Question: I would like to ask a question not on tetraethyl lead. What would be your reaction to a workman who day after day would wash his hands in benzol fluid, for say, six or eight months, possibly washing his hands three or four times during the day?

Answer: There is no evidence today that benzol, i.e. coal tar distillate, is absorbable through the skin to any significant degree. Benzol will give rise to dermatitis, and a very persistent and miserable dermatitis to treat in many cases, but in general one finds that a group of men who may be having their hands immersed in benzol, working with it day after day, do get symptoms of benzol intoxication. This is due to the vapors which they inhale, working in such circumstances, with their hands immersed, the chances are they will be inhaling vapor in which case the first symptom is usually that of weakness and anemia, which latter is characterized by a blood picture which the physician can easily recognize if you inform him of the benzol exposure of the man.

Benzol poisoning in this country today is usually first manifested by changes in the blood, recognized upon medical examination. We do not usually see convulsions, acute purpura, skin hemorrhages or bleeding from the gums because the condition is not permitted to progress that far. The first thing I would suggest that you look for would be the finding in the blood on medical examination.

MR. HENDERSON: This case developed a lack of white blood corpuscles.

Answer: In some cases reduction in the number of white cells is the first and in most cases a slightly later sign of benzol intoxication. The first sign is often a reduction in the platelet count and since it is not usual to count platelets in the blood as a routine measure, that sign is often overlooked, and one sees the picture of reduction of white cells, with anemia, as usually the

first sign for the general practitioner.

MR. H. Would that be a general break-down, or would it come suddenly? Would the man suddenly become very weak?

Answer: It depends upon the magnitude of his exposure. Some work under conditions of exposure for considerable periods of time before the first sign of benzol intoxication develops, then suddenly the onset occurs -- paleness, weakness and aplastic anemia. Often after people have worked for long periods of time with benzol exposure the changes in the blood may be very difficult to treat. There are cases on record of benzol intoxication which, in spite of treatment and discontinuing exposure of the man have persisted over periods of years. There is no uniformity about the mode of onset or the time of onset, no certainty about what might be the first symptom. If a workman is exposed continuously, and there is an aplastic anemia with other findings associated, I think you can rest assured that he has benzol poisoning. Today we have, as a consequence of work done at the Bureau of Mines and other places, a very effective means of determining the magnitude of benzol exposure by examination of the sulfates in the urine. With the use of this method the amount of exposure can be accurately gaged. This method of study should be used on workmen with any significant exposure to benzol.

MR. SCOTT: I wonder if the Doctor will make clear to us -- in your paper you spoke of a percentage of 5 to 20 per cent. Was that tetraethyl lead contained in the residue in one of these tanks?

Answer: No, that was lead sulfide probably. It was

referring to the percentage of lead, and where such high percentages of lead occur we can attribute its occurrence in over 90 per cent of instances to contamination of the sludge by litharge. In other words, after treating gasoline to remove sulfur, the gasoline has been passed through intermediate settling tanks before complete settlement has occurred. The gasoline goes to a storage tank where it stands for a period of time and more lead sulfide settles out. This lead has its origin in litharge. If one takes as we are doing now, a group of tanks from stations particularly where litharge treating is practised, you will find that the lead content of the sludge is extremely high. If you take in comparison a group of tanks at stations where litharge is not used, and which have never been blended into and are so situated that gasoline has adequate time to settle and be purified before it reaches the tank, you will find the lead contamination well below 1 per cent, sometimes in the neighborhood of 0.8 per cent.

MR. SUTTON: Is there a chance of lead poisoning from those litharge settlings in the tank bottoms?

Answer: Yes, there is some question, a big question, as to how much lead is needed in order to produce poisoning. Much depends on the state of the material, if it is being inhaled or swallowed. Lead which is in the form of litharge, actually lead sulfide, in practically all cases is just as poisonous as lead in any other form, if you get it into the body or swallow it, so in cleaning of tanks where considerable dust is raised and there is an opportunity for exposure of workmen who are not wearing respirators, poisoning can occur. Practically speaking, the danger of poisoning from residual tetraethyl will be much

greater.

The reason poisoning has not occurred more frequently in the petroleum industry from litharge residues is that the chances of the exposure of any one man is rather infrequent. Tank cleaning is not carried out every day, and due to this infrequent exposure we find few cases of poisoning. However chances exist and one may expect to find poisoning occurring from exposure to lead compounds.

MR. McLEAN: Your findings on litharge being a source of lead has not changed your conclusion that the main difficulty still exists only at refineries and where bulk tanks are used they are practically free from lead contamination from either source?

Answer: That is true with certain reservations. Refining tankage has certainly more lead from litharge, and when one measures the organic lead in residues one may find more lead from sources connected with the use of tetraethyl lead. We will take litharge first because it is somewhat more simple. In the case of litharge although treating is obviously done in the refinery there is the supplying and trans-shipping and in some instances this procedure is so rapid on a time basis or the characteristics of the gasoline as such that the litharge does not readily settle, that we do find in cases of some bulk storage tanks, significant amounts of lead sulfide from litharge contamination. That is not usual as is the case with refineries.

In so far as hazard from tetraethyl lead is concerned, we have not had any accurate means of knowing just where this hazard is located. Most of the blending by accepted

procedures of course is done at refineries, but over a period of the last thirteen or fourteen years we have had an unknown number of instances of spiking of tanks by the direct addition of tetraethyl lead from drums or cans, and it has been impossible to know the exact frequency. We cannot go to any place in the state of Ohio and say with certainty, "This tank has not been spiked" or "This tank has been spiked" unless it was built in recent years. We do know that some companies, when they began to market leaded gasoline, wanted to get it on the market at a certain date, accounting for the spiking in some filling stations in the state. Not only was spiking done in instances by representatives of the Ethyl Gasoline Corporation, but others who wanted lead added in any particular tank seemed to have taken it upon themselves to add it. We don't know precisely how widespread this practice was. Certainly in tanks less than two or three years old the possible contamination of lead from Ethyl Fluid is minimal, but until eight or ten or twelve years have elapsed, in which time practically all tanks will have been cleaned, we will not know for certain that some tanks do not have some tetraethyl lead in the bottoms.

MR. SCOTT: The Doctor has been so fine in his answering the questions asked on the lead question, I would like to ask another question.

During the early part of your paper you spoke of educating the workers. I wonder if you would enlarge on that a little. We find it so difficult to secure a perfect understanding and perfect cooperation. We can discuss mechanical defects, we can discuss hidden hazards, poisoning and other

things, and we can secure all kinds of knowledge, and know these things ourselves, but what I would like to get is some standard way of conveying all this information to the men down on the line, and secure their cooperation in doing their part. I come to the point sometimes where I feel completely washed out. I have given everything I have, I don't know anything else to give, then what am I going to do?

If you have a minute Doctor, I would like to tell you what we have tried to do in our refinery, then I would like to have you give us some additional information.

You will find if you get your men together, instead of your teaching them, they are able to teach you, and teach you plenty. We have introduced in the No. 1 refinery what we call a working man's committee in each department, and as each department has its own safety meetings they take charge of the meeting and the department head or safety man stays on the side lines. They pick a committee of five or six and they in turn choose their chairman and secretary, and when we hold a meeting they have a blackboard and the chairman of this committee takes charge of the meeting.

This committee chooses its own program, which consists of problems they run into during the course of their routine work; for instance, at our first meeting the welders outlined on the blackboard the position they wanted certain work left by the boiler makers in order to allow them to make a perfect weld, make it the most efficiently, and of course the more efficient it is, the safer it is. But you would be surprised, after the welder gets through up walks a boiler man

and he in turn outlines his ideas on the subject, and before you are through you will find these men that we called into a meeting -- well, we stand up and try to teach them something -- we are putting the cart before the horse. They can teach us a whole lot.

Can you give us a few words on this subject of education?

Answer: I would not know what to add to your program. In having the workers' committees you have done about all that can be done in the direction of the organization and structure of the program. The rest depends largely upon how much is put into it. You cannot do any more than have groups of workers themselves reporting on the business. In some companies, for instance one or two of the large steel companies, the worker committee system is used, in which committee the foreman participates as well as the workmen in various operations, and in addition there exists a sort of floating mail box in which all helpful suggestions are dropped. These go to the foremen of the various divisions and are passed with perhaps notations by the foreman to the head of the safety department.

One thing I think you can do in connection with your committees is to attempt to enlarge the scope of activities and thus stimulate the interest of the worker. One can see very easily that the workman may know more about the hazards to which he has been exposed for a period of years than anybody else in the plant. That is often the case. He may not know the rationale of safety measures or toxicology of the material, but he knows what he can and cannot do, after following his work every day. But if one can give these men a little more than

instruction on the hazards before them day after day, and a little something to take home with them in the way of widening their health outlook, or a point of view on personal hygiene outside the plant, perhaps it can be made more interesting.