YALE UNIVERSITY

LABORATORY OF APPLIED PHYSIOLOGY
4 HILLHOUSE AVENUE

NEW HAVEN, CONNECTICUT

January 20, 1925.

Dr. R. R. Sayers,
Department of the Interior,
Bureau of Mines,
Washington, D. C.

Dear Doctor Sayers:

I read your paper on "Exhaust Gases from Engines Using Ethyl Gasoline" with much interest. I note that you compare the risk to that which is faced by painters. I think this comparison is very well taken, for practically all painters suffer, at one time or another and in some cases repeatedly, from lead poisoning. If the use of lead in paints were not already established and difficult to replace, there is no question in my mind that the proper policy of public health would absolutely forbid that use of lead.

I learned, from some of the people who have been associated with the development of tetra ethyl lead, that the formation of scale in the engine is one of the conditions they are trying to overcome, so that all of the lead will be discharged into the atmosphere.

It is points of this sort which leave me still inclined to believe that the use of lead in automobile fuel is contrary to a proper public health policy. In the past, the position taken by the authorities has been that nothing could be prohibited until it was proved to have killed a number of people. I trust that in future, especially in a matter of this sort, the position will be that a substance like tetra ethyl lead cannot be introduced for general use until it is proved harmless.

I am very glad indeed that the Surgeon General plans to appoint a commission to consider this whole matter from the broadest standpoint.

Sincerely yours,

Yandell Henderson

YH:GMV

OFFICE OF THE DIRECTOR
HYGIENIC LABORATORY
TWENTY-FIFTH AND E STREETS NW.

TREASURY DEPARTMENT

UNITED STATES
PUBLIC HEALTH SERVICE
WASHINGTON, D. C.

October 11, 1922.

Memorandum to Assistant Surgeon General
A. M. Stimson, through the Acting Director,
Hygienic Laboratory.

Sir:

My attention has been called to a situation which contains the elements of a serious menace to the public health.

Thomas Midgley, and his coworkers (J. Ind. End. Chem., 14 894, 1922), employed in the research staff of the General Motors Corporation at Dayton, Ohio, have discovered that certain compounds when introduced into the gasoline act as "Antiknock" or "Compressionizers" in that they prevent the knocking in engines running at low speed or at high compression. The most important of these compounds are diethylselenide and tetra ethyl lead.

At the present time the Dye Works Plant of E. I. duPont de Nemours and Company (the duPont Company controls the General Motors) is preparing to manufacture 20,000 gallons of lead tetra ethyl per day and it is reported that arrangements have been perfected with the Standard Oil Company of New Jersey to distribute the same.

In the preliminary work of manufacture of lead tetra ethyl several very serious cases of lead poisoning have resulted.

It is proposed to employ lead tetra ethyl in gasoline in the proportion of 2.5 c.c. per gallon. This is equivalent to approximately 1 part of lead tetra ethyl in 740 parts of gasoline.

The lead is eliminated from the engine exhaust in the form of oxides of lead, principally litharge, as an exceedingly fine dust.

The burning of 1 gallon of gasoline will throw into the atmosphere this dust to approximately the amount of 4 grams and since the average automobile engine will consume 2 gallons of gasoline per hour, 8 grams of litharge dust will result.

In the case of a gasoline engine operated in a building w' h-out means for leading out the exhaust gases, or in the case of a busy thoroughfare with continuously passing lines of motor cars or in the case of vehicular tunnels, it is possible that serious results may follow.

Attention is called to the fact that the lead oxides turned into the atmosphere are not diffusible as is carbon monoxide and that on busy thoroughfares it is highly probable that the lead oxide dust will remain in the lower stratum.

Very respectfully,

Wm Mansfield Clark

Wm. Mansfield Clark
Professor of Chemistry.

WMC:FL.

Respectfully forwarded,
approved

R. E. Dyer
Acting Director.

Pending

October 13, 1922.

Passed Assistant Surgeon R. N. Dyer,
Acting Director, Hygienic Laboratory,
U. S. Public Health Service,
Washington, D. C.

Sir:

Receipt is acknowledged of a memorandum dated October 11, signed by the Professor of Chemistry, relating to the possible health menace of a new fuel for gasoline engines.

It appears to this office that the possibilities of a real health menace do exist in the use of such a fuel and it is deemed advisable that the Service should be provided with some experimental evidence tending to support this opinion.

You are requested, therefore, to take up with the Divisions of Chemistry and Pharmacology in the Laboratory the question of designing certain experimental work calculated to furnish dependable data on the subject, and to transmit this plan with your recommendations to this office.

By direction of the Surgeon General.

Respectfully,

(signed) A. M. Stimson

(A. M. STIMSON)
Assistant Surgeon General.

AMS:ASB.

OFFICE OF THE DIRECTOR
HYGIENIC LABORATORY
TWENTY-FIFTH AND E STREETS NW.
RED-TAPE

TREASURY DEPARTMENT

UNITED STATES
PUBLIC HEALTH SERVICE

WASHINGTON, D. C.
October 18, 1922.

FILE H. L. C.

The Surgeon General,
U.S.Public Health Service,
Washington,D.C.-Attention Assistant Surgeon General A.M.Stimson:

Sir:--

Replying to Bureau letter of October 12, 1922, signed "Assistant Surgeon General A.M.Stimson", requesting that experimental work be outlinedto furnish data on the subject of the relation of the use of lead tetra ethyl as an admixture to gasoline, I have the honor to transmit herewith a memorandum prepared by Professor Voegtlin after conference with Professor Clark and myself.

Respectfully,

R.E.Dyer,
Acting Director.

Outline of an investigation into the possible injurious effect

of organic lead compounds as additions to gasoline.

The proposed introduction of lead tetra ethyl as an admixture to gasoline should unquestionably be considered from the point of view of its possible injurious nature to the public health.

There is every reason to believe that organic lead compounds of this type as such are highly toxic when introduced into the human body. The first health hazard would therefore probably appear in the manufacture of tetra ethyl lead on a large scale. The toxicological action of this substance should therefore be investigated on animals, with particular reference to the amount of poison required to produce acute and chronic lead poisoning and the channels of absorption of the poison into the animal body.

The second health hazard involved in the use of this chemical would probably occur through the absorption of lead by persons handling gasoline containing lead tetra ethyl. Experiments should therefore be carried out to determine the volatility of lead tetra ethyl as contained in a finished gasoline mixture under various conditions of temperature, and the toxic effect of such vapors upon animals. The poisonous effect of such mixtures should also be established with regard to the absorption of lead when the mixture in liquid form is applied to the skin.

The third health hazard may consist in the possibility of poisoning due to the admixture of lead oxide to the motor exhaust gases. It is quite possible that gasoline containing lead tetra ethyl might produce exhaust gases containing a large amount of finely divided lead oxide, which would contaminate the air of garages and automobile repair shops to such an extent that persons breathing this air over a considerable period of time might take in sufficient lead so as to cause chronic lead poisoning. Similar possibilities of lead poisoning might exist in vehicular tunnels such as the New York tunnel. It is also possible that in congested large cities under favorable wind conditions enough lead oxide might accumulate as a fine dust in the air so as to produce conditions which might be dangerous to persons exposed to this air. Toxicological experiments should therefore be performed to determine the toxic effect of exhaust gases developed by motors burning gasoline containing lead tetra ethyl, these experiments to be performed on various species of animals under conditions similar to those obtaining in the actual use of this fuel. This would require methods for the accurate estimation of lead in air, and methods for the estimation of lead in the excreta of animals exposed to lead contaminated air.

Carl Voegtlin

Carl Voegtlin,
Professor of Pharmacology.

CV/srd

TREASURY DEPARTMENT
BUREAU OF THE PUBLIC HEALTH SERVICE
-oOo-

Hygienic Laboratory
RECEIVED
NOV 8 1922

Date November 7, 1922.

Memorandum

~~Letter~~ from: Professor Carl Voegtlin,

Dated: ----------

Subject: Re: Data on subject of relation of use of lead tetra ethyl as an admixture to gasoline.

Respectfully referred to Director, Hygienic Laboratory, for his consideration and recommendation.

By direction of the Surgeon General

Assistant Surgeon General.

KJDB

to gasoline.

McC-MAN

FILE B. L. J.

November 23, 1922.

The attached file with respect to the introduction of lead tetra ethyl as an admixture to gasoline is respectfully returned to the Surgeon General, for the attention of Assistant Surgeon General A.M.Stimson with the statement that the risk of lead poisoning from the use of lead tetra ethyl in gasoline has been carefully considered and this office is not disposed o recommend any experimental investigation of the subject at the present time for the following reasons:

1. To secure trustworthy data would require a considerable period of time, perhaps a year. This delay would probably prevent results of an experimental investigation from being of much practical use since the trial of the material under ordinary conditions should show whether there is risk to man.

2. Experimental data of either a positive or negative nature would be most difficult to interpret with respect to the hazard to human beings since we have almost no information as to the relative susceptibility to lead of man and of laboratory animals.

3. Experimental results would apply to a limited set of conditions which might or might not prevail in the use of the material in gas engine d.

It seems, however, to this office that it would be eminently proper to communicate with the manufacturers, pointing out the possibility of harm and inquiring as to whether or not this feature has been given consideration.

It is believed that it would also be proper to advise health officers of the proposed use of lead tetra ethyl and suggest the advisability of careful watch being kept for manifestations of lead poisoning.

G.W.McCoy,
Director.