

We have one occupation, however, that is an outstanding exception and that is comparable to this situation, namely, the occupation of painting. There are some others that are comparable also, but that is the outstanding one.

There you have this situation: The individuals carrying out instructions are individual human beings working separately, they are subject to no control, and you have all the errors of the human individual to deal with, as contrasted with a group that work under control and under conditions that can be made very definite.

Painting has been widely studied by students of hygiene, by the employers themselves and increasingly by governments. In that occupation regulation and instruction are really very disappointing and oftentimes entirely fruitless. Hence governments are increasingly acting toward the elimination of lead from paints to a more or less considerable degree, because they know no other method of controlling the situation.

In the use of tetraethyl lead by the public we have to take into consideration the fact that we are in a position where we must depend upon the individual in garages, both public and private, and in other uses as to the care with which the substance is employed, or special precautions used. That makes a very difficult situation, it seems to me. You may make all the regulations you wish and you may give all the warnings that you will, but we know from experience in other conditions that are quite comparable that those warnings will very commonly be neglected and that most individuals will be utterly careless in the way that they use the dangerous substance. Furthermore, I find it very difficult to conceive how a garage, for example, could be kept hygienically safe if there were amounts of dust in it comparable even to those that Doctor Sayers found in his room. It is very difficult to see how they could be made safe, with the floor, the rafters, and everything covered with fine dust such as this. Conditions in a garage are not such that it can be kept clean, as most factories can be kept clean. I should suppose that there would be necessarily always a considerable amount of lead-containing dust if this substance were used in garages. Granting that, I think we can scarcely deny that there is a definite hazard.

I repeat, the only way that I can conceive of that we could determine how serious, how extensive that hazard is, would be by making very extensive and very elaborate and very careful studies over a long time.

The CHAIRMAN. Doctor Touart, have you something to say in regard to hospital education?

DR. M. DE M. TOUART

Medical Director, Reconstruction Hospital, New York City

Mr. Chairman, ladies, and gentlemen, I doubt if I have anything to say that would be of very great help to this conference, but I speak from the observation and treatment of 49 individuals who were suspected of being poisoned by tetraethyl lead. Thirty-nine of these patients presented clinical evidence that might be charged to the poisoning. The other 10 we may disregard.

I am impressed by the fact that this substance, in concentrated form, produces a train of symptoms that in some cases results in severe and fatal illness. Among the cases that did not die, several were ill, with great suffering, for a long period of time.

I can not help but feel, under these circumstances, that if the hazard is going to be extended to the general population the matter should be carefully considered before doing so.

I might say that of these 39 patients, 28 had stool examinations for lead, and, as Professor Flinn said, 18 of these showed positive lead findings. The other 10 did not show positive lead findings in the stool. At the same time, however, there was definite clinical evidence of tetraethyl lead poisoning, and I feel we have had sufficient experience with the condition to be able to recognize it clinically where well developed.

I would also say, however, that some of these individuals gave no physical evidence and no symptoms or any evidence that could be found by a physical examination that would indicate they were ill, but at the same time showed lead in the stools. This suggested to me that perhaps a man may be poisoned from the tetraethyl lead without showing clinical evidence, and that therefore there may be a considerable number of individuals so poisoned who have not come under observation.

It would not be of any interest to this meeting to hear anything about the clinical signs that are found in this condition. It has been said to-day that industry was willing or is willing, if it is shown conclusively that the use of leaded gasoline is a hazard to the general population, to cease the distribution of the same. It seems to me that perhaps the attitude should be taken that this tetraethyl gasoline is under suspicion and therefore should be withheld from public consumption until it is conclusively shown that it is not poisonous.

The CHAIRMAN. Any discussion of this clinical question?

Dr. JOSEPH C. AUB. Mr. Chairman, may I just say a word in regard to this question?

The CHAIRMAN. Yes.

DR. JOSEPH C. AUB

Medical School, Harvard University

I would like to say that I think that some who have to diagnose industrial hazards feel that the finding of lead in the stools constitutes lead poisoning, but anybody who is exposed to lead may have lead in the stools. That may mean only absorption, and it may mean poisoning; but it does not necessarily mean that lead found in the stools had been absorbed or that one can base a diagnosis of lead intoxication upon this finding alone. If that were so, everybody exposed to lead dusts would have lead poisoning, and many of them show no signs whatever of it.

The CHAIRMAN. Is there any further discussion on this aspect?

DR. ROBERT A. KEHOE

College of Medicine, Cincinnati, Ohio

Mr. Chairman, I have just one more word to say and then I have finished. I beg your indulgence in that matter.

One thing that has been seen in tetraethyl lead poisoning—and we have had occasion to observe it in every form in which it has occurred—is that in those cases in which absorption is present over a long period of time the symptoms do not differ strikingly from the symptoms in chronic lead poisoning except that up to the present the paralytic conditions have not been seen in any considerable number. However, it must be said that the lead line, stippling of the blood, that sort of effect, which is considered very good evidence of chronic lead poisoning in the human beings, appears in the tetraethyl lead poisoning. Such evidence has been found in the blood also in cases of more rapid poisoning, but in the case of slow poisoning—for example, in cases in which we have had any reason whatsoever to suspect that lead poisoning was occurring, or in which there have been any suggestive symptoms, or in the case of exposure over a considerable portion of time to minute quantities of lead—in all these cases we have been able to find stippling and in some few of them we have been able to find the lead line.

It would appear that the presence of a lead line in teeth is conditioned by a certain amount of inflammatory reaction in the gum margin. In a person of perfectly normal dental condition the lead line in the gums is not likely to appear, but stippling of the blood is much more likely to be present. In the case of the men examined we have made very careful blood examinations. The blood examinations have been made by myself, personally, and I can therefore say from my own observation that in the cases which have been examined which have had exposure to ethylized gasoline no

evidence even of this type has been found of poisoning in these cases.

The examinations made of men who have been exposed to any of these possible hazards must be made not on a basis of symptoms of tetraethyl lead poisoning but must be made on the basis of those symptoms, any one or all of which have ever been seen, which have been considered indicative of lead poisoning. Only by such a method of examination which we have made, or attempted to make, is it possible to determine whether any symptoms or any clinical signs have arisen.

May I say just one other word? I do not regard the data which we have presented on men examined up to the present as conclusive in any way. I should not like to be understood to say the examinations which have been made up to the present—the analytic work which has been done up to the present—are adequate. It only presents suggestive evidence which, in my opinion, should be carried further to a conclusive result.

The CHAIRMAN. Is there any further discussion of the clinical symptoms?

MR. FRANK A. HOWARD

Standard Oil Co. of New Jersey

If I may comment just a moment on Doctor Sayers's report here on page 6, section 9—"The guinea pigs exposed to motor benzol and motor-gasoline blend died."

My reason for commenting on that is that in the oil industry we know only of one situation, one commercial situation, that has any parallel to the one we are now discussing; that, is, the use of benzol blends marketed as motor fuel.

In the city of Baltimore our own company's statistics show that in 1923, 70 per cent of the motor-gasoline consumption of that city was benzol blends. That was largely 40 to 50 per cent benzol blend, which is the type that Doctor Sayers was working with. Is that correct?

A VOICE. Fifty-fifty.

Mr. HOWARD. There was a statement also made in regard to benzol poisoning this morning that very much surprised me. Doctor Flinn, I thought, said that benzol vapor was poisonous but that the poisoning was not cumulative. I do not think he meant to say that. I think what he meant to say was that the benzol itself was not accumulated, because the poisoning certainly is cumulative. I think it produces a very dangerous condition of anemia. This has been recognized in the State of Massachusetts, and legislation has been enacted prohibiting its use in factories.

Now, we have just that one piece of evidence concerning the use of cumulative poisons in motor gasoline. We have a record of about 10 years of use, growing steadily up to proportions of 70 per cent in a city of the size of Baltimore, and to a lesser extent in other isolated spots throughout the country. On that point I think Doctor Shrader, who addressed the conference here, might tell us whether the condition in the use of benzol in Baltimore has shown any indication whatever of the development of a chronic condition of benzol poisoning.

The CHAIRMAN. Mr. Howard, may I ask, for my information, under what trade names is the benzol mostly sold?

Mr. HOWARD. It is mostly under the name of Lightning Motor Fuel, Betholene, Amoco Gas, and Standard Gasoline blended with benzol; I do not recall any others.

A VOICE. C-4 is another.

The CHAIRMAN. Thank you very much. Any further suggestions on this question? If not, we will hear from Doctor Shrader, of Baltimore, on the next subject.

DOCTOR SHRADER. We have not investigated it.

The CHAIRMAN. The public health aspect will be opened by Dr. Haven Emerson, professor of Columbia University.

DR. HAVEN EMERSON

Professor of Public Health, Columbia University, New York City

Mr. Chairman, members of the conference: It is, of course, recognized that until the laboratory and clinical findings have been reasonably conclusive and in agreement, administrative action is not justifiable. We must recognize that the object of public health administration is to get the maximum amount of protection with the minimum interference in private activities, but it would seem to me that in view of the public and private interests involved throughout the United States we might properly look to your office, to the United States Public Health Service, to prepare, after due consideration of all material facts, possibly presented to you by a committee appointed for this purpose, recommendations for administrative action by State and local health departments. A poor impression will be made upon the public and the industry if individual health officers throughout the United States rely upon their individual opinions or resort to political or publicity measures to get support for their administrative actions. It would be very conducive to effective and intelligent public health action in this matter if the health officers of the country were advised by you at some future time of a desirable policy. I feel that a policy of such importance can hardly be arrived at now or with the evidence pre-

sented to us to-day. At some future date we ought to expect the issuance of a statement from the United States Public Health Service not only with regard to possible Federal action but recommendations which should apply to those conditions appropriately dealt with under the police power of the respective States, either under their departments of industrial hygiene or under the departments of health.

I should think we must admit, after all that has been said, that we are in the face of a distinct industrial hazard, so far as production is concerned and, as others have indicated, one that is not at all beyond the scope of industrial ingenuity and technical skill to control. But I think it might be worth while to have it specifically admitted and included in the list of compensable diseases, in the laws of the different States, that poisoning by tetraethyl lead is a real hazard. The question has come up from time to time as to whether this is to be regarded as a lead hazard or as a new type of industrial poison. It seems to me that the producing companies concerned might with great advantage participate in advising the various industrial and health commissioners of the country to include this as a definitely proved industrial hazard so that workmen in the plants where this substance is made or used might get the benefit of the protection that is now given to those injured by certain other specified and listed lead products.

The proof of possible or demonstrable damage as offered by an animal experiment will never wholly satisfy health officers or physicians. But there remain to be carried out, as Doctor Edsall has suggested, and as have been attempted in a small way by Doctor Kehoe, very carefully controlled clinical tests of persons exposed to the ethyl-gasoline mixture as ordinarily used in garages or elsewhere.

It seems to me that the problem before us, the precise information on which a health officer would wish to predicate his individual action would be clinical observation of persons exposed to ethyl gasoline in the ordinary course of use. Since the use of ethyl gasoline has been discontinued for the time being it certainly ought to be possible to create practical experimental conditions which would indicate whether or not a substantial number of persons thus exposed developed evidence either of acute, temporary, or progressive chronic lead intoxication.

In connection with this I would like to comment upon the difficulty of clinically identifying the effects of ethyl lead poison. Health officers and physicians are faced everywhere with the great difficulty of getting the true etiological factor in the great variety of anemias and chronic diseases of the kidneys, damage to the brain, and interference with other functions possibly due to unrecognized chronic lead poisoning.

Our problem is not one of detecting acutely fatal conditions caused by exposure to the concentrated tetraethyl lead, but to distinguish between health and something a little less than good health. The notorious indifference of people to anything less than a striking disabling symptom is one of the problems of modern health administrators. People wait until they suffer an obvious illness or disability before they complain. It is the business of the health officer to see that people through medical observation become much more acutely sensitive to the slightest deteriorations in their health which are constantly being caused by a multitude of harmful conditions of environment among which lead in industry is a common cause of disability.

Up to the present time those who have reported upon the toxic results of tetraethyl lead have laid considerable emphasis on the occurrence of a number of deaths. I think health officers would agree, and certainly students of industrial hygiene would, that the number of deaths is not necessarily an index of the extent of the industrial hazard. We should like very much in this conference to know the number of days lost on account of disabilities which have been created among those who did not die. We should like to know whether those who have been subjected to acute poisoning by tetraethyl lead have ever resumed their former perfect physical fitness. In this our information is very incomplete. We have reason from other examples of lead poisoning to suspect that there is a considerable duration of deterioration in physique and in capacity for work and attention and self-control which follows any form of serious lead poisoning.

Unless we know the relation between the number of man-days of exposure and the duration of days of handicap from minor illnesses resulting from nonfatal poisoning, we shall not be in a position to measure the true importance of the hazard. Certainly the death rate is a very poor and incomplete indication, although a serious one, of the degree of any industrial hazard.

I presume that it is the inclination of every health officer to urge a continuance of the cessation of the use or sale of the ethyl gasoline which has been voluntarily determined upon by the company.

I should like to suggest and request—and this I say with due respect for the undoubted determination of the industries here represented to act as humane and considerate men—that in the future animal experimentation will precede and not follow human experimentation.

Up to the present time we have almost invariably got our first inkling of a new industrial chemical hazard by some human catastrophe. The technique of approaching any problem of possible toxic effect of a new substance is so well known to medical schools,

experimental laboratories, and government laboratories of various departments that it seems rather pitiable in a country of such wealth in means and knowledge that we had to wait for a series of human catastrophes to develop the demand for a series of animal experiments. Certainly in the future we could properly expect, either by common consent or by some form of governmental suggestion or direction, that no possibly dangerous new chemical substance should be put into retail use until proof of its harmlessness had been shown beyond doubt.

Such suggested control need not imply governmental interference with the liberty of process and discovery of chemical materials, but it seems inevitable that in some way or other there should be a clearing house for hazards, preferably at the expense of the Government, but if not at the expense of the Government, certainly by mutual agreement among the chemical industries generally, before retail distribution of a new product is carried out.

I believe that the Surgeon General would find it greatly to the advantage of his colleagues in State and municipal health work throughout the country to have as a result of such a conference as this the basis for recommendations following such a series of clinical studies as has already been suggested.

The CHAIRMAN. Dr. Henry Vaughan.

DR. HENRY F. VAUGHAN

President of the American Public Health Association

Mr. Chairman, as a health officer and as one of the few health administrators whom I see here in attendance to-day, I have been trying to assimilate and trying to arrive at some decision as to how a health commissioner might logically proceed in drawing some conclusions from the discussions which have taken place to-day, and my feeling is that the whole thing is more or less in a state of flux. I find myself wobbling in one direction at one time and in another direction the next moment.

As health administrators it is our prime function and duty to try to keep our respective communities as healthy as possible. In the city of Detroit, where I happen to be engaged as a health administrator, I am sorry to say that we have on an average one death each day from automobile accidents, approximately 300 to 350 each year, and yet there has been no legislation so far to do away with the automobiles.

Furthermore, we annually have a few people who close themselves up in the winter months in their garages, and in spite of the publicity which we have given to this subject insist upon choking themselves to death with carbon monoxide, and still we have not legislated

against the construction of garages; nor have we said that such people can not drive automobiles. It seems to be almost impossible to safeguard against all foolhardy accidents.

There are other things which have contributed to the lead hazard in large cities. With us we have had quite a hazard in the painting of automobile bodies which fortunately has been eliminated, and there has been a marked decrease in the incidence of lead poisoning in our city. I judge that this is true also in other automobile centers.

This question of whether there should be a prolonged discontinuation of the use of ethyl gasoline is not a matter that can be settled in any degree by the administrative health officer and one for which he would not assume prime responsibility at this time. It is rather a function of the physiologist and the physiological chemist to tell us from this mass of information which has been brought together to-day whether we may expect an accumulative health hazard. Certainly in a study of the statistics in our large cities there is nothing which would warrant a health commissioner in saying that you could not sell ethyl gasoline.

Now, you take our own city, for example: We have made a little survey there on ethyl gasoline. Ethyl gasoline has been sold in Detroit for approximately a year and a half, and the amount which has been consumed has averaged from 60,000 to 1,250,000 gallons a month. It was first used in October, 1923, and discontinued in May, 1925, and we have personally interviewed 170 individuals who have handled ethyl fluid and ethyl gasoline both, and who have averaged over 11 months of service in the handling of this fluid; men at the filling stations who have not only handled the complete mixture, the ethyl gasoline, but also the ethyl fluid.

In 139 instances the men handled the fluid and in 169 instances the ethyl gasoline. You can see, therefore, that most of the men had had experience with each type.

During the period of 11 months there were 9 out of the 170 who were sick at some time, and only 1 individual claimed as the cause of sickness the ethyl gasoline, and in further questioning concerning any ill effects from ethyl gasoline his reply was in the negative. So apparently his sickness was not connected at all with the use of ethyl gasoline.

Now, of these 170 individuals 137 had spilled ethyl fluid or ethyl gasoline on their clothing or on their bodies, or had had some of the material squirted into their faces or into their eyes. They had had the warning, they had been told that they must remove the ethyl fluid with gasoline and use a soap, but this warning had not been followed, and in practically all instances the material had simply been wiped off the clothing or off the skin. Out of the 137 claiming to have been exposed in this fashion only 16 felt any slight ill

effects at all—temporary burning and skin blotches, but nothing more serious.

Now, that is the situation as we found it in interviewing those who had handled ethyl fluid and also ethyl gasoline, and the results are entirely negative. As health administrators, you will readily see that in a report like that you would not be justified in stating that it is logical to discontinue the use of ethyl gasoline on those results alone. We must be guided entirely by the findings and the result and the dictum of those who can foresee whether there is toxic material or lead poisoning which may make itself felt in the future; but so far as the present situation is concerned, as a health administrator I feel that it is entirely negative.

I would certainly urge, as Doctor Emerson has, the continuation of these experiments, and I would also like to urge that the Surgeon General ultimately arrive at some decision which may act as a guide to the health commissioners and health officers throughout the country.

Now, Mr. Chairman, the American Public Health Association has been fit to appoint a committee to represent the association at this conference, and Doctor Hayhurst, of Columbus, who is an active member of our section on industrial hygiene, is here, and I hope that you will permit Doctor Hayhurst to continue this discussion on behalf of the health administrators.

The CHAIRMAN. Doctor Hayhurst.

DR. E. R. HAYHURST

College of Medicine, Ohio State University, Columbus, Ohio

I have also been delegated by the State Department of Ohio to state our experiences with ethyl gasoline. The substance of the whole situation is summed up very much in this, that we have been undecided what to do because of the animal experimentations on the one side, in this place and that, and in the result of the reports of our health officers. We have had to get out, as the late President Burton, of Michigan, said in a story and root for ourselves. President Burton said that a man who decided to raise pigs scientifically put one in a pen on a balanced diet and it gained a hundred pounds in six months. Another one he put in a pen on a balanced diet and all the alfalfa it could eat and it gained 200 pounds in six months. Another he put in a similar pen, but he left a hole in the end of the pen. It got out in the yard and rooted for itself and gained 300 pounds in six months.

I am only going to talk about the rooting part of the investigations. Last August when we were called to Dayton, Ohio, we made reports on conditions which had been investigated by the State de-

partment of industrial relations and by the State department of health. The reports on those investigations are on file. The distinct paragraphs of them have already been addressed to you in response to a communication from the Surgeon General asking us to summarize the material which we could prepare for the conference.

I will read simply the end paragraphs in the two reports, first that from the department of industrial relations:

In view of the fact that the hazard of contact and of inhalation no longer exists since this new equipment has been installed, it is the opinion of the writer that the chances of a recurrence are very remote.

This refers to the manufacturing laboratories.

From the physician's report from the State department of health I will read the the conclusion in its entirety:

Since the installation of the new filling and "blending" arrangement with the downward exhaust, no symptoms have been experienced by the workmen, whereas previously complaint of sleeplessness, headache, loss of weight and appetite were quite common among those employed in this process.

It is the opinion of the writer that: (1) As at present handled the hazard of the compound to workmen at the plant of the Research Corporation is slight; (2) the great dilution of the compound in fuel gasoline makes the danger to garage workers and auto repairmen practically negligible, and (3) although proof is not yet established it is very probable that there will be no appreciable detriment to the health of the public and of garage men because of the infinitesimal amount of lead which may be present in automobile exhaust.

Those were the reports on August 1, 1924.

Official certificates of occupational diseases for tetraethyl lead poisoning of 24 employees have been filed by Dr. Robert A. Kehoe of the General Motors Research Corporation (now the Ethyl Gasoline Corporation). Eighteen of these are concerned with the events of the year 1924. During 1925 the following number of cases have been reported by months: January, 1; February, 1; March, 1 (?) reported as "influenzalike infection" occurring during the epidemic of same and with mania, also recovery; April, 2; May, 1, reported as complicated with "gingivitis with abscess."

These cases, totaling 24 all told, had acute symptoms only. The severe or fatal cases which occurred in Dayton and in Bayway, N. J., are exactly similar to the cases reported in "Dangerous Trades," published by Sir Thomas Oliver in 1902. If anyone can distinguish the symptomatology from that which Sir Thomas Oliver gave at that time for acute lead poisoning going to the brain (lead encephalopathy), I must be convinced.

For instance, he states, on page 307 of that book published in 1902, that young women are especially susceptible, become pale, lose appetite, have a severe headache in the morning, falling in convulsions, with unconsciousness, coma, and death within two days, and he recites several cases of three days' duration which were

preceded by premonitory toxic hysteria (which he marks in italics), followed with blindness, convulsions, coma, and death in three to four days. Acute mania is also emphasized, usually followed by death or incomplete recovery, and then (I quote) "the individual passes the remainder of his or her days in an asylum." In a total of 133 cases of lead insanity 33 cases of mania are recorded. (Dangerous Trades, p. 308.)

On page 45 of the Ohio "Survey of Industrial Health Hazards and Occupational Diseases," published in 1915, there is shown a case, recorded in 1914, with a full-page picture of a man suffering from acute lead encephalitis, with mania, who had to be strapped to his bed. This was in the Cincinnati General Hospital.

I want to emphasize the point, therefore, that in my opinion, the symptomatology of the recent cases associated with tetraethyl lead is nothing new. It is the usual, clear-cut set of symptoms of lead poisoning involving the brain.

It is also pointed out in the literature that this type of poisoning, lead encephalitis, is most apt to occur in cases using lead in the form of dust.

I would say, in reference to the point made by Doctor Emerson, that all of our cases of lead poisoning are compensated in Ohio, irrespective of the form of lead, provided it is industrial in origin. These cases of the Ethyl Gasoline Corporation have been compensated; i. e., all who have filed claims. There has been no question about them.

In regard to data relating to public health hazards in the use of tetraethyl lead compounds and gasoline, under date of May 9 and May 12, we sent out the following request to our health departments of the cities listed:

In view of a possible alleged hazard to the public or to the filling station and garage employees from the use of ethyl gasoline, we desire to ask whether you have received any information, direct or hearsay, pointing to mishap or ill health among the citizens of your community.

I have arranged the following list of cities in alphabetical order. The health commissioners of these cities (most of them full-time men) have been known to us in health work and associations for many years: Akron, Cincinnati, Cleveland, Dayton, Hamilton, Middletown, Sydney, Piqua, Springfield, St. Marys, Toledo, Youngstown, and Zanesville. Up to date all but two had been heard from (Middletown and St. Marys). The cities heard from represent over 2,000,000 of the 6,000,000 population of the State of Ohio and represent, of course, the most densely concentrated aggregations of population as well as the filling stations and sales places of ethyl gasoline in those cities.

I have these replies all here, but allow me to summarize in a single statement:

"All of these replies (that is, 11 out of the 13 received) are unanimous in stating that no mishaps or ill health resulting from the use of ethyl gasoline have occurred. Three commissioners—those of Cincinnati, Dr. William H. Peters; of Dayton, Dr. A. O. Peters; and of Cleveland, Dr. R. L. Rockwood—state that they have made special investigations and given the subject considerable attention and have come to the conclusion that there are no facts concerning the handling of this product or its distribution that would justify prohibiting the sale of the product in their cities" (or words to this effect, since I am quoting the composite statements of these three men).

I shall be pleased to read these replies. I have them here.

It should be added that the State department of health gave considerable publicity to this question, beginning November 1, 1924, following the report of mishaps at the Standard Oil Co. at Bayway, N. J., last October, and proclaimed that no steps would be taken to prevent the sale of ethyl gas in Ohio, as no evidence had been received that it was dangerous to the public or to garage men and others except those concerned in its manufacture, where apparently successful methods of control have been worked out.

Since that date we have asked a number of health commissioners and others to watch the situation continually and inform us of any evidence of danger. It was a subject of limited discussion at the annual conference of health commissioners of Ohio held in Columbus in November, 1924. The public has also been kept informed of the possible hazard through the press, including copies of press statements from New York and elsewhere.

To date no unfavorable reports, official, unofficial or hearsay, have been received at the State department of health.

To verify certain points concerning the time and circumstance of placing a possibly dangerous substance upon the market for sale in Ohio to the public without proper admonitions, we sent a questionnaire to the Ethyl Gasoline Corporation on November 21, 1924, and received reply November 25, 1924, from Mr. Thomas Midgley, jr., vice president and general manager of the corporation, stating that the sale and distribution of tetraethyl gasoline was first begun on February 1, 1923. That was at a filling station in Dayton, which was the first city in the United States where it was publicly sold. This was after the research staff of the General Motors Research Corporation had recognized and investigated its acute and chronic toxic nature for a considerable period prior to February 1, 1923; that the corporation also devised a proper set of instructions

for the safe handling of ethyl fluid and ethyl gasoline at filling stations, which instructions were first worked out by one of their own men at the filling station where it was first dispensed. Furthermore, after they had satisfied themselves of the absence of apparent danger to the public, these acute cases appeared. They were especially concerned in their preliminary investigations with the chronic and cumulative forms of lead poisoning which apparently failed to occur. It was then that this matter was taken up with the Government for investigation and our health departments began to hear about it and worry about it.

To my mind it is, of course, possible that none of the public or filling station employees, etc., has as yet been exposed over a sufficient length of time to show the effects of possibly slow accumulation of lead from this source, if such hazard exists. Still a period of over two and one-fourth years, including the nation-wide publicity of the past several months should have sufficed to bring out some mishaps and poisonings suspected to have been caused by tetraethyl lead, especially in susceptible persons, because idiosyncrasy to lead poisoning, even in minute doses, is rather common and also well discussed in the literature of the subject.

I think there is one thing about the animal experimental data which is not comparable to the public health situation. These experiments are all done in closed chambers. The public are not breathing exhaust gases under such conditions. They may be down in streets lined with tall buildings, but they are not in closed chambers retaining the poisonous products.

The CHAIRMAN. I see Doctor Nicoll, of the Health Department of the State of New York. Doctor Nicoll.

DR. M. NICOLL, JR.

Commissioner of Health, New York State Health Department, Albany, N. Y.

Mr. Chairman, I wish to urge that you be made the court of last appeal to consider the evidence that has already been presented and to collect further evidence which is apparently very necessary in order to arrive at a conclusion as to whether the use of tetraethyl lead is a public health hazard or not and advise the officers of the various States as to your conclusions. We should not expect you, sir, to arrive at a conclusion in the very near future. You should have time. Being a health official, I know that you have not any money available to do this work yourself, but you can call upon the other branches of government, private agencies, and university laboratories to render assistance.

Take the situation in the State of New York. The public health council of the State three or four months ago, as a result of all the

evidence that could be obtained at that time, forbade the use of the concentrated preparation, but did not prohibit the use of the diluted form under certain definite restrictions as to sale and distribution.

The city of New York, over which I have not jurisdiction, prohibited the use of any form of ethyl lead. In other words, a man filling his gas tank at Buffalo or Syracuse with this preparation and going down to New York City would be amenable to the rules of the Board of Health of the City of New York and be punishable by the city authorities.

Many city and State boards of health are in a quandary as to what action, if any, to take in this matter, or are in doubt as to the wisdom of action already taken. For this reason, whether you as Surgeon General of the Public Health Service have legal authority or not, I am very certain that your opinion, arrived at after careful investigation of all the facts, will be accepted by the majority of health officials.

Finally may I suggest that this matter be brought up at the coming conference between the United States Public Health Service and the State boards of health.

The CHAIRMAN. Doctor Nicoll spoke as nicely as though he were giving me a box of candy.

Is there any further discussion?

MRS. GRACE M. BURNHAM

Director Workers' Health Bureau

Mr. Chairman, I have looked over the program, and I do not exactly see where the Workers' Health Bureau comes in—either entirely under the heading of "Industrial aspects" or entirely under "Public health aspects"—so I have chosen to wait until the Public Health speakers have spoken.

The CHAIRMAN. It comes under the second heading.

Mrs. BURNHAM. The Workers' Health Bureau is interested in studying occupational diseases as they affect various groups of industrial workers and in working out programs of health control for those groups.

We are interested in the problem of tetraethyl lead and tetraethyl-lead gasoline in its different stages.

In the first place, we are interested in the factory production stages. In looking over the material which has been made public on the subject during the past six months we were interested in finding that there is no authoritative list of actual deaths and occupational-disease records which anyone can have recourse to. That is, no governmental agency has compiled from the data which have ap-

appeared in individual reports or in the newspapers any authoritative lists of deaths or disease.

In cooperating in preparing the article on tetraethyl lead which appeared in the Medical Journal May 16 we had some doubt about the 60 cases of poisoning and 11 deaths which we enumerated. Yet this morning, after having heard the speakers from the various plants, I have added up 149 cases of poisoning; 43 at Bayway—or 48, as one gentleman says, including 5 deaths—28 at the du Pont plant up to May 16, 1924, after which we have no record; and 78 at the General Motor Co. plant up to date. That makes a total of 149 that we know of already.

Now, it seems that one of the immediate things to ask would be for the United States Public Health Service to get the medical records of these men that have been examined and compile them. We have heard reports here that men have been given medical examinations and have shown no symptoms, and then we have heard other reports stating that they did show certain symptoms.

If we knew the symptoms that the men did show, we could go over the number of cases and arrive at certain definite conclusions that would be authoritative. My suggestion is that the United States Public Health Service have made available to them immediately the medical records of all the men examined in all the plants where tetraethyl lead has been either manufactured or compounded or handled, and that from those records a statement be made as to the actual number of deaths and poisonings, showing also how long the men have been employed before they died or were poisoned.

I agree with the suggestion already made here that we also find out what happened to the men after they had been poisoned, and what happened to them after they had been laid off or discharged, whether they were reemployed in other industries, or whether they were permanently injured as a result of what occurred.

I was very much interested in looking over Commissioner McBride's report last fall, after the Bayway tragedy, to notice the seriousness with which the men who were responsible for the poisonings from tetraethyl lead regarded the situation.

Commissioner McBride said that there were certain precautions which had been taken to protect the workers.

Commissioner McBride made the statement that at the Standard Oil Co. plant "in many instances a medical examination was required twice a day" and that in the du Pont plant "a man would forfeit a full day's pay if he did not bathe every day." It seems to me that where a material handled is so poisonous that as a precaution a medical examination of the men employed is required as often as twice a day, we are faced with a very serious situation.