

June 30, 1958

Dr. S. I. Gleason
Director of Research & Development
Wynn Oil Company
1151 West Fifth Street
Azusa, California

Dear Dr. Gleason:

I have before me your letter of June 19 addressed to the New York office of Ethyl Corporation and that of corresponding date addressed to me. Inasmuch as I am the Medical Director of Ethyl Corporation (by a strange combination of circumstances that date back to 1925) and the Director of this Department in this Medical College, of which The Kettering Laboratory is a part, I wear two hats, and your letter to New York was bound to come to me. With respect to the circumstances referred to above, I was an assistant professor of physiology in this medical school in 1924, when some of the problems concerned with tetraethyl lead were brought to me for investigation by C. F. Kettering and Thomas Midgley, Jr. The pursuit of these problems within the laboratories of the medical school and within the industry put me in the way of being just about the only source of scientific and practical information on hygienic matters relating to tetraethyl lead, and so, without relinquishing my university responsibilities, I became the Medical Director to Ethyl Corporation and have so continued. The main problems of the industry involved research and since this was my field of activity, I could carry on both jobs without conflict.

Since I can answer both letters at once and with the same background of information, it is just as well that I was delayed in my reply to the one that came directly. Incidentally, the facts used by Dr. Rankin in his talks have come from this Laboratory. I have no responsibility for his interpretation of them, although from my acquaintance with Dr. Rankin I should expect them to be fairly sound, for during the years up to 1945, when E. I. du Pont de Nemours and Company was engaged in the manufacture of tetraethyl lead under contract with Ethyl Corporation, I was their chief medical advisor on the hygienic aspects of this process. I shall speak to the point of your questions quite without reference to any apparently or possibly contradictory opinions expressed by Dr. Rankin, especially since this is a matter on which misunderstandings can easily occur.

First, let me say that the great bulk of the experimental work on tetraethyl lead, and on the hygienic problems associated with this compound and its use in gasoline was done in the late twenties and early thirties. The experimental work on the metabolism of lead compounds, generally, with emphasis on the inorganic compounds of lead has continued since then to the present time. Reprints of most of the early publications are no longer available and I can

Dr. S. I. Gleason - (2) - June 30, 1958

send you only a few that give references to the others. The later investigations, some of which are still in progress, have been published only in part, but those available are being forwarded to you.

I think I should warn you that it is somewhat dangerous for you to undertake the interpretation of medical procedures and practices based upon the experimental data. This is a complex series of problems, and even after thirty years of intensive study of them, it is necessary for me to be cautious in the matter of conclusions based on analogies. I suggest that you examine the literature which I shall send you, being careful not to make inferences beyond the direct evidence, and then submit to me any questions concerning the practical occupational situation with which you are concerned.

Now with reference to the absorption of lead through the skin; there is abundant evidence concerning the absorption of tetraethyl lead through the skin, and on the extent to which the dilution of tetraethyl lead with gasoline slows up the rate of absorption. The facts here are known in some detail. With respect to the absorption of lead soaps through the skin there is much less information, and the evidence on which current opinions are based is both scanty and poor. Our experience in industry leads us to believe that this is a matter of little importance. We have investigated but one of the soaps in this regard and have found that its absorption is too slight to be of practical importance. This one was lead octoate. So far as I know and can establish on a reasonable basis of inference (not proof) there is no evidence that any one of the lead soaps (oleate, naphthenate, styphnate) is absorbed in any more than theoretical amounts through the skin. On the other hand, if I were to have the responsibility for a group of men whose work called for frequent or prolonged contact of their skin with one of these compounds, I would establish the facts with evidence and not inference. This can be done. It has never been a problem to us in this Laboratory. We have funds to investigate only those problems which industry brings to us and pays for, and only one company has ever asked us this question out of a willingness to finance its investigation. There are satisfactory methods for such an investigation both in the Laboratory and in the field of operations.

One other point of practical importance in this connection is that all individuals are absorbing lead at all times in not inconsequential amounts. The average adult North American takes in about 0.4 mg. of Pb^{++} daily and eliminates approximately that amount daily. The sources are food and beverages, including water, and the air, which is contaminated with a small quantity of lead from many sources. You see, therefore, that unless the amount absorbed through the skin under unusual or occupational conditions is appreciable, it will be lost in this normal intake and output of lead. For example, persons who handle commercial leaded gasoline do not absorb enough lead out of the gasoline (the concentration of tetraethyl lead is always low and never in excess of 3 ml. per gallon in automobile gasoline or of 4.5 ml. per gallon in aviation gasoline) to

KE 0005058

Dr. S. I. Gleason - (3) - June 30, 1958

make any measurable change in their normal rate of excretion. On the other hand, men who handle the tetraethyl lead itself (without dilution) show a gross increase in their lead output in the urine on the next day after they have suffered accidental contact with even a small quantity or have been subjected to contact with an appreciable (measured) quantity on their skin.

In an experience of nearly a life time in the lead trades, I have never seen a case of lead poisoning that was due to the absorption of the inorganic or organic salts of lead through the skin. I do not believe it occurs, but I repeat that I would surely investigate the matter carefully if I had the responsibility for the safety of exposed personnel in the specific instance. It is not necessary to depend upon guess work in such a matter. I should call attention to the simple, but not always recognized, fact that when the skin of men, especially of hands, comes in contact with lead compounds, they may fail to observe, sufficiently, the necessities of personal cleanliness, and so swallow significant amounts of lead with their food and drinks, not to speak of their tobacco and other objects that the fingers put into the mouth.

I trust that this may serve to point up, if not to answer some of your questions.

Very truly yours,

Robert A. Kehoe, M.D.

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Exposure to Lead - Kehoe
Experimental Studies on the Ingestion of Lead Compounds - Kehoe, Cholak, Hubbard, Bambach, McNary and Story
On the Toxicity of Tetraethyl Lead and Inorganic Lead Salts - Kehoe

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Wynn Oil Company

1151 WEST FIFTH STREET
AZUSA, CALIFORNIA

DEPARTMENT OF
RESEARCH & DEVELOPMENT

June 19, 1958

Ethyl Corporation
100 Park Avenue
New York 17, New York

Attention: Medical Research Division

Gentlemen:

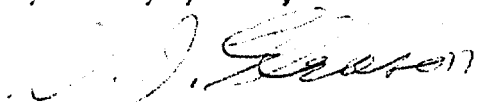
We have a current interest in the possible rate of assimilation of lead poisoning by absorption through the skin on the hands. Our interest lies in the fact that our product which contains an oil soluble organic lead salt in very small proportion is sometimes used with or added to conventional metal working coolants, either soluble type or oil base type.

Could you also advise us if the Ethyl Corporation has ever published any available literature on the subject of lead poisoning and the rate of depletion of lead from the human system.

In 1954 we had the pleasure of attending a symposium on lead poisoning at which time very reliable and interesting information regarding the biochemical elimination of lead from the human system was presented. Also various methods for determining lead in both the blood stream and the urine were discussed.

Our interest is purely technical and we would appreciate having an answer from someone in authority in your Department at your earliest convenience.

Very truly yours,


S. I. Gleason, Ph. D.
Director of Research & Development

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