

PLAINTIFF'S EXHIBIT

ZUR-110

1929
TRANSACTIONS
OF THE
**National Safety
Council**

EIGHTEENTH ANNUAL
SAFETY CONGRESS

VOLUME I



Chicago
September 30 — October 4, 1929

Stevens and Congress
Hotels

Copyright, 1930, National Safety Council

drugs, poisons, toxins, as far as their effect on living animals or patients is concerned, do not regard the glittering attractions of any single property as a sure index for the safety of the whole.

If you are physicians, using drugs for treatment, always inquire into the Therapeutic Index.

If you are chemists, bear in mind: "Margin of Safety."

If you are lawyers, great executives, captains of industry, do not commit the glaring fallacy of the deductive logic, *Non Sequitur*, which draws unwarranted conclusions from minor premises to complex wholes; or, if you pride yourselves on being scientific, beware of making hasty generalization from insufficient data, a fallacy of the inductive method.

If you are philosophers consider actions of drug in *tout ensemble*, not with an eye to single properties, but on the whole.

If you are moralists, I beg you bear in mind the famous dictum of the psalmist (Ps. 34:15), "Depart from evil" first, and only after that "do good"; or putting it in other language, "The ends don't always justify the means."

And lastly, if you are plain, honest men of business, I beg you to maintain a balance 'twixt your gains and losses in terms of toxicology. In handling chemicals and drugs, 'tis well to keep your books on double-entry basis, for every drug is also poison; you wield a two-edged sword. This is the message which Pharmacology brings to all those who have inscribed upon their banners, SAFETY FIRST.

CHAIRMAN WHITEMORE: Because of lack of time this morning we shall turn the meeting over to general discussion of Dr. Macht's paper, at the same time that we discuss the next subject on the program. Mr. S. E. Whiting will talk to us on "Putting the Specialist's Ideas to Work in Our Plant."

Putting the Specialist's Ideas to Work in Our Plants

By S. E. WHITING

Assistant Chief Engineer, Liberty Mutual Insurance Company, Boston

Mr. Chairman and gentlemen: referring first to Dr. Macht's admirable address, it is certainly going to take us a couple of more years to put all of this particular specialist's ideas to work in our plants. However, we have already gained on this first contact with him a much clearer understanding than we had of the fundamental factors governing the action of poisons upon human beings,—an excellent basis for further progress in the safety man's fight against industrial diseases.

As some of you know, it has been my function in this Chemical Section, most inappropriately, to head up your Industrial Poisons Committee for several years. I do not assert that the subject itself does not justify you in maintaining such a standing committee, because the chemical industries themselves and certain products they sell for use in other industries are probably responsible for their share in creating this type of hazard in industry. You chemical safety men are as much concerned to avoid disabling a workman slowly through poisoning as you are to avoid disabling him quickly through traumatic injury and I feel sure your concern is no less because of the fact that in certain states, the employer, strangely enough, is not legally liable for disability caused by occupational diseases. For one example out of many, Pennsylvania does not require compensation for lead poisoning.

I do not know how important this disease hazard is compared with the other industrial hazards. Because of its intangible quality compared with machinery accidents, falls, etc., and because of its typically slow onset, an occupational disease does not always jolt us into as prompt corrective measures as it should. By

pure chance I noted a month ago one of the Haskin newspaper articles from Washington giving some Bureau of Labor Statistics data on this subject in "round figures." I should say they were distinctly round figures, possibly somewhat inflated. It is asserted that the direct economic loss from occupational diseases is about \$2,000,000,000 per annum. Indeed the Bureau goes further and by including the loss of future earning power (derived from life expectancy factors) sets the annual loss at \$6,000,000,000 and adds some two billions more for medical and hospital costs.

Now, of course, no one is trying to pin all of these figures onto the chemical or any other industry. They pretend to be all inclusive and doubtless are, from anthrax in tanneries to Klieg eyes at Hollywood. They even mention what was historically probably the earliest occupational disease,—what doctors call prepatellar bursitis or house-maids knee. So far as I can see, house maids knees seem more prevalent today than ever.

Growing Recognition

Practically speaking and coming right up to present date, I have gained the impression from discussions before this section and from my regular business connection that more and more recognition of these industrial poisoning cases is developing. As one specialist recently expressed it in the American Medical Journal, more new diseases are coming out in this occupational exposure than "in any other field of medical endeavor". What does the doctor mean by that word "endeavor"?

The newest disease that has been triumphantly discovered by our specialists is a real humdinger because the prognosis is extremely grave or in layman's language, the victim is sure to die. We had one such case this summer and we don't yet know what the State Accident Board will think of it because, of course, industrial causation is alleged. This particular man looked the picture of health but several months ago developed ring worm, a fungus skin disease of no great seriousness. He treated for it privately and cleared it up, but it came back at him repeatedly, still nothing more than a nuisance to a perfectly rugged young man. Then he took some X-ray treatments for the skin lesions and promptly flared up with severe inflammation. He was sent to a hospital and they examined his blood and they looked for the various types of white cells and could not find anything but lymphocytes. This meant nothing at all to the ordinary surgeon so we consulted a specialist, an internist they called him. He named the trouble right away,—agranulocytosis—and said this fine looking man would die. I did not believe it but, in spite of transfusions and every other effort at the largest hospital in Massachusetts, he did die. What was the cause? Nobody knows; the specialists say the etiology of this disease is unknown. The man worked at spraying under good conditions of ventilation. The solvents were largely other than benzol which entered the picture only as the denaturant of the alcohol with which the pyroxylin was moistened for safe shipment. What, if any, industrial causation or even industrial aggravation exists in this death case is up to the specialists and I await their decision with interest.

Changing Ideas of the Specialists

Certainly this Chemical Section cannot be accused of failure in giving forethought to these disease problems. For years your practice has been to seek authoritative medical men to address your meetings,—more so than any other Section of the whole Council. You have also initiated technical research on particular poisoning hazards. By association with you, I too have gained many ideas to put to work in our plants where a disease hazard might be present. My main trouble, however, has been to keep within sight of the procession of changing ideas our specialists are marshalling before us.

Take the treatment for chemical burns. Many of you recall how at Cleveland we were told by one specialist to neutralize; bicarbonate of soda wash for acid burns, acetic acid wash for alkalis and ammonia fumes for nitrous fume inhalation. The proof was as direct as an inorganic chemical formula. Then we went to Detroit and learned from another specialist that neutralizing (on skin burns at least) was all wrong and he proved it too by presenting the testimony of the rats themselves who had undertaken this research. We indeed were happy then because this greatly simplified our plant first aid,—one universal wash for every sort of chemical burn, ordinary tap water. Further research on eye burns arrived at the same conclusion.

This, I think, is a permanent step forward but we must not forget that the rinsing must be genuinely thorough. It may be the water should be warmed somewhat and may be some wiping action with a wet rag should be applied to secure this thoroughness. Nor should we forget that a few caustic chemicals are not water soluble and you must not then depend for saving the case upon a mere garden hose or shower bath. For example, carbolic acid is quite dangerous on the skin or in the eye and for this you should rinse with alcohol,—if you can place your hands on any of it. Nor am I entirely sure that we can completely abandon the old idea of neutralization. Surely an antidote has essentially a neutralizing action and I find that Underhill of Yale in his book on Toxicology issued in 1928 repeatedly suggests antidotes to counteract poisons.

New Hospital Treatment for Burns

As a side issue in our chemical burn discussions, we brought out at the Detroit meeting some evidence that the hospital treatment of such cases was changing. In fact our own speaker, Dr. E. C. Davidson, had developed a new method in his research at the Henry Ford Hospital and mentioned it briefly; the application of wet compresses of 2 per cent to 5 per cent tannic acid for from 24 to 36 hours followed by dry treatment only. This treatment precipitates the proteins in the burned area, eliminating toxic absorption and minimizing bacterial invasion as well as reducing scar tissue deformities wonderfully.

Of course this seemed to be none of our business as safety men, but we knew how often these extensive body burns had proven fatal—whether chemical burns, fire burns, or scalds—and we naturally want to be sure everything possible is done to help save any injured man, whether by the plant first aid or by the later hospital treatment. I make no apologies for transgressing on these hospital grounds. The fact is that some of them have so few industrial cases they are glad to get the plant man's viewpoint. So I have watched the extension in use of this tannic acid treatment on extensive burns and have gained the impression that more and more hospitals are standardizing on it, including some of the big metropolitan leaders in the field. I suggest you inquire of your own hospital as to their knowledge and practice in respect to tannic acid,—the whole matter is available to them in medical literature.

Appropriate First Aid for Burns

I come now to the real reason for this digression, the question of our own plant first aid technique for body burns. For years this practice has been largely the application of an oily salve or liquid to exclude the air and kill the pain somewhat. This was all right when the hospital would later use a similar treatment of oily dressing, but is it all right if the hospital is going to use aqueous tannic acid? It seemed to me it would not be all right; that the oil or petrolatum or whatever you used would tend to interfere with the tanning action or at least to delay treatment until the hospital surgeon had removed all of your first aid,—a difficult and

painful process. I have been asking the surgeons about this,—Dr. Sawyer of Eastman and others of the Conference of Physicians in Industry and Boston surgeons and Dr. Davidson himself. A few see no great importance to the point I raised, but most of them do and concede that the first aid should be some water-miscible treatment if tannic acid is to be the hospital treatment. One surgeon goes so far as to say that the best first aid would be to wrap the patient in a blanket soaked in tannic acid itself. This may not be practicable because the solution is not, I understand, a stable one. There are several burn ointments on the market, however, that are water-miscible: Tannoid, Hydro-Picric, and KY Lubricating Jelly. These are made by reputable concerns and there may be others available. I suggest you check up this matter fully in your own locality,—unless you are confident you have guarded infallibly against having one of these extensive burn cases that are so pitiful.

Lead Poisoning Therapy

Perhaps this section is not much interested in the newer ideas regarding lead poisoning,—that almost classical subject. Yet some of you do use sheet lead in acid chambers and if so, you should watch out for this hazard when doing any welding or cutting of the sheet by flame,—an exposure that could easily lead to a dangerous acute attack of poisoning. Again, some of you doubtless manufacture lead compounds. I hope, indeed, your plant physicians already know the best treatment for lead poisoning. This was brought out by the fundamental research that was made at Harvard some years ago by Aub, Fairhall, etc., under support from the National Lead Institute. As a result we have several practical ideas that you can put to work in your plants where needed. The easiest channel of absorption was found to be by respiration of dusts or fumes. The other channels—ingestion and skin absorption—are less important in the usual types of lead exposure. The lead is disabling while in the blood stream and not when stored in the bones. The storing of lead in the bones and its re-mobilizing in the blood stream vary with the calcium metabolism, positive or negative. Any doctor now has direct guidance in treating such cases adequately if only he understands all that this research has brought out. Yet I still find—years after the research findings were published—repeated cases where the attending doctor does not use the best treatment. It is even quite conceivable in a case of severe acute lead poisoning that any immediate deleading treatment might precipitate a fatal outcome. Therefore, if any of you encounter this hazard, I suggest you make sure your plant physician and also the staff of the hospital you use are acquainted with this new technique on lead therapy. With these newer ideas too, you will understand how a man who has worked for years without disability under a slight lead exposure, is not necessarily faking if he develops lead symptoms shortly after he gets laid off.

Further Study of Benzol

I must pass up benzol. We had this question settled once only to find, at our New York Congress luncheon, that certain high authorities (but not all of them) fear there is more to be learned about it. I am glad to see that further research on the subject is now under way supported by the benzol industry itself,—the logical procedure. With the medical profession turning more and more to hematology or blood study for diagnosis of humanity's many ailments, we need to be sure of our basis for holding any chemical substance responsible for a lethal blood disorder. I do like also the attitude of this industry in giving its customers technical advice on ventilation based on direct plant tests with an interferometer. This service is free for the asking.

Inhalation of Dusts

On the dusty lung hazard, I suspect this section is not particularly interesting. Other industries have the chief exposure to it. The specialists give it a variety of names; silicosis, anthracosis, siderosis, asbestosis and pneumoconiosis. The "ons" mean the insurance company has to pay for it. I have been learning this, however, that we cannot depend on the chemist alone to tell us whether or not any particular dust is or is not dangerous. We have to hire another specialist that calls himself a petrographer. You see our lung specialist says the most dangerous dust is free silica, not combined silicates, and straight chemical analysis does not make this distinction. It makes a microscopic optical examination necessary. It was at our Rochester mid-year meeting that I got the straight dope on this free silica idea from Dr. Russell of the Public Health Service. The finer particles of free silica (only a few microns in length) are breathed right into the air sacs of the lungs. Particles of other substances are similarly deposited but are then gobbled up by certain white cells and carried away. The free silica is not, but stays there and is walled up by tissue. Some years later the silica becomes colloided, breaks through the wall and presents a nice culture medium of devitalized tissue for tuberculosis germs to breed in and there you are. So watch out for free silica dust or silicosis. Another test for the dangerousness of dusts was given me by Dr. Sayres of the Bureau of Mines. He has to approve the kind of rock that can be used for rock dusting of coal mines. He injects a sample of the dust into the peritoneal cavity of a guinea pig and in a week or so examines the peritoneum for fibrosis; if any, the dust is unsafe; if none, it is O. K. which reminds me that one specialist asserted we could get a fibrosis in the lungs merely from swallowing sand. Except for the next specialist I met scoffing at his idea, I was all set to cut spinach off of my menu.

Lapse in Industrial Poison Data Sheets

Some inquiry has been made in this Section as to why your Industrial Poisons Committee has quit on the job of getting out Industrial Poisons Data Sheets. While officially connected with these flyers of which the chief merit was brevity I hardly dared to mention them,—they so quickly became obsolete under the onset of new ideas from the real specialists. Logically, I am now dropping myself out of this activity (being Chairman of your Nominating Committee) and leave the issuance of further sheets in the capable hands of your retiring sectional Chairman, Dr. Greenburg. Of course, also, there is now a Health Section of the Council and Dr. Sappington is going to press every month or so with up-to-date articles of the same general type. I might mention the subject that finally stalled us two years ago on the run of data sheets: chlorine. The Poisons Committee could not agree as to whether chlorine was a poison or was not. The toxicologists said it was, the manufacturers said it was not. The real answer probably was a quantitative one, as Dr. Macht has just pointed out to you in discussing drugs in general. The manufacturers finally said that their case was proved by the fact that President Coolidge cured his cold by inhaling chlorine. Ever since we have been waiting to hear from President Hoover. If the toxicologists win out, the country will have to go into mourning.

New Treatment for Nitrous Fumes

I do want to trespass a bit more upon your time to mention nitrous fumes. The air seems to be clearing on this subject. I do not recall how many expert chemists in your industry have tried to persuade me that this hazard was exaggerated, that process were the really toxic fumes generated,—some higher oxide like N_2O_5 or "ordinary" nitrous fumes were harmless, that only in the rare disorder of a nitrating

whatnot. Yet we have been getting such cases every now and then with fatal outcome. We even had such a fatal case in an ordinary shop exposure,—a man cleaning a casting in a pail of nitric acid and outdoors at that. Now comes the Cleveland Clinic disaster and focuses attention again on this nitrous fume question. The immediate deaths are assigned to high concentrations of carbon monoxide, the delayed deaths, to nitrous fumes from the decomposing film. The Chemical Warfare Service seems competent to speak from both chemical and toxicological standpoints. They tell us the fumes involved were nitrogen dioxide, NO_2 , and nitrogen tetroxide, N_2O_4 , both present in a reversible reaction in proportions depending on the temperature. The originally generated fume is nitric oxide, NO . (The harmless nitrous oxide, N_2O , is generated in negligible amounts.) On exposure to moist air, the nitric oxide is immediately oxidized to the dioxide or tetroxide and I do not see how a workman is likely to breathe the nitric oxide before it has been exposed to the air.

I hesitate about going into the details of this new therapy for nitrous fume poisoning. Your doctors should themselves study the medical literature on the subject. As Mr. Armstrong has mentioned, our section has just issued a Chemical Safe practices Pamphlet on "Nitrous Fumes." This includes the new hospital treatment and you will note that the old passive method is replaced by a new aggressive treatment. As before, and this is within the safety man's functions, all doubtful cases must be followed up over night because of the delayed onset of the really serious symptoms. It is safest to allow no exercise at all and to send the case in an ambulance to a hospital for observation.

Absolute rest and warmth are called for with prompt study of the blood (hourly hemoglobin estimations) to detect any increase in concentration. At the first hint that the blood is thickening, radical steps to hold it down are advised by the specialists. There are two ways to accomplish this and present authorities appear to differ slightly as to priority between them. The one is water or saline solution intake of from four to eight liters per day, intravenously if necessary. The other is venesection or bleeding to the extent of 350 to 800 cubic centimeters, depending on the severity of the case (and also, I suppose, on the heft of the individual involved). Now our pamphlet on the subject and also, I understand, Dr. Underhill, placed fluid intake ahead of blood discharge, whereas the Chemical Warfare Service report on the Cleveland Hospital Disaster gives priority to bleeding "for incipient or advanced" cases of this type of edema from gassing. The Warfare Service feels that the blood remaining after venesection will then withdraw fluid from the tissues to restore the whole volume to normal. If this means a reduction in lung fluid, it would seem to the layman an important distinction, especially since in critical cases oxygen administration is advised.

Perhaps this question of sequence is not of importance since both treatments follow each other closely or are even given at the same time. If a certain sequence is important, however, I hope our specialists will advise us definitely as soon as they can, because we all want to conquer this fume hazard if possible.

Of course, the question as to quantity inhaled still remains a factor in determining the damage done. It is stated by Henderson that nitrous fumes do not cause a spasm of the glottis (as strong chlorine does) and no particular pain accompanies their deep inhalation. This makes them all the more dangerous. Shallow breathing as a protection is talked about by practical men but I would be more inclined to train the workmen, in case of a spill or fume off, to hold their breath and beat or any direct handling of the exposed nitrating liquid should always include adequate respiratory protection, whether you think there is any danger or whether you it for the great outdoors. All necessary repair work in vats, on pipelines, etc., don't.