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The following statement is made in answer to a request by Mr. Clifford W. Axtell for an opinion in the case of [REDACTED] vs. Thermopolis. It is my understanding that Mr. [REDACTED] has become blind, that a diagnosis of optic atrophy has been made and that Mr. [REDACTED] has made claim through his attorney that the optic atrophy was produced by the action of lead which was absorbed from leaded gasoline, which was used in small quantities (several gallons per month) for the purpose of operating a starting motor and also for wiping engine parts.

My name is Lester W. Sanders. I was graduated with the degree of Bachelor of Arts from Miami University in 1922, the degree of Bachelor of Medicine from the University of Cincinnati in 1927 and the degree of Doctor of Medicine from the University of Cincinnati in 1928. I am a member of the American Medical Association, the Ohio State Medical Association, the Academy of Medicine of Cincinnati, Ohio, and the Association of Industrial Physicians and Surgeons. I am an Instructor in Physiology and an Instructor in Applied Physiology at the College of Medicine of the University of Cincinnati. I am a member of the medical staff of the Ethyl Corporation.

The Laboratory of Applied Physiology, with which I am associated, engaged itself in the investigation of the toxicity of tetraethyl lead in 1923 and has continued this study throughout the past 24 years. Every effort has been made to have knowledge of and investigate every case of alleged or actual tetraethyl lead intoxication which occurs in the United States (and also in other countries) and these cases are reported by us to the Surgeon General's Office in Washington.

If optic atrophy is produced by the action of lead, a generalized lead intoxication must first exist. In order to establish a certain or even reasonable diagnosis of lead intoxication, the following requirements must be satisfied:

1. A reasonable number of the characteristic signs and symptoms of lead intoxication must exist. There is no single clinical sign or symptom which could possibly establish the diagnosis.
2. Either:
  - a. A reasonable source of lead for absorption must be proved or
  - b. An amount of lead must be found in the excreta and blood which is sufficiently high to account for an intoxication and to prove an absorption of lead greater than that which occurs in the average population. The mean level of lead

in the urines of specifically unexposed individuals (those having no known exposure to lead) is 0.02 milligrams per liter. The individual level not infrequently is found to be as high as 0.07 milligrams per liter.

It is my contention that a lead intoxication in the case of Mr. Langshaw was never proved and that there is no reason whatsoever to believe that it ever existed.

To the best of my knowledge, the signs and symptoms presented by Mr. [REDACTED] were not characteristic of lead intoxication at any time during his illness. This opinion is supported by the fact that out of a reported 48 physicians who were consulted, only one (or one group of physicians) suggested the possibility of a lead intoxication.

Lead was reported to have been found in the urine, but no quantitative amount was stated.

The source of the lead allegedly absorbed was stated to have been the gasoline used as previously described. No intelligent evaluation was made of the amount of lead which could possibly have been absorbed under the existing circumstances.

The reasons why a quantity of lead sufficient to produce any intoxication or pathologic change could not have been absorbed from the source stated is established in the scientific literature.

During the years of about 1924 and 1925, this specific problem of the possibility of the absorption of lead through the skin from leaded gasoline applied to the skin was investigated by the department described before as the Department of Applied Physiology at the University of Cincinnati. Gasoline containing the maximum allowable amount of tetraethyl lead was applied daily to the skin of laboratory animals. No appreciable amount of lead was ever found to have been absorbed from the applied gasoline.

Furthermore, in investigations made independently by the United States Public Health Service, and by the group with which I am associated, of a cross section of workers having the greatest exposure to leaded gasolines, it was demonstrated by both groups of investigators that no significant amounts of lead were absorbed from leaded gasoline, either by skin contact or inhalation. This was demonstrated by individual analyses of the faeces and urine of the men examined.

Leaded gasoline is handled at least four times from its manufacture to its ultimate consumption. It is loaded at the refinery into tank cars, trucks or barges as an open process through large

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swing lines which are operated by men on an eight hour or longer shift. It is unloaded and later redispensed at bulk stations by similar methods. It is then put into tanks at service stations and redispensed by the service station operators. All of these workers, during their working hours, handle continually from hundreds to thousands of gallons of leaded gasolines per day. All of these men are frequently wetted by these gasolines and are exposed in various degrees to the vapors of these gasolines. In 1946 there were 588 points where leaded gasoline was blended and subsequently loaded. It is a conservative estimate that from eight to ten thousand men were engaged full time in loading this gasoline. There were many more involved in the same kind of work at bulk plants, and there were at least a million filling station attendants in some 230,000 stations handling leaded gasoline throughout their days work. In the State of Wyoming alone, eighty three million gallons of leaded gasoline were sold in 1946, and necessarily handled by the before mentioned groups. In the entire United States, one billion eight hundred thousand gallons of leaded gasoline were handled in the same fashion.

No one authenticated case of lead intoxication has ever been reported or seen by us in any of these groups of workers who have the maximum exposure to leaded gasolines.

An additional group of men who are intermittently in contact with leaded gasoline is composed of garage mechanics. No authenticated case of lead intoxication has ever been reported or seen by us in this group.

There have been cases of tetraethyl lead intoxication seen by us from time to time, as a result of exposure to the concentrated lead compound which is added to gasoline. In none of these cases have we seen blindness and/or optic atrophy or other forms of peripheral neuritis.

The maximum allowable limit of lead added to automobile gasoline is three cubic centimeters per gallon, but this limit is infrequently reached and it is estimated that in the area concerned the gasoline lead content would rarely exceed two cubic centimeters, and usually considerably less. This would mean a usual concentration of from 0.0125 to 0.025% lead in the gasoline in question.

The medical history of Mr. [REDACTED] illness is not characteristic of lead intoxication. The industrial history of Mr. Langshaw shows that his exposure to leaded gasoline was infinitely small compared with workers whose essential full time job is that of handling leaded gasoline and it has been shown that lead intoxication has not occurred in these groups where millions of men have been involved. There is not a sufficient difference in susceptibility to lead intoxication to account for this case as one isolated case out of millions of similar, but very much greater exposures.

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Lester W. Sanders, M.D.