

Safety and Health Hazards

[An address by Mr. John S. Shaw, Manager, Safety and Service Dept., Hercules Powder Co., to the annual meeting, Federation of Paint and Varnish Production Clubs, October 30th, 1940.]

I understand that on your program as originally designed, there was provision made for an item which read as follows: "Would it be advisable for the Federation of Paint and Varnish Production Clubs to appoint a committee to investigate and to make recommendations for safety, health and fire protection?" Afterwards Dr. Mattiello told me that you decided to cut this out of your program because you were going to turn that question over to me, and that is what I have come to speak to you about this morning.

What is your problem? Is there a problem in accident prevention? How great is the problem? I will start by saying the problem is probably the greatest one we have in industry today, regardless of what industry it is. It is the greatest of all manufacturing problems, because, first, of the lack of experience, and secondly, because we are dealing with the uncertainty of human nature, the human element.

Now in the paint, varnish and lacquer industry, which is a part of the chemical industry, your accidents are about one-seventh, or 15 per cent., of the total accidents in the chemical industry. Last year you operated 21,846,000 man-hours, with 10,742 men. You have thirty-seven plants reporting to the National Safety Council, and as accidents go, last year, you had one death, four permanent disabilities, and 136 partial disabilities, or a total of 141 disabilities, with a frequency of 6.45 and a severity of .47.

How did you stand in the chemical industry? Just about average. Their frequency, for instance, was 7.48. So if you are average in the chemical industry, it would seem there is some room for improvement, although you are a "good bunch."

As industries go throughout, excluding the chemical industry, you are better than the national average of all industries.

Is there a problem? What does it cost to have injuries? Well, your loss in the paint and varnish and lacquer industry last year is estimated at \$400,000 for 141 injuries. For all workers employed, that is an average of \$40 a worker. For the 141 workers injured, it is an average of \$2,830 an injury. Now that is really something that is astonishing, to think that it cost \$2,830 to injure a workman.

How is that figure made up? It is made up by direct and indirect costs? Direct costs are hospitalization, medical care, nursing, and so forth; workmen's compensation if the man has lost time, in accordance with the state law, if there is a state compensation law—and there is a law in almost every state, and if there isn't a law in your state, you know what you are up against, a still worse proposition.

The indirect costs are very interesting to consider. Heinrich, of the Travelers, the Assistant Chief Engineer of the Travelers Insurance Company, a few years ago made a study of 72,000 accidents. He found that the indirect costs are just about four times the direct cost. In other words, if an injury cost you \$10 direct costs for the doctor and hospital and getting the man to the hospital and back, and so forth, taking care of him, the total cost would be \$50. How could it be \$50? That seems absurd. First of all, the man had to "knock off" work after he had mashed that finger or stepped on a nail—I am taking a very simple injury now. Somebody had to take him to the hospital.

Suppose that man was operating and making twenty units a day of your product, worth \$10 a unit. He is gone two hours out of the 8-hour day before he is put back to work.

of your product that you could have sold. He hasn't turned it out. And the hospital bill, as I stated, the first cost, the nurse's time, the chauffeur's time, the doctor's time, the bandages, and what not cost \$10. There is your four to one, making a total of five. It is just simple arithmetic.

But suppose that man was a trained man on a mixing machine, on the grinding rolls, and you have to train another man. This man is knocked out, he is off thirty days and you have to train another man. You have lost the product the injured man would have made if he hadn't been injured. You see the story. I don't need to go on. It can run very high, and if there is a death, then you run into enormous figures.

Now these figures are not fictitious. The authority is the National Safety Council, and our friend Kirkpatrick has recently published a very interesting article in *Chem-Met*, and I refer you to that article if you haven't read it, because I think it is very interesting and very truthful.

If you want to disregard the indirect costs, the cost of injuries in your industry last year per man injured was \$700 for each man injured. That was the average. Is there a problem? Is there a saving to be made? I am trying to answer this question that was going to be in your program: "Should we have a committee to decide whether or not there is anything to be done about accident prevention in your industry?"

What are the causes of accidents? How are we going to get at them? Strange to say, they are not fumes and poisons and toxicants. Your losses are not due largely to peculiarities of your business. They are due to the common variety of accident—and this holds true in all industries; it holds true in high explosives, it holds true in paints and varnishes and lacquers, it holds true in the steel industry, in the cement industry, in quarrying, and what not. The common variety of accidents is what is cutting a hole in your pocketbook, and they are such things as are usually caused by bad training and bad housekeeping: slips and falls, stumbles causing fractures and wounds, anything from bruises to fractured skulls and death. A broom left in a walkway is bad housekeeping. That is a common variety of accident.

Bad housekeeping is the greatest factor you have to deal with. It also is the part of many other good things in your factory. When you begin to get your house in order, your plant clean, then you begin to see other things that need correction. When your place is so clean that you can't see anything more to clean up, then you begin to see faults in the machinery and you begin to smell things that shouldn't be escaping into the air.

However, when you do have an injury or an accident peculiar to your own industry, it is usually a very severe one. In severity it ranks high, it costs you more money. That is why we pay a great deal of attention to the hazards of our particular industry. That holds good everywhere.

To give you an illustration of one company or one industry that became very much concerned with its poor records and its losses, in the mining industry—a few years ago, accidents were enormous, but that industry set about in an earnest endeavor, in all sincerity, to clean house. Now they have many hazardous operations which are not a permanent setup. Today the setup may be one thing, tomorrow it is torn down and it is another. They have blasting, they have drilling, they have powder loading, they have the hazards of falling over-burden, rock, timber, all sorts of uncertain footings on which men work. They can't make a clean plant and have it in order as you can. There are constantly changing conditions. In a few years, in about five

best in the country, from united, honest effort. The savings ran into the millions.

By the way, I didn't tell you that the losses in the chemical industry, of which you are a member, for 1939 are estimated at \$10,000,000 for accidents and injury to man and not to property—that is personal injury loss. Is there a problem? I believe we begin to see that there is a problem, although you are better than the average of the chemical industry. I would say that you are in a class that is called "good," but there is still room for you to make quite a saving, apparently.

The subject given me was on safety and health, as I recall it, and I don't know whether to concentrate more on the things that cause trauma or the things that cause sickness. It is going to be very hard to separate the two because if you have a traumatic injury, invariably your health isn't going to be very good for a little while, and perhaps not good for a long time. I wouldn't call a man with a fractured skull in good health, would you? I don't believe anybody would. So it is going to be very hard to separate these two.

Continuous study of the causes of accidents is the only way to get at the elimination of accidents. Your hazards, as I see them, as I understand them, are fire, explosion, asphyxiation, toxicity, all of which may cause injury to health or to the body, trauma or sickness. Now, the U. S. Public Health Service found that a health program not only paid handsomely, namely—150 per cent.—on the money invested, but they found that it led to a very much higher degree of accident prevention. You see, they couldn't separate health from injury. There you are, 150 per cent. profit. They showed that an investment of \$6 on each employee per year brought back \$12.

The National Association of Manufacturers made an exhaustive study to see whether or not the little fellow could afford a safety program. In about two years, they concluded definitely that the plant of twenty to thirty or forty men, up to 100 men, in the small plant class, really profited greater per capita than the big fellow.

So, they made it a little more conservative, came out and said that the little fellow had just as big a chance to make a killing on accident prevention as the big fellow.

The little fellow pays more for an accident than the big fellow. Let me give an illustration: a big plant has its own plant hospital. Joe Bates is hurt. He is sent right over to the plant doctor. He is fixed up and put right back to work. Joe Bates's wound is dressed each day, and he doesn't lose any time.

Now, let's look at Joe Brown in the little plant. His boss gets the message in the front office that Joe Brown is hurt. They have to get a taxi out and take him to the hospital and arrange to hospitalize him and get him dressed up. The hospital costs a good deal more than the local hospital in the large plant. The fees are greater. You see the story. It calls for another taxi to get Joe back to work if he comes back that day. But ten to one they don't send him back that day. They say they would like to see him the next day for observation or at least to dress the wounds. Joe has lost a lot of time. What about those units he is supposed to get out in the warehouse? What about the shipment delay? What about kicks from the sales department? What about the impatient customers?

The little fellow is in no position to put up with accidents. He is in a worse position, and it is more important that he get into safety harder than even the big fellow from the standpoint of dollars and cents.

I am talking costs to you because that is what you folks are all thinking about. Some of you have some little pet theories, I guess, about happy relations, which I will come to in

If you make a study of a new process or if you are going to change the solvents, say to the engineer on the job that he should make a complete study of that solvent, its toxicity characteristics. He should make a pre-analysis on every change you make in your plant and submit his record, his recommendation, to you as to what he believes, from the safety standpoint, should be done.

In the smaller plant you may not be able to afford a safety engineer. Then it is certainly the duty of the man who devotes his full time to operation and not the man who catches the calls in the office on orders or has to go out and dicker with the sales department and go to meetings. The man who is in the plant and knows his men is the man that should be watching for safety, but I sometimes think that even he is burdened with too many special requests that come in on very short notice from the sales department, to change some product or to advance the shipment of a certain product another twenty-four hours, get it out today instead of tomorrow, which disrupts and disorganizes the entire line.

However, if your workmen are healthy and happy, safe and efficient, they meet those emergency changes very much better than the disgruntled fellow who is half sick all the time. I could tell you many stories, and you could tell me many too, of what bad health does in an organization. A smile spreads like the ripples on the water; a grouch goes very much faster—it travels like the wind. A grouchy word from a foreman or supervisor who is in bad health multiplies tenfold within ten minutes in an organization. Workers get grouchy with each other. Harmony ceases. Efficiency drops. Some of the product begins to go off standard, and from that one grouch you can have carloads of your product shipped back into your plant for re-working.

What am I talking about? Am I drifting? I don't think so. I am still talking about good health. What are the things that lead up to good health? Good plant operation. Safety is not a thing set aside. Happiness has proved itself to be vital in good management, and if the management is alert, it will see that the plant at all times is safe for the men and for your customers.

Now, there is one obligation that I think we really have, not only to our worker in our plant, but to our customers. We ship out into the field various things that are intoxicant or dangerous if not properly used. Good sales service should see that our customer is educated along the lines of prevention of sickness and accident while consuming our products. The manufacturer must educate the public. He can't get out of it. It is just as important to do that as it is to make a good product.

Recently the Government has started out a series of health meetings, usually fostered by your local chambers of commerce in your various cities, in the interest of good health in industry and its relation to better employment relations. Why has the Government done that? It hasn't just awakened to the fact that good health in industry is desirable, but it has awakened to the fact that in our national defense it is absolutely necessary because our loss is something like six million man-hours a day due to sickness in industry. The nation can't afford it. Therefore, accident prevention and good health have now become a national and a patriotic duty.

I think that is all I have to say. If I can help you in any way or answer any questions, I will be glad to.

To those who haven't started a safety program I would suggest that you take this program that you have here today and go right down the line, read each item from the standpoint of safety alone. What is the hazard of

the safety engineer says, "Is that dust?" If you are going to talk about changing a solvent, what solvent are you going to change and what kind of a solvent and what will it do? Just take this program and read that and question every one of the items from the safety viewpoint and what is there for the safety engineer to pick up and make a study of before you go ahead.

I want to mention, too, another point in conclusion, and that is the blacklist jobs. I have been through the industries now for over thirty years and we have had what we call blacklist jobs, jobs on which men wouldn't go to work, some equipment. They would tip off men on the outside, "If you go in there to get a job, don't work in such and such a house." And yet I have never seen a blacklist job that couldn't be made an ideal job, and at the same time make money in so doing. I know of one job that you couldn't get any men to work on except those who were desperately in need of money; they would need work. But they would soon quit and the turnover was very high, over 100 per cent. per annum.

We set about and air-conditioned that job and used plenty of good white paint. We discovered that some of the compounds used were not good for their health. We made a study of the whole thing and gave them uniforms and gloves which were washed every day, aprons and caps likewise. The air-conditioning made the houses so delightful that the men kicked when quitting time came. Their wives complained because they said their husbands wanted to go back to the plant at night where they worked all day. They said it was too hot in the house. It is true that that particular job is now at a premium. It has a long waiting list for it.

We had another job where we were using thousands of gallons of boiling benzol, and the news spread around the plant that it was a very dangerous thing. We made a research and an advanced analysis and submitted a full analysis report to the management of the plant and told them what precautions would have to be taken. Yet you could smell benzol occasionally and the men were afraid to go at it. So we put in a safety vacuum system so that if anything ever sprung a leak anywhere in a gasket or flange joint, the vapor was drawn in rather than permitted to leak out. Nobody ever smelled benzol, so in about a month or so, they forgot what benzol smells like, and they also forgot their fear. That is a challenge to us, too. We must continue it even better than that if we can. Never let them smell benzol again. If there is any occasion for repair, go at it the right way, with hospital masks and control and safeguard them.

Incidentally, in connection with the hospital mask, the pressure air mask, take your air from a clean source and pipe it to a non-lubricated compressor, such as the Nash rotary, or a pump of that type that is water-lubricated, and run your air through an independent system. Don't run it from the power-house compressors, because you get oils and scales and dust, and above all, the dangerous and insidious poison of CO generated from slow oxidation of some of your lubricating oils in the compressors. So give them an independent air-source. I could talk on that for a long time, but I think that is rather unnecessary.

I have attempted this morning to show that there is real ground for improvement in every industry, that you can make a saving, a handsome saving, a saving that will pay you more than the profit on your product. You show me any company now that can invest a dollar and get back a dollar and a half. Not with present conditions. And you can't

The most valuable thing of it all is that you have grateful, steady workmen, reduced labor turnover, reduced lost time, reduced spoilage of product, reduced complaints from the sales department, and many other factors that bring in a very handsome saving. I don't think that anybody is a "doubting Thomas" in regard to safety. During the World War it was rather in the soap-box stage, ballyhoo and posters. Today it is really scientific procedure, requiring study and research, for it embraces design, engineering, construction, erection of equipment, and operation of that equipment. It goes right straight through the whole thing. You can't separate it from anything that you are doing.

Virginia Goes Totalitarian

Virginia Department of Agriculture and Immigration, Richmond, Virginia. To all manufacturers and distributors of, and to all dealers in paints, turpentine, and linseed oil:

1. In accordance with the provisions of Section 1411a of Chapter 59 of the Code of Virginia, and by virtue of the authority vested in me by the provisions of the said section, the following rules and regulations shall, by and with the approval of the State Board of Agriculture and Immigration, take effect July 1, 1941 (provided, however, that those manufacturers so desiring, may comply immediately with these rules and regulations), governing the labeling, use of terms, tolerances, and items included under these rules and regulations.

2. Labeling: The label shall give the manufacturer's name and address, or the name and address of the distributor; and unless otherwise stamped on the container, the net contents in U. S. Standard gallons or fractions thereof; or the net weight avoirdupois.

The label shall also give the composition of the paint in per cent, by weight, preferably broken down as follows:

Composition of Paint (by weight)

Pigment	%
Vehicle	%
	100.0%

Composition of Pigment (by weight)

Basic Carbonate—White Lead	%
Basic Sulfate—White Lead	%
Zinc Oxide	%
Titanium Barium	%
Magnesium Silicate	%
	100.0%

Composition of Vehicle (by weight)

Raw Linseed Oil	%
Heat Treated Tung Oil	%
Volatile and Drier	%
	100.0%

In case varnish is used as the vehicle in outside gloss paints:

Volatile	%
Non-volatile	%
	100.0%

The composition of the paint may also be shown as follows:

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Aluminum paints, if recommended for exterior use on buildings, fences and structures, shall state on the label the per cent, and type of aluminum pigment, and the per cent, volatile and non-volatile in the vehicle.

3. Terms: The terms used to designate raw

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Composition of Paint (by weight)	
Pigment	%
Vehicle	%
	100.0%

Composition of Pigment (by weight)	
Basic Carbonate—White Lead	%
Basic Sulfate—White Lead	%
Zinc Oxide	%
Titanium Barium	%
Magnesium Silicate	%
	100.0%

Composition of Vehicle (by weight)	
Raw Linseed Oil	%
Heat Treated Tung Oil	%
Volatile and Drier	%
	100.0%

In case varnish is used as the vehicle in outside gloss paints:

Volatile	%
Non-volatile	%
	100.0%

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