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Ambassador, Chelsea, Ritz-Carlton Hotels
and Atlantic City Auditorium

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Maintaining Interest in Safety

WEDNESDAY AFTERNOON SESSION

October 7, 1936

The causes of lagging interest in a safety program and the means of reviving this interest were discussed in the session on Maintaining Interest in Safety, which was held Wednesday afternoon, October 7.

C. B. Boulet, Personnel Director, Wisconsin Public Service Corp., Milwaukee, was chairman of the panel discussion.

Panel participants were E. W. Beck, Supervisor of Safety, U. S. Rubber Products, Inc., New York City; Roy S. Bonsib, Chief Safety Inspector, Standard Oil Co. (New Jersey), New York City; Clayton Braatz, Personnel Director, Marathon Paper Mills Co., Rothschild, Wis.; W. T. Filmer, Supervisor of Safety, Youngstown Sheet and Tube Co., Youngstown, Ohio; G. A. Kuechenmeister, Personnel Manager, Dominion Forge and Stamping Co., Walkerville, Ont., Canada; T. E. Lightfoot, Engr. in Charge of Accident Prevention and Compensation, Koppers Coal Co., Pittsburgh; G. E. Sanford, General Electric Co., Schenectady, N. Y.; and H. F. Webb, General Safety Director, West Penn System, Pittsburgh.

Chairman Boulet: It is easy to start a safety program. With the blare of bands and the flag waving everyone is temporarily interested, and usually accident frequency will take a sharp drop. However, after you have had a program for several years everyone takes it for granted, and the interest drops. Immediately your frequency goes up. For this reason it is vitally important to find ways to maintain interest.

But first we must find out what causes lack of interest.

A. H. Niclan (Crown Cork & Seal, Baltimore): Is it possible that a let-down is due to a part-time safety director?

Mr. Lightfoot: Yes. A safety director's job is an all-time job. I feel that if you have a part-time safety director, you can look for a let-down. There may be an exceptional case of an unusual industry, or an unusual part-time safety director, of course.

But it is hard to understand how any plant can maintain an efficient and definite safety program when the safety director or the safety engineer may suddenly be called away or directed to do something else.

Chairman Boulet: I think that is the right slant for a big plant—a full-time

man; but I disagree on the small plant. I don't see how you can have it.

Mr. Titus (National Lock Washer, Newark, Ohio): It seems to me that if you take up these problems with the safety man, and he is not much interested in them because he has a lot of production work to do, he just slips up on the job.

Mr. Braatz: If your management is thoroughly sold on safety, whether your safety director is part-time or not, your program will be successful. I am laying the blame for a let-down in the safety program in management's lap entirely. You men probably have had waste to contend with in the past, and your wastes have been overcome by action through your management. Accidents are merely another form of waste, and when your management lays some emphasis on waste, you are going to get action, and not until then.

Mr. B. Lincoln (Indemnity of North America): A good foreman is recognized as a good example of the part-time safety man. His duties are multiple and important in successful safety management.

George Alexander (Socony Vacuum): Outside influences have a direct bearing on the let-down of your safety program

—interesting influences of national scope, such as bank holidays.

Chairman Boulet: Elections and world series?

Mr. Alexander: Right.

Mr. Beck: I disagree with the statement about the foreman doing safety work on a part-time basis.

A foreman will do it in his own department, yes, but you are interested in the whole plant. If you have a small plant you can maintain interest with a part-time safety man, but only if he is given responsibility.

Chairman Boulet: I think that clinches the part-time question: In a large plant a full-time man is necessary, and in a small plant a part-time man can do a good job and maintain interest, provided he is definitely given the responsibility and authority.

Mr. Turner (Bethlehem Steel): What influence has the depression had on the let-down of safety?

Mr. Webb: A great deal, because our executives, even though they were safety-minded and thought a great deal of safety, neglected it during the depression.

Safety effort reached bottom during those years, but I think it is coming back fast. It is regaining executive assistance and support, and that is what you must have to maintain interest in safety.

You must have a two-fisted executive who will go down the line and say, "I am for safety, and I am going to have it!"

Chairman Boulet: Does a continued good record cause a let-down in safety?

F. M. Pepper (Illinois Bell Telephone Company): There is a danger of that. I am not a very strong advocate of contests, and the reason lies right in with that. I think there should be some form of appreciation of a job well done, whether it is safety or something else, but I don't think we should pick out the safety job particularly and pin saucers and medals and other things on men's chests just because they did something they should be doing; and that goes for the supervisory people just as it does for the workers.

A continuous and successful safety program brings a danger of getting contented with what we are doing. The winning of too many contests will lead to

that to some extent, and it takes an energetic executive to keep prodding us, to keep us out of that situation.

H. P. Heyne (Industrial Commission of Ohio): I disagree. In Ohio we are interested in the community type of safety campaign, and in Cleveland some years ago we started a safety campaign among all the industries. We had 307 companies. This year on October 1 we completed our sixth annual campaign with 1,400 Cleveland companies. If there is any way to maintain interest, and if there is any way to keep from getting too satisfied with a safety record, I believe this is one way of doing it.

Not only has it proved successful in industry but also in vehicle fleet management.

As a matter of fact, the company that won in Cleveland this year has now won first place four times out of six years; and it employs 1,800 men, and works close to 2,000,000 hours, without a single lost-time accident.

I believe that the number of companies participating—307 in 1931, 500 in 1932, 650 in 1933, 715 in 1934, 1,100 in 1935, and 1,650 in 1936—is enough to bear out the value of the contest.

George Hanley (Perfect Circle Co., Hagerstown, Ind.): I think the question of lack of interest in safety is measured by how busy the firm is. This old question of dollars and cents enters into safety more than anything else, and when we have licked that, we have licked the whole problem. When the departments of a plant get so busy that they just haven't got time for safety, that is when accidents happen.

When management and men really become interested in safety, not from a safety angle, but from the angle of people going home whole and unhurt and well and in their normal condition, then we will have real safety; but until then, there isn't any contest nor anything of that sort that will answer the purpose.

Mr. Beck: We have been conducting a safety contest for 10 years, and if I were asked to discontinue everything but one thing, I would hold onto the safety contest.

One of the large rubber companies has just established a record of 6,000,000 man hours without a lost-time accident. Inter-

ber section contest, and not a man can afford to break that record. They are on their toes all the time. Bring in crutches? No, sir.

The contest is based on compensable accidents; and where money is spent, it counts against their experience. They cannot cheat. The contest is tight and sound. It is based on their improvement on their previous three-year average, and they are all competing with themselves and nobody else.

T. E. Lightfoot: Why should we run contests in our plant, with only 250 men? We know their families, and we know these men. We simply tell them, "Don't get hurt, whether it is accidental or wilful or anything else."

We don't say that contests are no good, but my point is that they should be used in a program if they fit. If you can prevent injuries without contests, why not do it?

You know what happens to production any time the supervisory staff loses interest in it. Down it goes; and if it is true what we have been told for the last five or ten years, that safety and production go hand in hand, then why try to separate them and run safety as a program or contest or something of that sort, when you don't do it and don't have to do it with production?

Chairman Boulet: How many think contests are all right? How many are opposed?

The ayes have it.

T. A. Schlatter (Davison Chemical Co., Baltimore, Md.): The main instrument for the prevention, not of accidents, but of personal injury, is education. If we conduct a contest, we don't do it for direct commercial value, but for advertising value; and from that advertising we receive safety education. If you can do this, by all means use your safety contest.

But if the manager of a plant puts an injured man to work pushing a broom to keep him from considering it a lost time accident, he is not kidding anyone but himself. The only valuable information we get from a safety contest is how much better we are doing our job than we have done it before, and how much better than the other fellow in the same line of work. If we are losing interest in our safety organization, it is not the fault

of the management, nor of the men, but of you, the safety engineer.

Dust off your bookshelves, read up on safety, and you will be able to stimulate more interest among your men than a safety contest can do.

To keep interest stimulated in a man, we must understand the individual. We must know his domestic troubles, and sympathize with him, give him advice, and not mistreat the confidence he has in us. When a safety engineer accomplishes this, he will not have a problem of stimulating interest.

Chairman Boulet: "What is the proper method of approach to the workers to inspire interest in safety?"

Mr. Sanford: With various types of individuals the same method isn't going to work. Suppose you have some ruling that you would like to put through in the plant. You may start with your general supervisory committee and discuss it. Then let each one of those men go back to the group of which he is chairman and discuss the thing, asking, "What do you think of it?" Then sell the idea to the next group, and so on, until you get to the workmen's committee. Get their slant and bring it right back to the management. When the order comes out, you will find these fellows saying, "There is something I had a hand in."

Get them to express their opinions, and you may sell the idea to them without their realizing that it is coming from the top down.

Another rather old-time method is the workmen's safety committee. I know of one plant that arbitrarily picked out one man from ten, right down to the floor, telling him he was on the safety committee. It was his job as long as there were no accidents.

It was surprising how accidents decreased immediately. Each man was taking care of his brothers as well as himself.

V. I. Calkin (American Seating Company): Sometimes these methods come from the men themselves. In our plant the men suggested that each foreman appoint one or two men in each department, for one month, to be the safety committee in that department. It was decided to try it for one month, and the results were such that the plan was used for a whole year. So far this year we have

at least sixty men vitally interested in safety who were not greatly concerned with it before.

Taeke Bieboer (American Seating Company): We also instituted a safety cigar or candy bar plan. In any department which goes without a lost-time accident for a month, every member gets a cigar at the end of that period. I think this has done more to interest our men in safety than anything else.

W. P. Coster (American Sugar Refining Co): What success have any individual members had with strict enforcement of discipline in inspiring safety or keeping up safety interest?

I. H. McNeil (Nebraska Power Co., Omaha): A few years ago we used to give cigars away, and we threw the plan out. Strict enforcement of discipline and observance of safety rules will do more than anything else.

A. D. Schiller (Corning Glass Works): About four years ago in the mixing room at the Corning Glass Works we had the problem of making the men wear goggles and respirators. We used discipline, telling those men either to wear the goggles and the respirators or to leave their jobs. Now they wear their protective equipment without being told.

A. H. Trestrail (Pickands, Mather & Co., Caspian, Mich.): We had difficulty in training men to report accidents, but after we gave a man a three-day layoff, we didn't have any more trouble. We do give awards, however. We used cigars for a long time, but now have an accumulated credit system. If a department goes a month without a lost time accident, we credit each man with 25 cents. After the second month this is increased to 30 cents a month, and by the end of a year a man builds up a prize fund of about \$3.50. By buying wholesale we can give him a reward of something worth about \$7.

Now, you can laugh at cigars, but we gave candy, cigarettes, cigars, and then we switched over to this accumulated credit system, and it works. Discipline has to be accompanied with some sort of contest. We couldn't teach men first-aid until we had first-aid contests. This stimulated their interest enough to make them seek an education; if you can get a man interested in safety, he will seek his education, but of course you have to have

the educators ready to supply the information.

Mr. Filmer: Notice the wording of that. The best way is to inspire, not to compel. Action that is compelled is not spontaneous. It is likely to let up as soon as the compulsion is removed.

When you inspire, you appeal to the best there is in a man, and he responds because something inside of him is telling him that it is to his interest, not somebody outside telling him, "You do this, and you get a cigar." Possibly there is a selfish purpose behind it for the man, but where can you eliminate selfishness?

Why ask a man to wear safety shoes? If he fails to protect his feet, his own toes will suffer. Why ask him to wear the goggles? To save his own eyesight.

Something inside of the man is telling him, "For your own interest, for the interest of your family, for the interest of your future and your ability to carry on your job with all of your faculties—work safely. It is your problem, and not ours."

You are then inspiring that man, and not compelling him. You have him working with you, and you don't have to worry so much about him after that.

Mr. Kuechenmeister: How many of you men have a working agreement with your wife, that for every day she doesn't burn her finger, you will give her any little trinket? Do you promise your children that if they come home from school without getting hurt, you will buy them a lollipop? You haven't got your working program with your family, and you don't think it is necessary, because you suspect that being hurt is very much like virtue—it has its own reward.

Teach the man in the plant that it is his eyes, and his toes; but provide him with the necessary devices. Make it easy for him to buy safety shoes. Show him that it is for his own protection, and that safety, or the lack of injury, has its own reward.

Chairman Boulet: Jim Eaton, here, gives away safety shoes. Will you tell us why you do it, and whether it works?

James P. Eaton (General Electric, Schenectady): I think the plan was suggested by the men themselves, a group in the plant. If they go six months without an accident, their name is put in a hat, and they get a pair of safety shoes

free. I don't know how many accidents we have prevented, but it is creating a lot of interest.

Mr. J. L. Schaeffer (National Cash Register Co., Dayton, Ohio): One way to maintain interest is to investigate every accident, minor or otherwise, and discuss it with the injured and with the men closely associated with him. That has a psychological effect on the whole department. It shows that the foreman, supervisor, or the leaders of that department are interested in the man's welfare and that where anything can be done to prevent some other workman from having a similar accident, it will be done.

G. A. Cooper (Public Service Electric & Gas Co., Newark): What about the "white elephant contest," in which the management provides a white elephant, and the foreman with the worst record for the previous month is obliged to keep the elephant on his desk and explain to all inquirers why it is there.

Chairman Boulet: We have a white elephant in our company. Our company won national honors in the Public Utilities section for three or four years, and then we had a let-down.

We decided our supervisory force was at fault. We started this contest on June 30, and we have not had a lost time accident since then. For the first time in the last three years we have gone more than 30 days without a lost time accident. I give the elephant some of the credit. It is just a means to the end. In itself it doesn't mean a thing, but nobody wants it, and everybody is on his toes.

Let us see hands. This is a debatable question. This disciplinary action, and we will have the vote.

Somebody wants a vote here, so I am willing. How many favor disciplinary action where it is needed?

How many say no?

Well, here is a man that says no. He wants to talk again.

Mr. Hanley (Perfect Circle Company): Regarding discipline and protective equipment—we have no right to go into a man's pocketbook, even though it is a protection to himself, and take the wages that belong to him and his family. There is another approach to this disciplinary action that is much more effective.

In our plant each foreman is told,

"Don't have a lost time accident in your department."

He will say, "But what shall I do about this?" We say it is up to him to figure it out. He calls his men in and says, "Men, we are not going to have a lost time accident." He works with those men personally, and after all, safety is a personal problem.

When you get your foreman working with individual workers in his department, you will soon eliminate accidents.

We have in each department a foreman's safety record, hanging on a bulletin board. If he has a clear record for the month, we send him a gold star, and he gets his men together, and up goes the star. If he has a lost time accident, he puts up a red star together with the man-hours of exposure, and his standing in comparison with other departments.

H. E. Hensel (Youngstown Sheet & Tube): If you want your men to be interested in your accident prevention program, give them a part in it. Several of our foremen developed this idea.

In the semi-monthly meetings of their men, they appoint a man from the ranks to talk on safety at the next gathering. When those fellows dig up facts on accident prevention, talk and think about hazards of their department, they can't very well go back into the department and commit unsafe practices.

Chairman Boulet: I think that is a hundred per cent right.

R. B. Robinson (Washburn Crosby Company): The only man who can do the work safely is the man doing the job; but the foreman must help him. We have used that principle for the last three years, getting the man himself to take part in our program with the help of the foreman, and you would be surprised at the practical ideas that will come from those men.

Mr. Kinner (Accident Prevention Association of Ontario): I want to give another slant on this disciplinary thing. Some years ago I investigated a fatality on a construction job. The victim had been riding on the foot board of an engine, and the engine jumped the track. The man died from loss of blood and shock.

The foreman said "I warned him every day for a week not to ride on the foot board of the engine."

I said, "If you had fired him the second day you caught him doing that"—

"Yes," he said "he would probably be alive today."

I said, "I don't know whether he would or would not, but at least your skirts would have been clean of any possibility of being blamed for his death."

There is another point regarding disciplinary action. In Ontario we don't pay compensation until a man has been off for seven days, and we had one firm with an exceedingly large number of one-week accidents. At the end of the seventh day all the men were ready to come back to work. The boss, peeved at this, said, "For every man that loses time through an accident that is his own fault I am going to deduct 5 cents an hour from his wages for the same number of hours that he loses through the accident."

At the end of the next year he had taken 15 cents off his workmen's wages.

Regarding the proper method of approach to inspire interest, I would suggest the setting of a good example. Mr. Kuechenmeister has a rule that the president of the company can not come into the plant unless he wears goggles like the rest of the men, and that inspires interest in his workmen.

Mr. Braatz: I wonder how many of you men ever asked your foremen what they want to do about discipline? Our safety committee, composed of men in the ranks, set their own safety rules, and they follow them.

David Snell (Kimball Glass, Vineland, N. J.): I disagree with the thought that 75 per cent of the men will obey rules and be safe and that the other 25 per cent, for some reason, need discipline. The latter are intelligent enough to do their work, and certainly intelligent enough to be safe. It is up to the men above them to take the responsibility.

Mr. W. H. Hasam: If a man makes a recommendation regarding a hazard, see that it is followed as quickly as possible. That shows your interest in his ideas, and he then takes a greater interest in his work. In discipline I believe we should be tolerant. If a man breaks the rules, talk to him about it and reason with him; if he continues to commit the crime, use your disciplinary measures.

C. V. Davison (American Rolling Mill Co., Middleton, Ohio): During the past few months we have taken on a lot of new men, fellows who have been out of work, or who have been out of school for possibly five or six years and have never worked before. Sometimes these boys get into trouble. I have found that instead of using discipline it is better to talk to them like a Dutch uncle.

Chairman Boulet: What is the responsibility of the safety department, the management and the foremen, in stimulating interest in the program?

E. J. Kreh (Philadelphia Co., Pittsburgh): I think responsibility begins with the management. It is necessary first to get the support of the executive and work through him to get the support of the supervisors, and down through them to the men.

J. P. Watson (Bureau of Indian Affairs): The fact that an organization has a safety engineer is evidence that there is executive interest in safety. It is not the responsibility of management to direct the safety engineer. He was hired on the assumption that he knew his business.

If he has the correct application and interpretation of the statistics in hand, then the interest on the part of other departments will be self-evident. They will recognize the value of what he is trying to do, and the results will be, I think, sufficient remuneration.

Mr. Bonsib: I think the function of the safety engineer and the safety man is to act as a mainspring, to keep the thing moving. I don't think it is possible for any safety man to go in and tell a man what to do, but he should be the means of getting that employee to do what he should do—and to get the employee to see that the things that cause accidents are exactly the things that cause high production costs, waste, and inefficiency.

The sooner we safety men stop talking safety and talk efficiency and cost, the sooner we will get safety.

The trouble is that the safety man is thinking only of how he can prevent accidents, and he forgets about the fact that the plant is trying to make dividends. If a guard interferes with production, it is going to be taken off; it is up to the safety man to work with the production

man and see that a guard is designed so that it helps production rather than hinders it. That is simply a technical matter that can be worked out. Some of the guards these safety men design are ridiculous, and I think that that is what has hurt the safety movement—the failure of the safety man to realize that the production has got to go on.

I want to repeat—the same thing that causes accidents causes inefficiency.

Chairman Boulet: I suppose we might sum that up by saying that the job of the safety department is to act in an advisory capacity.

M. A. Gimbel (General Electric Co.): If a man is to be disciplined, have you ever had your foreman say this: "If I send that man home, we are penalizing ourselves; we need the job."

From the floor: Send the man home. You are driving for safety. If you get sentimental, and he gets hurt, then it is your responsibility.

Chairman Boulet: You think after one or two penalties you won't have the trouble again, and that an accident will stop production, too.

Suppose the foreman is responsible for an accident?

From the Floor: Any time that there is an accident in a department, we compel the foreman to wear a big yellow button for the following week. We hold the foreman strictly responsible for every accident in his department.

I. A. Brinkman (Macintosh-Hemphill Co., Pittsburgh): The president of our company issued an order that if any man had an accident which goggles or safety shoes would have prevented, that man would lose his job, and the foreman would get a week off without pay.

One fellow took the lenses out of his goggle frames and lost his eye. He lost his job, and the foreman got the week off without pay. We haven't had an accident to an eye or a foot since.

Chairman Boulet: Let us get down to the responsibility of the management.

Mr. Wurten (Bayuk Ciga Co.) I am a manager. Our plant has gone about four and a half million man-hours this year without a lost time accident. I have heard varying opinions here that the foreman is the crux of the situation, or that the safety director is the crux of the

situation, but everyone seems to agree that management must first be sold.

It doesn't make any difference what the safety director or the foreman is—management is 100 per cent responsible for every accident that occurs. Until the management in our organization recognized that fact, we got nowhere.

Chairman Boulet: Let us go to the foreman.

P. H. Sanville (Philadelphia Electric Co.): I was, until about a year ago, general line foreman. My conception of safety was that it was entirely my job to sell it to the foremen and the linemen and the ground hands. That was in conjunction with the safety department.

It was necessary that the safety department act as a clearing house for me. I had to get my facts from them. Still, I believe that the foreman is the only man who can carry safety through to those below him.

Mr. Filmer: I wish this matter of management were as simple as has been represented. I wonder if we have enough sympathy for the position of management? The same men who are responsible for safety at the top are also responsible for production, for satisfying customers, for satisfying stockholders, for satisfying everybody, and they have to play all those things together.

We must look to them for the establishment of a policy which they are able to fulfill. We must take safety out of the abstract and put it into the concrete and say, "We know that sometimes the budget, will not permit the purchase of this or that, or permit certain work to be done, but we don't want to stall on it."

The attitude of management is not understood by the man on the floor. The superintendent may not want to add to his month's costs something that ought to be done. And the man on the floor is going to say, "You talk to me about safety; why don't you have that taken care of?"

Management's responsibility is to keep the man on the floor in sympathy, and management needs to be in sympathy with the man on the floor.

Mr. Webb: When you produce something that you think is going to help stimulate the safety program, remember that it is not an all-time stimulator. Be-

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TRANSACTIONS

25th

National Safety Congress

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ATLANTIC CITY, NEW JERSEY
OCTOBER 5 to OCTOBER 9, 1936

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Industrial Health

Poisoning A Department for Physicians and Laymen

Lesser Known Facts About Occupational Diseases

By ROBERT B. HUNT, M.D.

American Mutual Liability Insurance Company

PROBABLY the leader in the parade of industrial diseases is an acute or chronic inflammation of the skin which we call dermatitis. This disease may present itself in any type of shop, factory or foundry. Any paste, powder, gas or liquid which comes in contact with the employee's skin, even the water supplied by the town in which he lives or works, may be the potential cause of such a skin disturbance.

The wide diversity of causes, together with the varying susceptibility of different individuals, makes the problem of control difficult.

Much investigation is under way to determine why one person may be susceptible to a certain substance while another is not. It has been proved many times that a poisonous substance formed within the body has been able to prolong the action started by some external influence. A printer developed a marked dermatitis from ink which persisted for two years. Finally food tests were made and showed that he was susceptible to lettuce. Removing this from his diet cleared the skin. He returned to his usual occupation without a return of symptoms.

The poisoning of allergic substances is usually an accumulative process. It takes time to produce a manifestation of disease, but let any other substance cause the disease, and the irritating food may be of sufficient strength to magnify its action.

All cases of dermatitis cannot be cured by eliminating offending foods, but further investigation along these

the discomfort now produced by industrial dermatitis.

Metals

LEAD: The distribution of lead poisoning is quite extensive.

The skin of the body is a protective covering, and as long as it remains intact it does a good job except in the case of tetraethyl lead, which is used in blending gasoline and which is readily absorbed through the skin, having a tendency to create changes in the nervous system. The effect of other forms of lead, through that avenue of entrance, is practically nil, which explains the extremely low poisoning rate in typesetters, painters and others who continually come in contact with metallic lead.

Lead in any form, introduced through the mouth, acts rather slowly when compared with the inhalation of lead dust or fumes. However, no matter what the portal of entry may be, lead is acted upon by the body fluids and so converted that it may eventually be deposited within the bones.

Those bony safe deposit vaults may retain their lead contents for days or for years, and if the exposure is removed, may also free the employee of all signs and symptoms of lead poisoning. But imagine the surprise of that supposedly cured person when years later, perhaps following some type of infectious disease or the excessive use of alcoholic beverages, he awakes to find that he suffers the aches and pains and paralyses of an acute lead poisoning. As the body fluids alter lead that is in the bones, it

duce the original disease with all its discomforts.

One can readily see, then, that in some cases investigation of previous occupations is quite necessary to determine the original contact with lead.

Heating of molten lead causes a black scum of lead suboxide to form on its surface, and the heat from the metal disbursts the fine powder into the air. Hence, in the process of smelting ores such as zinc, copper and silver, mixed with lead, we find a rather high lead poisoning rate.

Those engaged in the manufacture of lead wire and cables, batteries, glass, pottery and rubber industries, plumbers and users of dry colors offer their share of lead poisoning cases.

Probably the greatest source of lead poisoning may be found among those who sandpaper, scrape, chip or burn lead paint, for the dust and fumes caused by those activities are rather rapid in their action. Such workers may become incapacitated in a few days because the inhalation of lead dust causes the maximum amount of absorption into the blood stream in the minimum space of time.

CHROMIUM: Chromium is a metal widely used as a foundation for colors, and dusts from its various salts may produce lesions of the skin and mucous membranes of the nose. Chromium plating by electrolysis may cause fumes which are similarly irritating. Although chromium poisoning does not usually cause death, the number of days of absence from work on account of incapacity which it causes is gradually increasing.

OTHER METALS: The most efficient portals of entry of foreign substances into the body are the nose and mouth. The smaller the dust (the size of smoke particles for example, the greater the speed of absorption by the blood. Fumes

electric cutting and welding.

When men are so employed over a prolonged period of time, the constant inhalation of fumes and dust might produce symptoms of the metal upon which they work. In the shipbuilding trade, particularly in the construction of metal ships, we find occasional cases of metal-fume fever. "Brass chills" and "spelter shakes" from zinc are names applied by the lay people to such diseases. The terrific heat applied to some of our common metals and alloys by acetylene torches produces sufficient fumes to cause a temporary incapacity in 24 hours. Permanent disability from such causes is rare, however.

Diseases Due to Dust

Twenty-five per cent of all workers exposed to high concentrations of inorganic dust are expected to develop changes within their lungs due to that agency. We are at a loss to explain why the other 75 per cent are not so affected.

Mining, quarrying, foundry work, grinding, sandblasting, abrasive soap manufacturing, asbestos work, the making of emery and carborundum products and many other occupations offer opportunities for employees to inhale microscopic dust particles and create a foundation for possible future incapacity.

We are interested particularly in those men who work with sandstone, quartz, flint, granite, and sand, because they expose themselves to silica, and the chemical changes between that dust and the body fluids, in the presence of tuberculosis, may and usually do lead to a fatal ending.

It is safe to say, in light of our present knowledge, that the action of other inorganic dusts is much less virulent and incapacitating. That, however, does not allow us to lower the vigilant methods to improve dust control and protect employees, because all dusty occupations are potential trouble makers.

Although the actions of various dusts differ within the body, the exposure to asbestos fibres, present in the weaving and grinding of dry asbestos material, offers another type of dust which may cause fatalities among workers.

The organic dusts from cotton, silk, wool, tobacco, flour and similar substances are practically harmless. Such dusts rarely reach the lungs but may cause irritation of the windpipe and larger air tubes and result at the most in

mind, particularly when dealing with silicosis and asbestosis, relates to the progression of such disease. When changes occur within the lungs as a result of the presence of such dusts, nature forms scar tissue to heal such lesions but may fail to stop when the job is finished. As a result, the continuation of that healing process may lead to such structural changes within the lungs that partial or total incapacity may follow months or years after the employee has been removed from his dusty occupation.

Benzol-Benzene

Benzol is a distillate of coal tar used extensively in industry. It is an essential ingredient in the manufacture of explosives. It is an excellent solvent for grease, oils and cements, and because of that property it is important in many phases of the rubber and cleaning industries. In the manufacture of shoes benzol may be an ingredient of the dressing applied to the leather and of the cement which fastens the heels and soles. Not only in the shoe trade but in other branches of industry where employees work with gummy, sticky material, the workers soon learn of the solvent and cleansing action of this liquid and use it freely for that purpose upon themselves. The subsequent outbreak of skin afflictions may be the first indication of such unauthorized use.

Benzol is extremely poisonous, entering either through the nose or mouth or absorbed through the skin. Its action within the body is varied and may produce a multitude of signs and symptoms. The bone marrow becomes affected which in turn alters the character of the blood; hemorrhages are common; it may cause death.

The fumes from benzol are heavier than air and lie near the floor, which is an important point in the engineering problem of ventilation.

The members of the benzene group are absorbed through the skin, and more cases of poisoning are found when men perspire than when their bodies are cool. Probably the answer to that is that the fumes may solidify as they cool and the powder may settle on the skin. The sweat on the body may dissolve this dust so that it is more readily absorbed through the increased surface blood supply.

Chlorinated Hydrocarbons

This group of petroleum derivatives

the industrial field has been widely distributed and most important. Led by carbon tetrachloride and its chemically associated members, it has furnished industry with refrigerants, excellent solvents for rubber, wax, oil and grease thinners for lacquers and a very fine household necessity for the removal of spots from clothes. Hospitals have been using it more and more for the removal of adhesive plaster.

Due to the non-flammability of carbon tetrachloride, it is used in fire extinguishers. The rapid evaporation produces fumes which may smother a small blaze, but we must not forget that excessive heat of the actual fire may bring about combustion sufficient to produce such by-products as hydrochloric acid and phosgene gas. Like its associated member, chloroform, it may produce sleep when inhaled by an individual, and only 1/350 of an ounce in a quart of air is necessary to produce such action. That thought must be remembered when a large quantity of those liquid products is spilled on the floor, perhaps accidentally. Action should be started at once before the liquid gasifies, and employees should be notified to keep their heads up to avoid the low ceiling of gas.

Chemists have developed and introduced to industry many new products, the basis of which is the chlorinated hydrocarbons. These derivatives of petroleum distillation are frequently combined with those from coal tar to form valuable chemical combinations. They have been placed on the market so rapidly that medical science has been unable to determine their physiological effect upon the health of man. We have known that some of these chemicals are capable of creating changes in the liver, and only recently in a city in Massachusetts one of these newer products caused the death of two employees and a battle to retain life among two others.

Carbon Monoxide

You remember the adage, "Where there is smoke, there is fire." We might add to that, "Where there is fire there is carbon monoxide."

This odorless but poisonous gas may occur in any industry or in any home, but the poorer the ventilation the better the chance of producing physical incapacity.

Since the advent of the motor car whose exhaust pipe may pour forth as high as six per cent of carbon monoxide

any passenger car liberates about two cubic feet per minute, and one can readily estimate the physical damage that may be done if such a motor is allowed to run within the doors of a poorly ventilated garage or shop. Fortunately, serious cases of such poisoning are not common among those employed in public garages, but many employees are likely to complain of headache and faintness at the end of a day's work, especially in colder weather when doors and windows remain closed.

In the steel industry, where gas is used as the heating agency in the blast furnaces, care must be taken to provide proper ventilation. Within the mines, workers are warned to allow enough time following blasts for the escape of this gas.

Infection

The skin is a protective covering of the body against infection and is extremely efficient as long as it remains intact, but allowing it to be broken or punctured introduces bacteria, and a battle ensues between the offensive agencies of infection and the defensive powers of the body. The winner of such a struggle may determine the presence or absence of incapacity. Infections are common throughout industry, but two types are particularly prominent—infection resulting from anthrax and infection among meat packers and fishermen.

Many of our fur, hair or wool-covered animals may contract anthrax. The germs of that disease defy the ordinary methods of sterilization and may linger on hides, bristles or hairs for long periods of time. Tanners, wool sorters, and hair or bristle workers may introduce the anthrax spore beneath their skin and undergo much physical suffering and sometimes death.

Infections are frequently found among meat and fish packers and those engaged in deep sea fishing. Although death rarely occurs, the loss of fingers, hands and nasty septic wounds are the result.

Summary

I feel that the time has come when an employer must demand of a manufacturer the answers to two questions:

1. How will your product affect my business?
2. How will your product affect the health of my employees?

That employer is entitled to honest answers based upon sufficient chemical and physiological examinations of the questionable product. Too many lives have been lost or jeopardized by too little knowledge of a product's action

Ferrosilicon

Industrial Data Sheet D-Chem. 20

A. Problem

1. What are the hazards of ferrosilicon and what precautions are necessary in its use?

B. Hazards

2. The principal hazard is that of poisoning by inhalation of the gases that may be given off, especially in the presence of moisture.

C. Discussion

3. Ferrosilicon is prepared by melting iron ore or steel shavings with coal or coke and ganister or quartz at a temperature of about 2,000 degrees centigrade (3,632 degrees Fahrenheit) in an electric furnace. In making steel, ferrosilicon is used for removing objectionable gases and oxides and also as an alloying element. When alloyed with cast iron, it affects the carbides and renders the iron soft and gray. More concentrated silicon alloys are sometimes used in certain processes for making hydrogen gas and in the manufacture of explosives.

4. The hazard in connection with ferrosilicon results from very small percentages of phosphorus together with other elements which may be present as impurities originating in the raw materials used. In the presence of moisture the phosphorus compounds react to form phosphoreted hydrogen or phosphine. This is a gas which in sufficient quantities is decidedly poisonous. It has a strong and distinctive odor somewhat resembling garlic so that its presence can be readily recognized. The stability of ferrosilicon depends upon its silicon content, grades below 48 percent and above 65 percent being entirely stable and ferrosilicon in these ranges does not give off any appreciable quantities of phosphine, even in the presence of moisture. It is, therefore, only in the intermediate range between 48 percent and 65 percent that there is any appreciable hazard.

Symptoms of Poisoning

5. When a person has breathed poisonous gases liberated from ferrosilicon, the symptoms of poisoning usually de-

veloped by general and abdominal pains, nausea, vomiting, diarrhea, hemorrhages, loss of consciousness, dilated pupils, cold clammy perspiration and coma. Cases of poisoning have been mistaken for cholera, gastro-enteritis, ptomaine poisoning, pneumonia and influenza.

First Aid

6. When a person displays any symptoms of poisoning because of the inhalation of the poisonous gases liberated by ferrosilicon, he should be promptly removed to the fresh air and, if conscious, be given a mild alkali drink. If unconscious, the prone pressure method of artificial respiration should be started immediately after the patient has been removed to the fresh air. In all cases of poisoning the services of a doctor should be promptly obtained.

Precautions

7. Ferrosilicon should be stored away from such places as offices and work rooms or living quarters of any description.

8. All buildings in which ferrosilicon is stored should be well ventilated and dry. (See Note X.) Ordinarily, in an open factory building the natural ventilation through monitors in the roof or through windows is sufficient if the ferrosilicon is kept dry.

9. If men are required to handle wet ferrosilicon in a confined space, artificial ventilation should be provided.

10. In case phosphine has been allowed to accumulate in a closely confined space such as a closed room or box-car, so that a strong odor of the gas is noticeable, no one, unless he is wearing a suitable gas mask or fresh air hose mask, should be allowed to enter the room until it has been thoroughly ventilated. (See Note Y.)

NOTE X. Detailed information on ventilation will be found in National Safety Council Safe Practices Pamphlet No. 27 "Industrial Ventilation."

NOTE Y. Detailed information on fresh air hose masks will be found in National Safety Council Safe Practices Pamphlet No. 43 "Respirators, Gas Masks, Hose Masks and Breathing Apparatus."

National Safety Council, Inc.

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