CALIFORNIA RESEARCH CORPORATION
A STANDARD OIL COMPANY OF CALIFORNIA SUBSIDIARY
200 BUSH STREET · SAN FRANCISCO 20 · CALIFORNIA

April 9, 1959

J. L. COOLEY
VICE PRESIDENT

DR. L. E. CURTIS:
DR. R. A. KEHOE:
MR. J. R. SABINA:
MR. R. K. SCALES:
MR. J. A. SPENCE:

Gentlemen:

By discussion and correspondence each of you has been advised of the general plan expected to be put into operation to evaluate the relative lead uptake by persons associated with gasolines containing tetramethyl lead compared to the uptake from gasolines containing tetraethyl lead. You were also informed that we had expected to receive concurrence from the selected account at which the subject gasolines are to be consumed early this week. Preliminary contacts have been made, but in view of the personnel aspects it is necessary for us to obtain approval of other executives who will not be available until April 15.

In the interim and because of Dr. Kehoe's important place in the program and his intended trip outside the country, we are appending the outline of the investigation under consideration. We would appreciate your early review on the assumption that arrangements can be made with the account for the early start of the test - the first phase of which will be under the conditions currently existing at the account.

Appended are copies of an exchange of correspondence between Mr. J. A. Spence and Dr. Kehoe which we believe will be self-explanatory. We feel that the inclusion of studies of atmosphere and lead in urine at gasoline handling location between the refinery and the customer will supply the additional information Dr. Kehoe requested. In a recent telephone communication between Dr. Curtis and Dr. Kehoe, the latter pointed out the necessity of having the preliminary examinations at least made at his laboratory in order to assure the use of best accepted techniques. It is our understanding that if Du Pont prefers to have tests made by their own laboratory, that through this route and concurrence by Dr. Kehoe economies of time and money may result.

It will be noted in the outline that tetramethyl lead has been identified by the code X-105A. This is consistent with the material previously used in our laboratory work - the suffix "A" indicating a new source of supply. For security reasons may we request that correspondence on the material use this means of identification.

Confirming our discussions with each of you, we hope that this program will supply the information considered most important by each of the participants and will lead to the preparation of a well-supported, convincing report for presentation to the Surgeon General. May I suggest that if there are any items that require clarification that they be handled directly between the individuals concerned and that we be advised of the outcome. We are most anxious that this program be brought to an early conclusion and appreciate the cooperation of each of you.

Yours very truly,

J. F. Carlyon

Attach: Report - "Assimilation of Lead by Persons Dispensing Gasoline - Proposed Test Program" 4/3/59

Ltr. J.A.Spence-R.A.Kehoe - 3/24
Ltr. R.A.Kehoe-J.A.Spence - 3/26

cc: Mr. J. G. Evans (Confidential)
Mr. J. F. Koehnle (Confidential)
Attach: As noted above

CALIFORNIA RESEARCH CORPORATION
RICHMOND, CALIFORNIA

ASSIMILATION OF LEAD BY PERSONS DISPENSING GASOLINE - PROPOSED TEST PROGRAM

FILE 121.102
APRIL 3, 1959

The following is a proposed test program to compare the lead exposure hazards of TEL and X-105A encountered by persons who dispense large volumes of leaded gasolines. The test program will be conducted in a basement service station which delivers about 5,000 gallons of gasoline daily.

Phase I - Determination of Base Line

The study is divided into three phases. In the first phase, both total air-borne lead and particulate lead in the vicinity of the gasoline pumps, as well as lead in the urine of the attendants will be determined. The station will be provided with its usual commercial gasoline containing 1-2 ml of TEL per gallon.

It is anticipated that 8-10 men from three shifts will contribute daily urine samples. If it can be arranged that the same truck driver deliver all test gasolines during the tests, he will be included in the sampling. Accumulation of the necessary base line data will require about two weeks. The men who contribute urine samples will have complete physical examinations. This will not be necessary if they are periodically examined in the course of their employment.

Phase II - Gasoline Containing Additional TEL

After the base line is established, the service station will be supplied with a gasoline containing 3 ml of TEL per gallon. Urinary lead, as well as total air-borne lead and particulate lead, will be measured as before. By daily sampling, it is hoped that statistically significant data can be obtained in about three weeks.

Phase III - Gasoline Containing X-105A

The gasoline containing 3 ml of TEL per gallon will be replaced with one containing the same molar concentration of X-105A. The test will be continued on this fuel for at least three weeks. Daily monitoring of the urine, as well as measurements of air-borne lead, will insure against any hazard to the test personnel.

Lead-in-Urine Analyses and Medical Examinations

The Du Pont Corporation has agreed to participate in the test program and assume responsibility for the daily Lead-in-Urine Analyses and any necessary physical examinations. In an attempt to get the program off to an early start, Dr. R. A. Kehoe, who is a consultant to the Standard Oil Company of California as well as the Ethyl Corporation and Du Pont, has commenced arrangements for the conduct of the Lead-in-Urine Analyses. The Du Pont representatives may wish to proceed along these lines initially or make other arrangements with Dr. Kehoe as they see fit.

Total Air-borne Lead and Particulate Lead Determinations

Since total air-borne lead includes both particulate lead from exhaust products and undecomposed organo-lead compounds from evaporating gasoline, it is desirable to obtain reliable measurements of both the total air-borne lead and particulate lead for comparison with the urinary lead values to assist in interpreting any differences in urinary lead between exposure to TEL and X-105A. The Ethyl Corporation has agreed to assume responsibility for these measurements.

The period of most interest will be the peak fueling rush in the middle of the afternoon, but it will be advisable to obtain some data on a 24-hour basis to aid in evaluating the exposure of the night shift personnel.

Responsibility and Logistical Support

It will be the responsibility of Cal Research to arrange for the conduct of the proposed tests, supply the test gasoline, and maintain liaison between the cooperating companies, our Medical Department, the Corporation Industrial Hygienist, and Dr. Kehoe. Mr. W. L. Richardson will be responsible for coordination of all aspects of the test program. Cal Research will obtain such supporting data as fueling rates during peak refueling operations, carbon monoxide levels, air movements, temperatures, records of cases of spills and other mishaps and any other data which may be required during the conduct of the tests.

W. L. RICHARDSON

:paa

STANDARD OIL COMPANY OF CALIFORNIA
225 BUSH STREET • SAN FRANCISCO 20 • CALIFORNIA

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March 24, 1959

TEL PROJECT

R. A. Kehoe, M.D.
Kettering Institute of Applied Physiology
Cincinnati 19, Ohio

Dear Dr. Kehoe:

As discussed with you by telephone last week, attached is a copy of our proposed field test for TEL. While certain modifications have been included, the test is still within the general framework of our discussion. Kindly advise should you have any suggestions for improvement.

We plan to take daily spot samples for lead in urine. This will require containers for up to 10 samples per day for about 6 weeks. We will start about the first week in April; however, this depends upon the delivery date of TEL and the availability of bleeding facilities. Please bill us directly for all lead analyses.

As you are aware, it is exceedingly important that we proceed as rapidly as possible, seeking a suitable answer on TEL. Since this will require close liaison and a considerable amount of your time, we would like to retain you as our Company consultant on this project. If it is agreeable with you, kindly advise us so that the necessary arrangements can be made.

Very truly yours,

J. [illegible] SPENCE

Attachment
cc: [illegible]

KE 0004043

PROPOSED FIELD STUDY COMPARING FUELING OF GASOLINES CONTAINING TEL AND TML

The following outlines a suggested field test program to permit evaluation of the comparative lead hazard when fueling gasoline containing TEL and/or TML. Measurement of the air-borne lead and lead in urine levels will be obtained during the periodic fueling of gasolines containing TEL and/or TML in the Turk Street Garage of the San Francisco Yellow Cab Company.

If when using TML the concentrations of air-borne lead and lead in urine are not significantly higher than those found when using TEL, then it will be tentatively assumed the potential health hazards are the same order of magnitude. It would then appear justifiable to proceed with further development studies on TML.

TEL - GASOLINE

Run 3 consecutive weeks using tetraethyl lead (3 ml per gallon). Determine the air-borne lead concentrations and the lead in urine levels.

(a) Air-borne lead - determine daily the total lead and particulate lead; obtain measurements to establish peak levels; record daily fueling loads in terms of gallons pumped per 15 minutes during peak operations.

As supporting data, determine carbon monoxide concentrations, temperature and air movement data, and record details of all cases of careless handling of gasoline or excessive exposures.

(b) Lead in Urine - sample daily according to instructions being exceedingly careful to avoid lead contamination. Sample the following men:

(1) Those pumping gasoline
(2) Others in the same general area during a major portion of the shift
(3) Calresearch personnel making the tests
(4) As negative controls, 2 men in no way exposed to lead.

(c) Consideration should be given to having all employees wear clean white coveralls daily. The degree to which they are stained will indicate carelessness in handling.

TML - GASOLINE

Run a second 3 consecutive weeks using tetramethyl lead (on an equivalent lead basis). To permit comparison, determine daily the air-borne lead concentrations and the lead in urine levels in similar fashion. Obtain other supporting data.

N 6831.03

KE 0004044

J. A. SPENCE

UNIVERSITY OF CINCINNATI
DEPARTMENT OF PREVENTIVE MEDICINE AND INDUSTRIAL HEALTH

KETTERING LABORATORY
COLLEGE OF MEDICINE—EDEN AVENUE
CINCINNATI 19, OHIO

CABLE ADDRESS: KETLAB CINCINNATI
TELEPHONE CAMPUS 1-1414

March 29, 1955

Mr. J. A. Spence
Standard Oil Company of California
225 Bush Street
San Francisco 20, California

Dear Mr. Spence:

I have gone over the proposed field study and it seems entirely satisfactory to me as a first look at this problem. I have but one item to add. It seems to me now, somewhat as a deviation from my advice to you over the telephone, that it would be well to collect two samples from each man who is to be included in the subsequent observations, prior to the initiation of the use of gasoline containing 3 ml. of TEL per gallon of gasoline. As I understand the situation the gasoline now in use in these garages contains somewhat more than 1 ml. of TEL per gallon. If I am wrong in this, then this suggestion can be ignored.

I was talking in a room in which a meeting was in progress, and while I heard reasonably well, it did not sink into my consciousness, until later, that your observations in this garage had indicated that the concentration of airborne lead was actually near the threshold value for industrial exposure. This finding, if I am correct in my interpretation of your statement, is nothing short of remarkable. I find it very difficult, indeed, even now, to believe that it is valid, and so in the haste of our conversation, I rejected it or ignored it more or less automatically. Please do not misunderstand me. I have no reason to doubt the technical precision of your determinations, but this situation as described by these results is entirely outside our experience. If the data obtained are representative of the facts, this must be a most unusual garage from the aspect of activity and ventilation. In any case we had better look at the status of the men who work there, with respect to lead absorption, before embarking upon any changes in the environmental conditions. Because of the variability of the urinary excretion of lead from day to day and throughout the day, we had better have a sufficient number of preliminary results to have some statistical weight, and, therefore, I suggest that spot samples of the urine of the 10 men be obtained on two successive days in the mid-week (or end of the week, not after the weekend), or in the morning (or the beginning of a shift) when the men come to work, and in the evening (or at the end of the shift). The 20 samples can be counted on to demonstrate whether or not these men are excreting lead at a higher than normal rate, and this is an highly important consideration at the outset.

It may be that these men should have complete physical examinations and certain other items of laboratory tests, if they have not had these previously or periodically in the course of their employment. Certainly their medical and employment histories should be reviewed carefully as a preliminary, in order to establish their reasonable fitness as subjects for these observations, and their reasonable freedom from other occupational exposure to lead. Their suitability as subjects for these observations will depend to some extent upon the duration of their employment under the present conditions of exposure to lead. It is not imperative, I should say, that we have detailed medical observations as a base line, but I think it may well be necessary to have such information and records at some time in the course of the study.

In the matter of my acting as a consultant to your Company in this relationship, I welcome the idea, since I had some concern, in view of my long relationship to Ethyl Corporation and your primary interest in the situation of your own Company, as to whether you were in position to make use of our long and valuable experience in this field. It will not surprise Mr. Curtis, I am sure, and probably will be no surprise to you, that I feel a fairly heavy burden of professional responsibility for the safety of the practices of the petroleum and automotive industries in relation to tetraethyl lead or its homologues. I shall be very sorry, indeed, and would indeed, feel some guilt, if the use of these materials should develop into a genuinely hazardous situation. I am relieved, therefore, probably beyond the realistic extent of my own responsibility, to be able to have some first hand knowledge of the sequence of your activities in this direction.

May I say that I think of this as a function of The Kettering Laboratory, and that I shall turn over to the Laboratory any financial returns which come to me in this activity, as I do in others of a similar nature. This may or may not satisfy your own wishes in this matter, in that you (or your legal people) may wish to bind me in some professional relationship to your Company. Be that as it may I shall be prepared to advise you in this matter as well as I can, without regard to any personal compensation. I could, for example, bill you, through the Laboratory, for the services rendered by others, and include in this such charges for myself time as would seem mutually reasonable, beyond those included in the administrative overhead charges of the Laboratory that are represented in the cost per analysis.

Very truly yours,

Robert A. Kehoe, M. D.

RAK:ns

P.S. We shall send off to you at once, a package of containers for the collection of samples of urine, with suitable instructions, and will follow this shipment up with others as indicated, up to the number of four hundred or somewhat more. If more are required, these can be supplied. I need emphasize only one point in the procedure of collection. It will be obvious to you, I am sure, that the slightest contamination of a sample of urine creates a serious and almost insurmountable problem. Every effort should be made, therefore, to secure the maximum degree of cleanliness on the part of each individual contributor of a sample on every occasion. This usually means careful bathing, and, even then, meticulous care in handling the container and its covering cap so as not to contaminate either these or the urine as it flows into the container. Since the cost of the shipping and the analyses is considerable, a bit of special care and supervision here is justified.

R. A. K.

cc: Dr. L. E. Curtis
Mr. J. L. Cooley