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Conference on Physiological Effect of
Ethyl Gas

Pittsburgh Experiment Station
U. S. Bureau of Mines.

January 4, 1924.

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INTER-OFFICE
CORRESPONDENCE
WASHINGTON D.C.

Present: Dr. E. R. Hayhurst, Ohio State University Medical College, Columbus, Ohio; T. A. Boyd, Engineer in charge Fuel Section of General Motors Research Corporation, Dayton, Ohio; Dr. W. J. McConnell, G. W. Jones, Wm. P. Yant, G. E. H. Thomas, and A. C. Fieldner, all of the Bureau of Mines.

Purpose: Review of progress on this investigation with the representatives of the General Motors Research Corporation, and planning the further course of the work.

1. The tests and equipment were examined by the party. The Bureau of Mines representatives explained the procedure and presented the results obtained up to the present time. The testing method is now running satisfactorily except for the determination of the lead in the chamber atmosphere; only 10% of the lead input in the gasoline is accounted for in the chamber gas analysis. Mr. Boyd stated that in his own tests 30% of the lead input was found in the cylinders, exhaust pipe, and water-cooled condenser following the exhaust pipe; that 70% was unaccounted for and he believed it went through the condenser and a series of wash bottles as fine particles. Mr. Yant reported that in testing the chamber atmosphere with several filter papers the lead was found on the first paper and none on the second. Mr. Yant will try a series of impingers and analyze the liquid in each.

2. Mr. Fieldner suggested that possibly an undue amount of lead was being washed down with the condensing water in the iron distributing pipe in the gas chamber; to avoid this it was proposed to thoroughly insulate the iron pipe and turn it over so that the lowest point is at the openings. With this arrangement there should be no condensation of tar or moisture. It was agreed that at the end of January 14 this change should be made and that the pipe should be up-ended and all the free running tar allowed to run out and be collected for analysis. All the condensate and tar should be collected and analyzed for lead after properly sampling and weighing the material so that a lead balance can be taken of the entire test.

Dr. Hayhurst recommended that subsequent tests be made in which the exhaust gas be driven directly into the chamber, distribution being effected entirely by baffles.

3. Mr. Boyd will mail procedure used by his laboratory in determining lead in tetraethyl lead. The method depends upon decomposing the tetraethyl lead with carbon tetrachloride solution of bromine, converting to nitrate, and electrolyzing.

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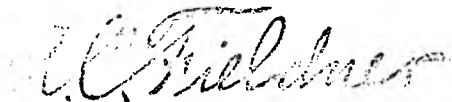
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4. The question of proper food for the animals was raised by Mr. Jones. Dr. Hayhurst recommended consulting books on dietetics, taking into consideration proper proportions of acid and base-forming foods, according to whether the animals were vegetable or meat eaters.

Mr. Fieldner suggested that Mr. Yant make a trip to the Highland Park Zoo and consult with the keepers on food and care of animals, especially since it is proposed to include three monkeys and some pigeons in the tests.

5. It was agreed that humidity determinations be included and that wet and dry bulb thermometers be set up in the incoming air stream.

6. The meeting adjourned at 2:30 p. m., the next meeting to be called in approximately four to six weeks, or sooner if it is desired by either party.



A. C. Fieldner,
Superintendent.

March 27, 1924. RRS/EJD

Memorandum for Asst. Surg. Gen. A. M. Stimson.

The Bureau of Mines began the study of the effects of tetra-ethyl lead some months ago (November 6, 1923). This study is being made to determine the extent of the health hazard, if any, due to the use of this chemical in automobile and other internal combustion engines. Guinea pigs, rabbits, dogs, pigeons, and monkeys are exposed to exhaust gas from a gasoline engine in two groups, one exposure lasting 3 hours and another 6 hours. These exposures are made daily with the exception of Sunday and will be carried out over a period of months.

No conclusions can be drawn at the present time, but we have found no pathological effects on animals examined up to the present. This, of course, is not conclusive.

I would suggest that, until definite information is obtained, no publicity be given to the study and no results be given out.

I am inclosing copy of the report of the last conference held on this subject at Pittsburgh.

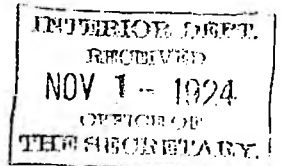
The above is in confirmation of my talk with you over the phone on this date.

R. R. SAYERS
Surgeon, U.S.P.H.S.
Chief Surgeon, U.S.B. of M.

Inclosure No. 2359.

April 9, 1924.

American Chemical Society,
Washington,
D. C.



Gentlemen:

I notice in the New York Herald-Tribune of even date mention of the fact that the subject of Tetra-Ethyl Lead dope for fuels is to be discussed in the next meeting of the Society at Washington the latter part of this month. The article alleges this poisonous compound will double miles per gallon.

In this connection, I beg to call your attention to the attached article by Dr. Henderson of the Yale Technical Staff from the New York Times of March 3, 1924, under the heading of "Health Hazards in Automobile Gas".

I also beg to call your attention to the paper read before the Society of Automotive Engineers, at their annual meeting in Detroit in January, 1924, by Doctors Holloway and Young, of the Purdue University Staff on the subject of high compression engines without the use of doped fuels.

I also call your attention, in this connection, to the statements of Mr. Horning, Chairman of the Society of Automotive Engineers Research Committee for 1924, as shown on page 31 of the American Petroleum Institute Bulletin under date of December 31, 1923. As spokesman for the Motor Industry, Mr. Horning told the Petroleum Institute members present, as follows:

"I want to make one statement to you this evening that I suppose will be interesting. The petroleum industry today and the automobile industry today can supply gasoline and engines that will drive small cars at 40 miles per gallon (and that is an actual thing) without doped fuels. With doped fuels I will state to you gentlemen it is easy to produce a small car that will go 50 miles on a gallon, and that is multiplying their mileage by two and three. It is being done on the roads today and all we need is a public demand for economy, if it ever will come, to give them those mileages."

It will appear, according to Mr. Horning, that it is possible to drive small cars forty miles per gallon without doped fuels, which is perhaps double the mileage per gallon of any commercial cars now operating in the hands of the public. You will note that Mr. Horning states that ten Miles per gallon may be added by the use of doped fuels, which is an alleged gain of 25% not 100%, as stated in press reports.

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I have been a great believer in high compression engines using completely vaporized fuels before entering the cylinders of motors. I have no objections to any dopes or additional constituents for any fuels whether added in the oil refinery or whether as an addition by the public and made by outsiders, if such dope increases the efficiency of the fuels and motors in the hands of the public, also provided such dopes do not unduly increase prices of fuels, in view of the fact there is already serious complaint against existing fuel prices.

I particularly remonstrate against the poisonous fluids and possible solids in minute form in the exhaust gas when using these poisonous compounds, such as those based on lead, for the reasons stated in the attached article from the New York Times by the Yale Technical men.

I have also been amazed at the seeming indifference of the public authorities in allowing such poisonous compounds by the carload to be sent into interstate commerce, apparently contrary to laws relating to the manufacture, use and sale of all poisonous articles of commerce otherwise.

As a member, I desire to ^{ad}formerly request that you make this letter a part of the proceedings of the meeting, if the paper announced by the General Motors representative is allowed to be presented to the meeting in Washington, as a matter of record and notice to the Society of the nature of the compound that is to be discussed on the occasion, if the press reports before me are correct.

I feel it would be a neglect of public duty on my part, as an advocate of public rights in the premises if I failed to put you on record in this matter now.

Yours sincerely,

W. P. Deppe.

enclosure.

COPY

GENERAL MOTORS CHEMICAL COMPANY

Dayton, Ohio.

July 18, 1924.

Doctor Paul Nicholas Leech,
American Medical Association,
535 North Dearborn Street,
Chicago, Illinois.

Dear Sir:

Your letter of July 11th addressed to Mr. Midgley has been referred to me. You are quite right in assuming that the General Motors Company and the Standard Oil Company would hardly have placed upon the market a substance containing lead without having the possible toxic effects carefully examined. Although no data have been published a comprehensive research on the possible danger to the general public have lead poisoning has been carried on by the Bureau of Mines in cooperation with the Department of Public Health. A preliminary report on this investigation will be available shortly. At present I may say that all indications are that there is no danger of acquiring lead poisoning through even prolonged exposure to the exhaust gases of cars using Ethyl Gas. Poisoning from carbon monoxide would arise long before the concentration of lead would reach a point where even cumulative poisoning is to be feared. Full details of this investigation will be available at a somewhat later date. I should be very glad to give you any further information which may be available.

Very truly yours,

(Signed) Graham Edgar,
Graham Edgar,
Director of Research