufacturing, East Pittsburgh, Pa.

CHAIRMAN BERMAN: The first question on the lineup is: "Should Goggles Be Worn by Punch Press Operators?" We are going to ask Mr. G. B. Tybring to discuss this question. After which, anyone else on the panel may enter the discussion, and the question will also be open for members from the floor.

MR. TYBRING: It occurs to me that the answer is found within the question itself, by transposing the words to read, "Goggles should be worn by press operators." We all agree that goggles should be worn and the eyes should be protected in any circumstance where the eyes are exposed to flying particles. There is no argument against that.

muscle resulted. Investigation revealed that long hours and the handling of 300 lb. blocks of ice had weakened his system. Our regulations prohibit such long hours and the handling of over 150 lbs. by one man.

A new man was employed to adjust the long hours. The manager told the new driver not to lift ice in excess of 150 lbs. and to build a chute for icing the shrimp house. This was done, but the manager failed to check up to see if it worked out satisfactorily.

A few mornings later the new driver was lifting one end of the 300 lb. block up and over the 2 x 4 cross member at the rear of the truck with his back to the outside edge of the truck bed. Thus, of course, was the wrong way to handle the ice, which slipped and started down the chute. A helper on the ground grabbed at the sliding block with one point of his tongs and the other point struck the driver in the leg. Possibility of a recurrence of this mishap was easily eliminated by cutting the 2 x 4 the width of the ice and placing it on hinges so that

the ice could shoot into the chute instead of being pulled into it.

A short time later in the same district a driver was traveling into the sun at about 1:40 in the afternoon and fell asleep. His truck hit a concrete bridge abutment, and he was severely injured. Investigation proved that this driver had been getting up every day at 4 o'clock in the morning to deliver ice to an oil camp and then working right on until evening.

It had been only a short time since a similar problem had been worked out by putting on an extra employee. A second accident occurring for the same reason was just too much. A special investigation revealed that this manager was not on the job and it became necessary to take drastic action.

If he had been giving proper supervision by making the rounds with the employees, he would have detected the safety violation and could have corrected it, thereby avoiding these accidents. These three cases clearly illustrate what will happen to men when they do not have proper supervision.

ADJOURNMENT

Rubber Section

Officers 1938-1939

- General Chairman*—R. A. BULLOCK, Corduroy Rubber Co., Grand Rapids, Mich.
Vice-Chairman in Charge of Program—R. W. MORSE, The Firestone Tire & Rubber Co., Akron, Ohio.
Secretary—OLIVER HOPKINS, U. S. Rubber Co., Providence, R. I.
News Letter Editor—C. W. UFFORD, Ohio Rubber Co., Willoughby, Ohio.
Engineering Committee Chairman—RALPH S. FARNUM, U. S. Rubber Co., Detroit, Mich.
Health Committee—DR. W. S. ASH, U. S. Rubber Co., Detroit, Mich.
 DR. P. A. DAVIS, The Goodyear Tire & Rubber Co., Akron, Ohio.
 DR. J. NEWTON SHIRLEY, Arrow Mutual Liability Insurance Co., Watertown, Mass.
Membership Committee Chairman—R. M. WEIMER, The Dayton Rubber Manufacturing Co., Dayton, Ohio.
Publicity Committee Chairman—JOHN L. GRIDER, American Hard Rubber Co., Butler, N. J.
Statistics Committee Chairman—ROLAND KASTEL, U. S. Rubber Co., New York, N. Y.
Members at Large—
 JOHN J. LOGE, The General Tire & Rubber Co., Akron, Ohio.
 J. E. LOVAS, U. S. Rubber Co., Passaic, N. J.
 W. H. MACKAY, Dunlop Tire & Rubber Corp., Buffalo, N. Y.
 URRAN L. MOFFER, Inland Div., General Motors Corp., Dayton, Ohio.
 WILLIAM SPANTON, American Hard Rubber Co., Akron, Ohio.
 PAUL VAN CLEEF, Van Cleef Brothers, Chicago, Ill.
 D. G. WELCH, Hewitt Rubber Corp., Buffalo, N. Y.
Past General Chairmen—
 E. W. BECK, U. S. Rubber Co., New York, N. Y.
 A. M. DIETZ, Pennsylvania Rubber Co., Jeannette, Pa.
 C. F. HORAN, Hood Rubber Co., Watertown, Mass.
 J. T. KIDNEY, The Goodyear Tire & Rubber Co., Akron, Ohio.
 H. A. WALKER, The Goodyear Tire & Rubber Co., Akron, Ohio.

Officers 1939-1940

- General Chairman*—R. W. MORSE, The Firestone Tire & Rubber Co., Akron, Ohio.
Vice-Chairman in Charge of Program—OLIVER HOPKINS, U. S. Rubber Co., Providence, R. I.
Secretary—C. W. UFFORD, Ohio Rubber Co., Willoughby, Ohio.
News Letter Editor—RALPH S. FARNUM, U. S. Rubber Co., Detroit, Mich.
Engineering Committee Chairman—D. G. WELCH, Hewitt Rubber Corp., Buffalo, N. Y.
Health Committee—DR. W. S. ASH (Chairman), U. S. Rubber Co., Detroit, Mich.
 DR. P. A. DAVIS, The Goodyear Tire & Rubber Co., Akron, Ohio.
 DR. J. NEWTON SHIRLEY, Arrow Mutual Liability Insurance Co., Watertown, Mass.
Membership Committee Chairman—JOHN L. GRIDER, American Hard Rubber Co., Butler, N. J.
Publicity Committee Chairman—R. M. WEIMER, The Dayton Rubber Manufacturing Co., Dayton, Ohio.
Statistics Committee Chairman—G. E. TEAL, U. S. Rubber Co., Naugatuck, Conn.
Members at Large—
 J. J. LOGE, General Tire & Rubber Co., Akron, Ohio.
 J. E. LOVAS, U. S. Rubber Co., Passaic, N. J.

W. H. MACKAY, Dunlop Tire & Rubber Corp., Buffalo, N. Y.
 EDWARD L. MORRIS, Inland Div., General Motor Corp., Dayton, Ohio
 C. FRECHARD, Ball Band Plant, U. S. Rubber Co., Mishawaka, Ind.
 W. SEYDOR, American Hard Rubber Co., Akron, Ohio
 PAUL VAN COTT, Van Cotte Bros., Chicago, Ill.

Past General Chairmen

E. W. BECK, U. S. Rubber Co., New York, N. Y.
 R. A. BULLOCK, Corduroy Rubber Co., Grand Rapids, Mich.
 A. M. DIEZ, Pennsylvania Rubber Co., Jeannette, Pa.
 C. F. HOBAN, Hood Rubber Co., Watertown, Mass.
 L. T. KIDNEY, The Goodyear Tire & Rubber Co., Akron, Ohio.

TUESDAY AFTERNOON SESSION

October 17, 1939

The opening session of the Rubber Section was called to order by General Chairman R. A. Bullock, Personnel Director, The Corduroy Rubber Company, Grand Rapids, Mich., who presided. Chairman Bullock first made a brief report of the activities of sectional committees during the past year, and then introduced the scheduled speakers.

Unfortunately the formal paper to be presented on the subject of "Carbon Tetrachloride in the Rubber Industry" was not available, and in the absence of the scheduled speaker a short discussion ensued. Led by C. W. Ulford, Personnel Manager, The Ohio Rubber Company, Willoughby, Ohio, this discussion has been summarized by Mr. Ulford for these Transactions as follows:

Carbon Tetrachloride Problems

It was pointed out that many of the small companies, in particular, have used carbon tetrachloride in washes and solvents in order to reduce the fire and explosion hazards to the people handling these materials. There is no question but that these same companies have experienced a wave of carbon tetrachloride sickness as a result and that there is room for considerable discussion as to a solution to the problem.

Ventilation on fixed installations can reduce the fume hazard materially, but the problem of local and oftentimes unauthorized use of carbon tetrachloride for isolated jobs still presents a real problem. The

question is, can a suitable control or a suitable substitute be found for carbon tetrachloride?

The discussion showed that many companies have definitely experienced ill effects from the use of carbon tetrachloride; to such an extent that many of the companies represented have prohibited its use in any form and have substituted a standard cleaning solvent known as Stoddard's Solvent or Solvent No. 5, which is used commonly in large quantities with complete safety in the cleaning industry.

Substitutes Dry Slowly

This point brought up the fact that many of the substitutes for carbon tetrachloride are very slow in drying and that factor has kept their use out of many operations. Several representatives said, however, that the difference was so slight as to be negligible and the advantage so great as to warrant a change in the expected operation time.

No definite conclusion was reached, although the majority of representatives felt that carbon tetrachloride had been eliminated from their use, and that by correct use of the various substitutes under conditions of their peculiarities, very satisfactory results had been obtained. Another group of representatives said that they had had satisfactory results from substitutes and that they were still faced with the hazard of carbon tetrachloride, particularly in washes, though not so much in solvents.

Progress of Safety in the Rubber Industry

By ERNEST W. BECK

Supervisor of Safety, United States Rubber Company, New York City

The National Safety Council today shows the rubber industry as *third* in severity and *fifth* in frequency among thirty major industries.

At the time of the organization of the Rubber Section of the National Safety Council in 1919 the rubber industry was regarded as a most hazardous one. After strenuous work and close cooperation on the part of everyone in the industry, in 1931 it stood *tenth* in frequency and *ninth* in severity among twenty-eight leading industries. In 1936 we took *fifth* place on the basis of frequency and *seventh* on the basis of severity in a list of thirty industries.

Our constructive work was really started twenty years ago when the Executive Committee of the Rubber Section, N. S. C., promoted the written standard practice for reporting accidents. As a result our industry can show accident figures for comparative purposes as far back as 1921.

Annual statistical reports show that the predominating number of serious accidents occurring in the rubber industry were due to machinery. Some of this machinery, such as mills, cannot be guarded at the point of operation. With this in mind, the Executive Committee of the Section devoted considerable attention to cooperating with machinery manufacturers, electrical equipment manufacturers, rubber manufacturers and State Departments of Labor, on the subject of drawing up a standard safety code covering safety factors on mills and calenders. The approved code was printed in March, 1930, and distributed as recommended American practice.

The adoption of this code has resulted in a marked reduction in accidents on mills and calenders. In fact, in 1938, not one person was injured in the rolling of calender rolls among the employees of a large number of companies which I have named. The survey covered a spread of 81,000,000 manhours worked each year or a total of 165,000,000 manhours. These same rubber companies reported but one accident at the bite of mill in 1935 with a cost of \$850.

Under the joint sponsorship of the Rubber Section and the Chemical Section, N. S. C., a complete report on "Benzol" was drawn up and received national recognition. The Rubber Section, through its annual meetings, has given publicity to outstanding authorities on such subjects as "Compounding Materials Used in the Rubber Industry," "Static Electricity," "Vulcanizing," "Fire and Dust Hazards in the Rubber Industry," "Digesters," "Hazards of Reclaiming," "Occupational Skin Diseases," etc.

During the past year our Rubber Section recognized the importance of revising Safe Practices Pamphlets RU-1 and RU-3—"Compounding Materials Used in the Rubber Industry." The work is in charge of a committee of which Dr. W. A. Gibbons, United States Rubber Company, Passaic, N. J., is chairman. Inasmuch as many rubber manufacturers are hesitant to use compounds which are not listed in the Safe Practices Pamphlets, it becomes a matter of concern to both the manufacturer and user that correct information regarding the later chemicals now in use in rubber compounding be classified and listed. A large number of questionnaires have been sent out to both manufacturers and users of rubber chemicals, and the work of this committee will assist materially in the safe handling of certain chemicals and compounds.

In the development of the Rubber Section safety program an excellent spirit of cooperation was created among the safety engineers of the industry. Rubber companies, while competitors in the marketing of their finished products, are extremely cooperative in the development of safety measures. This is a very real problem as the accident cost in large rubber companies over a period of 15 years shows that much less than 1 per cent of the total expense was paid for occupational disease, including chemical hazards. We seldom hear of a case of lead, benzol or aniline poisoning in our industry. The fact that many large rubber companies carry their own compensation insurance has tended

analysis should be generally approved, and received an affirmative answer. The showing of hands was practically unanimous. His own opinion was that it was a very good basis upon which to formulate discussion,

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

ADJOURNMENT

Steam Railroad Section

Officers 1939-1940

General Chairman—E. L. HENRY, Chicago & North Western Railway Co., Chicago, Ill.
Vice Chairman—D. G. PHILLIPS, Wabash Railway Co., St. Louis, Mo.
Secretary and News Letter Editor—P. E. BUCKLE, Chicago, Burlington & Quincy Railroad Co., Chicago, Ill.
Program Chairman, J. R. TENNEY, Western Maryland Railway Co., Hagerstown, Md.
Membership Chairman, ROBERT SCOTT, Atlantic Coast Line Railroad Co., Wilmington, N. C.
Statistics Chairman, T. H. CARROW, Pennsylvania Railroad, Philadelphia, Pa.
Guest Chairman, C. L. LAFONTAINE, Great Northern Railway, St. Paul, Minn.
Publicity Chairman, L. J. BENSON, Chicago, Milwaukee, St. Paul & Pacific Railroad Co., Chicago.
Practices Pamphlet Chairman, W. J. WEIL, Delaware, Lackawanna & Hudson Railroad, Scranton, Pa.
Nominations & Elections Chairman, W. C. SHELVER, Union Pacific Railroad Co., Omaha, Neb.
Health Chairman, DR. IRVING S. CUTLER, Chicago & North Western Railway Co., Chicago.

TUESDAY AFTERNOON SESSION

October 17, 1939

The opening session of Steam Railroad Section 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 one 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 those who believe in safety, who preach it, 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, 1869, quoted—

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.
- Beusch & Lomb Optical Co., Rochester, N. Y.
Safety Goggles and Safety Lenses.
- Best 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.
- Burton R. Browne Manufacturing Co., New York, N. Y.
Safety and Special Purpose Lights and Lamps.
- B. 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.
- Chemulphoil Co., Dallas, Texas.
Foils for Burns and Industrial Wounds.
- Childs & Co., Inc., Pittsburgh, Pa.
Industrial Safety Shoes.
- Cleveland Overall Co., Cleveland, Ohio.
Safe Industrial Work-Clothing and Uniforms.
- Hoist Co., Danville, Ill.
Cable Hand and Electric Hoists.
- James McKinnon Chain Corp., Tonawanda, N. Y.
Alloy Steel Sling Chains and Safety Hoists.
- McCoy & Cover, South Bend, Ind.
Respirators and Rubber Safety Goggles.
- Mock-Terry Shoe Corp., Lynchburg, Va.
Industrial Safety Shoes.
- Emergency Equipment Co., Inc., New York, N. Y.
First Aid and Industrial Safety Equipment.
- Dockson Co., Detroit, Mich.
Head and Eye Protection Equipment.
- Engineering Corp., Chicago, Ill.
Fire Extinguishing Equipment.

- 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.**
Safe 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.**
Long Reinforced Tire Chains
- International Shoe Co., St. Louis, Mo.**
Hi-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 Cord Sole and Heel Co., Lima, Ohio.**
Non-Slip Soles and Heels
- Lumbermen's Mutual Casualty Co., Chicago, Ill.**
Automobile, Compensation and General Casualty Insurance
- Lyon Metal Products, Inc.**
Showerway, Lockers, Shelving, Folding Chairs
- The Martindale Electric Co., Cleveland, Ohio.**
Stretcher Cots, Safety Road Signs, Respirators for Non-Toxic Dusts
- Masury-Young Co., Boston, Mass.**
Materials for Finishing and Maintaining Safe Floors
- Thom McAn Safety Shoe Co., New York, N. Y.**
Thom McAn Safety Shoes
- Medical Specialties Co., Indianapolis, Ind.**
The Harger Drunkometer
- Metropolitan Life Insurance Co., New York, N. Y.**
Life, Health, Accident, Pension and Group Insurance
- Milburn Co., Detroit, Mich.**
Protective Cream for Prevention of Occupational Skin Diseases
- Mine Safety Appliances Co., Pittsburgh, Pa.**
Safety Appliances and First Aid Materials
- The Morse Magneto Clock Co., New York, N. Y.**
Watchman's Clocks
- The National Conservation Bureau, New York, N. Y.**
Safety Education, Traffic Enforcement and Industrial Material
- National Production Co., Detroit, Mich.**
Wire Rope Sling Clamps
- National Safety Council, Inc., Chicago, Ill.**
Posters, Bureau of Information, Research and Education Division
- Oakite Products, Inc., New York, N. Y.**
Industrial Cleaning Materials and Methods
- Occupational Hazards, Cleveland, Ohio.**
Trade Magazine Dealing with Occupational Hazards
- G. H. Packwood Manufacturing Co., St. Louis, Mo.**
Safety Hand Soaps for Industrial Plant Use
- Panther-Panco Rubber Co., Inc., Chelsea, Mass.**
Safety Soles and Heels
- The Patent Scaffolding Co., Inc., Philadelphia, Pa.**
Safety Ladders and Scaffolds
- Prismo Safety Corp., Huntingdon, Pa.**
Luminous Markings for Highway Safety
- Protectoseal Co., Chicago, Ill.**
Safety Devices for Hazardous Liquids
- Palmosan Safety Equipment Corp., Brooklyn, N. Y.**
Industrial Safety Products
- Pyrene Manufacturing Co., Newark, N. J.**
Fire Protection Equipment
- Rose Manufacturing Co., Denver, Colorado.**
Industrial Safety Products
- Ruemelin Manufacturing Co., Milwaukee, Wis.**
Welding Fume Collectors, Exhaust Fans, Cloth Type Dust Collectors

- Safeguard Electric Co., Inc., Brooklyn, N. Y.**
Shockproof Portable Lamp Guards.
- The Safety Clothing Co., Cleveland, Ohio.**
Industrial Safety Equipment.
- Safety Engineering, Alfred M. Best Co., Inc., New York, N. Y.**
"Safety Engineering," Insurance Publications and Reports.
- The Safety Equipment Service Co., Cleveland, Ohio.**
Goggles and All Types of Accident Prevention Equipment.
- Safety First Shoe Co., Holliston, Mass.**
Safety Shoes.
- Safety First Supply Co., Pittsburgh, Pa.**
Industrial and Municipal Safety Products.
- Safway Steel Scaffolds Co., Milwaukee, Wis.**
Safway Steel Scaffold Equipment.
- W. H. Salisbury & Co., Inc., Chicago, Ill.**
Linemen's Rubber Protective Devices.
- The Sanitary Institute of America, Chicago, Ill.**
Sterilized Industrial Wiping Cloths.
- A. Schrader's Son, Brooklyn, N. Y.**
Power Press Pneumatic Safety Control Devices.
- A. Smith & Son, Inc., Philadelphia, Pa.**
Keeves Stretchers and Canvas Specialties.
- The Spencer Turbine Co., Hartford, Conn.**
Industrial Vacuum Cleaners and Dust Collection Equipment.
- Standard Safety Equipment Co., Chicago, Ill.**
Industrial Safety Equipment.
- Stonehouse Signs, Inc., Denver, Colorado.**
Accident Prevention Signs and Tags.
- The Strauss Co., Pittsburgh, Pa.**
Safety Helmets and Safety Belts.
- Sugar Beet Products Co., Saginaw, W. S. Mich.**
Industrial Soaps.
- The Surty Manufacturing Co., Inc., Chicago, Ill.**
Point of Operation Guards.
- Traffscope, Inc., Minneapolis, Minn.**
Device for Viewing Oncoming Traffic at Hill Crest.
- Trimont Manufacturing Co., Inc., Roxbury (Boston), Mass.**
Safety Steel Pipe Tools.
- U. S. Hoffman Machinery Corp., New York, N. Y.**
Portable or Permanent Piped Vacuum Cleaning Systems.
- Wahlert Products Corp., Brooklyn, N. Y.**
Industrial Safety and Fire Protection Equipment.
- Weaver Manufacturing Co., Springfield, Ill.**
Automotive Testing Equipment.
- West Disinfecting Co., Long Island City, N. Y.**
Products for the Promotion of Industrial Sanitation.
- Willson Products, Inc., Reading, Pa.**
Personal Protective Devices.

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NATIONAL SAFETY CONGRESS

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OCTOBER 16-20, 1939

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MONDAY AFTERNOON SESSION

October 16, 1939

The first session of the Metals Section was called to order by General Chairman Mell E. Trammell, Safety Supervisor, Republic 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 learned that a square inch cross-section of a certain analysis steel will support a definite load of certain fixed spans. As the span increases, the load that the member will carry decreases.

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

After strengths of materials were thoroughly proved and the exact load that a member would support was known, it was found, by bitter experience, that this was not enough. Thoughtless persons would exceed the load. Moving loads were substituted for a designed dead load and the design failed. This was not because of faulty engineering, but because of thoughtlessness of an individual that was unfamiliar with the basic laws of engineering.

This condition developed in the engineering profession the origination of the now

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 probably 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 develop at certain velocities, what shocks of moving or live loads will do. They know what to do to make their structure safe.

quality of the negative produced with the proper choice of fine grained film, makes it possible to make enlargements of any desirable size. By the use of auxiliary lenses, copies can be made of photographs, drawings, manuscripts, or other flat material. The scope of the miniature camera is almost unlimited for those who desire to collect and prepare material for group presentation. Practically anything that can be photographed can be readily transformed into a slide or strip film for projection.

One other outstanding advantage of the miniature is the use of 35 mm color film which costs in that size an average of \$250 per roll of 18 exposures including processing, an average of 14 cents per frame. There are two types of color film now available.

Both of these color films are available in larger sizes but the cost is prohibitive for non-commercial use nor are they so readily adaptable to inexpensive projection.

Over the past year or so, I have about come to the conclusion that two cameras offer the ideal outfit. The second camera should be of the type having ground glass focusing and adapted to the use of cut film and film pack. Outstanding examples of this type camera are easily procurable.

Let's take a look at the projector problem. As with the camera, the heart of the projector is its optical system. Here again it is necessary to rely upon the integrity and reputation of the manufacturer.

Projectors belong in one of four separate classes, depending upon design:

1. The opaque projector—designed to project pictures, pages of books, drawings, etc. by reflection. In general these are less efficient, watt for watt, than other types of projectors. Hence the illuminating system must be more powerful to offset light loss by reflection.

2. The standard slide projector for either 3 1/4 x 4 inch or 2 x 2 inch slides.

3. The strip or slide film projector for 35 mm film.

4. The sound-strip film projector. Us-

ally consisting of a sound unit operating in conjunction with a strip film projector. The projector may or may not be automatically synchronized to the sound record.

In some cases combinations of the foregoing are available. The opaque projector usually incorporates a slide unit and the strip film projector may be readily adapted for 2 x 2 inch glass slides.

In selecting a projector, the basic governing factors are:

1. The material to be presented. Pictures, slides or strip films.
2. The size of the audience or the size of the average room in which it is to be used.
3. Portability.
4. Ventilation of lamp housing and subject matter.

A combination of items 1 and 2 usually defines the size and type projector necessary. In most cases a combination unit is desirable in the interest of greater flexibility. It may also be necessary to procure two lenses of different focal length for the projector particularly if a variety of room sizes may be encountered. The shorter the distance between the projector and the screen, the shorter the focal length of the projection lens. For the average projector, a variety of projection lenses are usually available.

The question of portability is more or less self explanatory and is governed almost entirely by the local situation. Too much in the way of durability and projection power should not be sacrificed to portability. I believe that the power of a projector lamp should not be reduced below 200 watts.

Speaking of power, my preference is for a projector using a projector bulb of from 500 to 750 watts. A size larger than this requires a special power circuit which may not be available where needed. In projectors using projection bulbs larger than 300 watts some means of forced draft ventilation must be included. Otherwise damage to the slides or pictures being projected is almost inevitable. Then too, the bulb itself may be damaged by excessive heat.

ADJOURNMENT

Occupational Disease Control

THURSDAY MORNING SESSION

October 19, 1939

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 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. F. 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 the need is to be balanced with knowledge, would he think it advisable to attempt to determine a hazard in a plant 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. BONSI: 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, wherever they may be, and assure me that there will be no emergence of disability by means of these exposures."

The Medical Program

Let us build first the medical half of this 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, working with the engineering control. An 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-

pation 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, when 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 effect of an occupational disease exposure.

As Dr. Greenburg said, we do not attempt as a rule a routine examination at a fixed interval of a year, we will say. The periodicity of our re-examination is determined largely by several factors: first, the possible exposure to occupational disease hazards; second, what we notice in connection with that man's health as the days go by.

Our supervisory force is usually instructed to send in any man who seems a little under the weather, who does not seem to be doing well, who seems to be slipping a little. From their recommendations often we pick up cases that certainly require examination which otherwise would easily have been overlooked.

Another thing which we have to remember is that many symptoms are common not only to occupational disease exposures incident to life in general; and the medical program for the control of occupational disease is therefore extremely important in that the contact must be established with the men to determine what changes are going on and what is their origin.

CHAIRMAN JOHNSON: The important point to me is that you cannot drag in a physician from the outside who is a total stranger to your problem, merely because he is an expert toxicologist or expert something else, and ask him to set up a medical examination or control program for about a week, and then depart.

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

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

I want to ask this group of engineers if they want the medical men to tell them which they may use to utmost advantage 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 individuals in the plant, and that points the way to places that should come under engineering 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. BONSI: 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 engineer 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 threshold 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, maintaining 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—employable, or employable subject to medical

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. BONSB: 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 am assuming that the threshold limit is an essential thing for the engineer to know. That gives him something to stand 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 engineers 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 in his files completely.

Now let us summarize for just a moment, to see where we have arrived. We

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 knowledge in the aggregate to control them. We say that the need for a medical program is as vital as the need for an engineering program; that the doctor ought to be the plant doctor, augmented by such specialists as he needs to employ to counsel with him; that they have a certain amount of factual information that they must turn over to the hygienist or engineer for his use as a check for his performances, 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 examination to find out whether the engineers did a job or not depends upon the conditions 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 questions suggested there. The panel will discuss phases of exhaust systems. Are there in the engineering catalogues, data describing 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 no available ready-made exhaust ventilation equipment. The assumption that you can select from a catalogue and ventilate your problems has been a great drawback in the progress of this work.

By that I mean this: Oftentimes a contractor 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 designs 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 instruments 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 destroyers 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 ventilating system being used there?

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

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 commented.

Primarily in the consideration and selection of any cream, of course, is the nature of the exposure. If it is 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. Lano-line 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 with the discussion of respira-

tory protection. In connection with the examination of thousands of foundrymen, 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 the piece of respiratory protection and giving him more dust than he is getting in 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 cannot be done, it is advisable for the chippers 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, using 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-

ering 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 that

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 Gansister 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 bricklayer 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-pan 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-

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 I 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 cases we have checked the trouble has been due to the use of dirty oil, or using oil over and over again that is filled with small particles of metal. These cause small injuries to the skin, and that in turn brings about further damage. So if you keep the oil clean, I do not think you will have much trouble.

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 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. BONSIB: I think you can cause more unrest through fear, by failure to

tell the man, than in any other way. If you 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 the 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 technique 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 technique instruments, because it is necessary to keep the fumes down to very low concentrations otherwise a dermatitis may develop as 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 he has another idea.

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 Shift'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 unless there is some additional one that is particularly toxic. But particularly where you do have lead or cadmium, the determination should be made for those, and based upon those determinations you can get an idea on the basis of the relative duration of spraying of those particular metals what the exposure is.

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

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

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 examinations to determine an employee's possible allergy to the exposure?

DR. CRANCH: In general, I would say you would hardly be warranted in conducting 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 altogether simple. They have to be very carefully 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

a similar period. I believe this to be a very good practice.

First and training given with the understanding that it should be resorted to in emergency cases only, pending the arrival of the nurse or doctor would seem to have its place on the safety program, as a means of keeping the men safety minded and more efficient. Resuscitation instructions should be included in such a course.

All new equipment and additions should be carefully inspected by all concerned, the safety engineer, the safety committee, the operator, the maintenance men and the engineering department for hazards, and steps should be taken immediately to eliminate any that may be considered to exist.

I have stated that both from a moral and mercenary standpoint the supervisor must place accident prevention work on a par with any of his other duties. He must as-

CHAIRMAN CHANE: The other half of the contribution on this subject is to be

sume the responsibility for all accidents occurring in his department. In order to keep these accidents down to a minimum, he must have his men convinced that he is personally interested in their welfare and problems. He should act as friendly and neighborly as possible towards his men without losing any of their respect. He must take active leadership in such worthwhile endeavors as employee training, safety committee work, first aid training, hazard elimination, safety meetings, the dissemination of safety information and employee welfare work.

If all supervisors would religiously follow these practices, I feel certain that the number of accidents in our mills would be much less than they are at present and it is primarily up to the mill manager to see that such practices are followed.

made from the "Viewpoint of the Mill Worker," by Mr. Frank J. Pavlis.

The Human Side

By F. J. PAVLIS

Fireman and Engineer, The Flintkote Company, East Rutherford, N. J.

First, let's consider the new employee. Records show that it's the new employee who gets hurt most often.

The new man should be made to feel immediately that he is one of the gang. He should be introduced to his fellow workers in a friendly manner, such as "This is Bill, Jim or Jack" and not "This is Mr. Brown" or "This is Mr. Smith." As the foreman proceeds to acquaint the employee with his duties, it would be well for him to acquaint himself, too, with the personality of the man, judge his mental capacity, his weaknesses and his capabilities. After his instructions as to the operation of the job, and the rules of safety, the foreman should keep a close watch as to how the new man fits in with the gang—whether he is going to be a buddy or just a wind bag, and if the foreman has been a buddy to his own men, it won't be long before he will know how the new man rates.

You will note that the word "buddy" is applied both to the foreman and the em-

ployee. And what a word it is! How important to safety is the relationship which it denotes. How much better the new employee feels when the foreman comes in on the second morning and greets him with a "Hello, Bill" or a "Good morning, Jack" instead of passing him by as though he were afflicted with night blindness.

A friendly foreman puts the new employee at ease, lets him keep his mind on his work and its possible hazards, without worrying about what the "Boss" thinks of him. If the man has been out of work for a long time and needs the work badly, he will be anxious to make good at first. A tough and thoughtless foreman sometimes makes the new man nervous and jittery, afraid to ask questions, with the result that he is an unsafe worker; and the foreman, if he only knew it, is to blame.

Here is an illustration. About a year ago at the height of the depression, one of our departments developed a spurt of business and hired a couple of men. One

young chap had stood in line there every morning to get a job, and he landed it.

When the twelve o'clock whistle blew and the gang in the department knew it was lunchtime, they separated, grabbed their boxes of lunch and got around in the different corners and sat down to eat. The other fellows didn't pay any particular attention to the new man, but when it got close to starting time at half-past twelve, they noticed this chap in the corner, evidently not eating a thing. In the meantime, of course, all these birds had eaten up their lunches.

One of them said, "What's the matter, Jack, don't you eat today?"

And he said, "Well, no; I guess I can stand it until three o'clock. I didn't bring any lunch, and I have no money to buy any."

Well, this other fellow jumped around among the others, and made a little collection. They have a restaurant down there where they can get sandwiches and bottles of coffee. But in order to get the sandwiches and coffee, they had to get a pass from the foreman to get out of the gate. He's one tough baby, that foreman—at least, we all thought he was tough.

Bill went to the foreman and said, "Here, Red, this young fellow just came in this morning, and he hasn't had anything to eat and he has no money to buy anything. Can I go out and get him a sandwich and a bottle of coffee?"

And the foreman said, "Where are you going to get the money?"

And this guy said, "That's none of your business. We don't need money; all we want to do is to get through the gate."

And the foreman said, "Here, take my lunch and give it to him. I'm going over to the cafeteria and get mine."

Now, you know, that little move on the part of that tough bird just knocked the mask right off his face, and since then he has the friendliest bunch of men you would want to meet anywhere. When he comes in in the morning, he is not afflicted with this night blindness you hear about. He comes through and says, "Hello, fellows," and there isn't a thing the fellows in that department would not do for him.

Then, there's the attention paid by the foreman toward the requests of both new

and old employees. How fine it makes you feel when he will stop and listen to you as you report some defect in the machinery you are operating, or some job you are doing, with the assurance that he will have it fixed right away; and then does it, showing real, humane consideration for the welfare of his men, instead of saying, "Well, let's get by with it as long as we can and we'll fix it over the week end." Perhaps by that time someone has lost a finger.

No foreman can expect his men to report unsafe practices or conditions if, when they are reported, nothing is ever done about them, or done six months later. The men are quick to realize when the foreman really doesn't care, or is so concerned with production that safety comes last.

Men want safe conditions. Men don't want to get hurt, but if they can't get co-operation from their foreman, they soon give up trying. They know it's no use, and instead of reporting a hazard, they figure, and logically so, "it's every man for himself around here, and the devil take the hindmost."

Let's consider, next, the attitude of the foreman when the man makes an error.

None of us wants to be caught violating any company rules of production or safety, but sometimes, in spite of everything, that happens. Now, how does the foreman handle it? We don't feel so badly when the foreman will come over and say "Now, Jack, you made a bum guess on this thing, and you didn't use your head, and I have to answer for it, but I'll try and adjust it with the Big Boss." But when the foreman who sits in a little office in a corner of his department and governs us by remote control, sits down and writes a long letter to the Big Boss, we feel we have committed an unpardonable blunder.

The first guy, this buddy foreman I have spoken of, has made us feel that just for his sake the error will never be repeated. With the second foreman, the thought with us will be, "O K, Pal, I'll get even with you for this." The result is carelessness or sabotage, either of which may endanger the safety of other employees. Which type of foreman will have the safest department?

Then, there's the question of personal health. The man who becomes ill through faulty living or indulgence will go to his foreman who is a "buddy," and ask to get

9. (a) Do your employees have Group Life Insurance?

Yes, 54

No, 9

(b) Group health and accident insurance?

Yes, 35

No, 23

(c) Do you have a pension plan?

Yes, 31

No, 25

10. At what age is your pension plan put into effect?

Men, age 65 yrs., 28

Men, age 60 yrs., 8

Women, age 55 yrs., 7

Women, age 60 yrs., 7

Depends on physical condition, 1

11. How do you handle so-called "occupational diseases"?

a. No claims, 6

b. As compensable injuries where state laws provide, 13

c. No experience, 12

d. No set policy, 5

e. Change employee to remove contact, or determine and remove cause, 2

f. Treatment only, if satisfied that they arose from occupation, 2

g. No work that causes occupational disease, 1

h. As cases of illness, 3

12. Do you include permanent partial disability ratings in your accident statistics?

Yes, 55

No, 1

13. In a given case that loses no time from work but eventually has a certain percentage of permanent partial disability, do you classify it as a disabling injury under either the A. P. I. or N. S. C. Schedules?

Yes, 50

No, 6

14. Do you classify hernias as disabling injuries under either the A. P. I. or N. S. C. Schedules?

Yes, 19

No, 15

15. How do you handle claims first reported after a lay off?

a. Report to compensation carrier, 26

b. Handle each case on facts developed by investigation, 11

c. Have had no such experience, 2

d. No fixed policy, 1

16. Employee answers questionnaire concerning injuries before being laid off, 1

a. Refer to legal department, 1

b. Fight as hard as possible, 1

17. What is your ratio of non-disabling injuries to disabling injuries?

The average of the answers is 26:5:1

18. What is the average time lost per disabling injury?

13 days, according to 33 reports

(Average for the industry was reported about 126 days in 1938)

19. What is the average cost per disabling injury?

\$270.00, according to 19 reports

20. What is the average time lost after hernia operations?

7 weeks, according to 39 reports

Lowest time lost 3 weeks

Greatest time lost 13 weeks

No time lost with injection treatment

"25 cases treated by injection method with 25 cures reported"

21. What are the 3 most frequent types of injury?

Injuries were reported in the following order of frequency:

Cuts

Abrasions

Bruises and lacerations

Strains

Strained backs

Burns (various types)

Foreign bodies in eyes

Fractures

Puncture wounds and shivers

Hernias

Gas effects

Heat effects

22. Are your frequency and severity rates decreasing?

Yes, 45

No, 6

23. Do your employees lose more time from industrial injuries; non-industrial injuries; or from illness?

Illness, 38

Non-industrial injuries, 4

Industrial injuries, 3

24. Non-industrial injuries occur more frequently than industrial injuries.

25. What 3 illnesses cause most lost time?

Colds, 24

Other respiratory infections (Influenza, pneumonia, etc.), 29

Surgical operations (Appendectomies, tonsillectomies and hemorrhoidectomies are the most common operations), 17

Gastro-intestinal disorders, 10

Rheumatism and arthritis, 6

High blood pressure, 2

Heart disease, 2

Kidney disease, 2

Malaria, 3

Fever, 2

Infections, 3

Blood stream infections, 1

Tuberculosis, 2

Dental treatments, 1

26. What is your average number of employees?

Lowest number reported, 48

Highest number reported, 11,000

Average number, 2,481

27. Injuries promptly treated, what percentage develop infection?

Practically none

28. Does your doctor check the physical condition of employees resuming work after illness?

Yes, 17

No, 3

29. After prolonged, serious, or questionable illness, 7

Opinion of attending physician accepted, 1

Refinery Construction Problems

By WALTER ULLRICH and E. B. HEYDEN

The Lummus Company, New York City

The construction department's work starts at the inception of a building program, works in conjunction with the estimating department, and later with the designing department. A schedule is made when the equipment for the new unit will be delivered on the job site, and provision is made to have the erecting machinery in the field ready to start erection work when the materials are delivered.

The construction department builds a field office near the job site and assembles a skeleton organization for supervising the construction work. The personnel of a field organization depends on the size of the construction program. In general, it consists of: a superintendent, general foreman, field engineer, foremen for the various crafts, and office personnel.

The next move is to build a tool house and storeroom. All tools for the job are kept in the tool house when not in use on the job. The storehouse will contain all the small equipment needed on the job. As it is impossible to house the larger pieces of equipment, an open space is selected convenient to the job site to store such equipment. It is important that the receiving clerk sees that the incoming shipments of the larger items are conveniently placed so that the various items are easily accessible when needed.

When these preliminaries have been dis-

posed with, suitable transportation facilities to, and unloading facilities at, the job site are provided.

The next step is the clearing of the job site for the new construction work. If there is no old equipment on the site, the clearing of it consists of a preliminary leveling of the ground. The final grading is usually done at the conclusion of the construction work. But if the site is covered with old equipment, this equipment and such foundations as will interfere with the new construction work are removed.

There is little or no hazard encountered when leveling a job site. However, in the case of old equipment to be removed, it is advisable to exercise precautions in dismantling the old equipment especially where it is necessary to use a cutting torch. As an initial step, care should be taken to have all the utility and process lines disconnected and blanked off at the battery limits and to have all the sewers, drains, and ditches crossing the battery limits inspected for flammable gases and liquids. Gas tests should be made in all the vessels before they are dismantled to determine that they are free from inflammable gases.

The next step is to make excavations for the foundations and underground lines and drains. In case the soil has poor load-bearing characteristics, it is necessary to build the foundations on piling for the heavier

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 co-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

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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 subdivisions of:

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

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 discovered only by a series of x-rays taken 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. Pneumoconiotic; 2. Non-pneumoconiotic.

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

Pneumoconiotic:

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. Chalcosis—stone dusts.

Non-Pneumoconiotic

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 pneumoconiotic; 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 bulking 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—NHN.
12. Lithopone—NHN.
13. Red lead—HT.
14. High grade clay—HP, if over 1/2 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 mechanical 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.

35. Soap powder—irritant NH. Sometimes causes dermatitis.
36. Captao—NH.
37. Phenyl Beta Naphthylamine—HT, causes a dermatitis.
38. Soap bark—NH, sometimes causes a little coryza and conjunctivitis.
39. Cotton lint dust—NHN.
40. Bronze powder—HT, as to copper and lead content.
41. Zinc sulphide—NHN.
42. Sand—HP.
43. Various clays having more than 1/2 of 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 counts 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 involvements for dusty operations.

I have found that there is x-ray evidence of tuberculosis in about 2 per cent of the cases but only 1/2 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 12 1/4 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 you must insist that the ven-

ilation be sufficient to reduce the dust count to a certain point and leave 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 silicotic dusts—six months including x-rays.

Non-silicosis 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 1 1/2 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 states 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 silicotic 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

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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 the 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 tell our supervisors that they must accept 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