

Field Investigation of Potential Hazard of Commercial Distribution
of Gasoline Containing Tetramethyl Lead

Following the preparation of a memorandum on the general method of approach to this field investigation (Memorandum of April 1, 1960 by R.A.K.), two meetings of representatives of The Kettering Laboratory were held in San Francisco with representatives of the industries concerned, for the purpose of discussing and developing the details of the investigation (R.A.K. on April 8th, after his examination of the proposed sites at the Richmond Refinery and in San Francisco, and J.C. on April 13, 1960). The two meetings had to do with (a) the personnel to be investigated by means of physical examinations and analyses for lead in urine and blood, and (b) the sites and methods of the environmental investigation (air analyses) and the designation of technical personnel for the various tasks. These meetings have resolved the essential questions of procedure, have determined the general scope of the investigation, subject to the further examination of sites and the selection of suitable personnel at Bakersfield and El Segundo Refineries and in Los Angeles (this is being done along the lines developed in the Richmond and San Francisco area and agreed upon in principle at the meetings referred to above) by representatives of Standard Oil Company of California.

It is now possible to define the approximate scope of the entire investigation, to visualize the participation of the various groups and persons in the investigation, and to provide a fairly realistic estimate of the expense involved therein. No attempt is made, however, to estimate the precise value of the services that are to be rendered by personnel of the participating companies. It is believed that each company can make a more realistic estimate

Notations:- Re Memorandum of April 15 on Field Investigation

A. Correction of Error

- (a) On page 3 of the attachment (Mr. Cholak's memo), see 4. Service Stations. The total number of observations at 21 service stations, instead of 396, is 756.

The cost of analysing 756, rather than 396 filters, will be \$7,560 rather than \$3,960.

The correction of this error adds \$3,600 to the estimated cost of this item.

- (b) On page 10 of main memorandum, see 2. The analysis of samples -----

(1) Samples collected - - - - -

\$11,960 + 3,600 = \$15,560.00

(2) Samples collected - - - - -

(a) \$9,960.00 + 3,600.00 = \$13,560.00

(b) \$7,960.00 + 3,600.00 = 11,560.00

(c) \$5,960.00 + 3,600.00 = 9,560.00

4. Total Cost - - - - -

(1) Maximum \$22,960.00 + 3,600 = \$26,560.00

(2) Minimum \$16,960.00 + 3,600 = \$20,560.00

B. Alteration of program

(see pages 3 and 10 of main memorandum)

It is now agreed, because of the lack of service stations of suitable location and volume of business, that the survey will include 10 stations in San Francisco, 10 in Los Angeles, and 1 in Bakersfield.

This reduces the total of such personnel, and results in a proportional reduction in the cost of the analyses of urine and blood. The latter is estimated to be diminished by a sum which will range from \$3,000.00 and \$3,750.00.

Thus the overall cost of the survey, considering this revision and the error of calculation indicated above, will be very near the original estimate.

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of the value of the services contributed by its representatives than could be made by ourselves. With respect to expense, therefore, this memorandum will include only the actual cost of the parts of the investigative program which are to be performed in The Kettering Laboratory, and which, after the planning stage, are made up of analytical services, checking on the course and adequacy of the program, arrangement and examination of data, and the preparation of interim reports (if required) and a final report.

Scope of Investigation

A considered effort was made in a survey of the sites of potential hazard in the San Francisco Bay area, to discover those which might have the greatest expectation of hazard, and to select the men, employed at these sites, who would be subject to the greatest likelihood of exposure to such hazards. By this means one could hope to avoid the dilution of any significant affects of such exposure in a larger volume of insignificant findings. As it turned out, only a few of the potentially available sites or personnel could be regarded as suitable for investigation, as judged by the criteria which we adopted. The sites of investigation and the numbers of persons regarded as worthy of observation are listed below:

Sites, Specific Operations and Personnel.

<u>Sites</u>	<u>Types of work performed</u>	<u>Numbers of workmen whose exposure may be significant</u>
Richmond Refinery:		
(1) Lead Blending Plant	Regular conduct of blending operations	<u>5</u>
(2) Tank Truck Loading Rack	Loading petroleum products including Supreme gasoline and supervising loading done by approximately 60 drivers of trucks	<u>12</u> Loaders only. Drivers have too little exposure

<u>Sites</u>	<u>Types of work performed</u>	<u>Numbers of workmen whose exposure may be significant</u>
Richmond Refinery:		
(3) Barge Loading and Sampling at Long Wharf	Inspectors who take and test samples of gasoline, including Supreme	<u>4</u> Loaders' exposure negligible
(4) Barrel Filling Site	Workmen who fill drums with gasoline, including Supreme	<u>5</u> (2 regular, 3 relief)
(5) Chemical Laboratory	Men who carry out routine distillations on gasoline including Supreme	<u>4 (or 5)</u> Representatives of a group of 12 men
Standard Oil Company Service Stations:		
10 scattered in San Francisco	Regular attendants including Manager and Asst. Manager	<u>40</u> final number of suitable men
The Union Square Garage	The few men engaged to the greatest extent in fueling cars	<u>3</u> minimum <u>10</u> maximum on all shifts

Other groups of men employed at certain other sites were considered for inclusion, such as men employed in the knock-testing laboratory at Richmond, those engaged in loading tank cars with petroleum products, the drivers of tank trucks (as differentiated from Standard's regular loaders of tank trucks), the loaders of barges (as differentiated from the inspectors). The decision in each instance was made on the consideration of the severity and the duration per day of the potential exposure to TML or to Supreme gasoline containing TML. Since other types of exposure to lead compounds or to gasoline, in the absence of potential exposure to TML, must be regarded as irrelevant for the purposes of this investigation, the decision could be arrived at readily in most instances. It should be recognized that the exposure of service station personnel to TML will, almost certainly, be negligible, while that of persons working within any parking garage will be obscured, to some extent, by the greater exposure to

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particulate, inorganic lead. The inclusion of these two groups of workmen in the investigation, together with observations on their environmental conditions is desirable, however, in order to assess the impact of the use of TML upon the general atmospheric situation (with respect to lead absorption) which existed prior to its use. This is an essential point in the investigation, from the aspect of the public health. Despite the fact that the findings of the investigation, especially in relation to service stations, can be expected, with reasonable certainty, to be negative, it is imperative, nevertheless, that there be findings, whether negative or positive, in demonstration of the facts. A more important and immediate issue in the practical affairs of the industries concerned here, is that of the extent of the hazard, if any, to any of the handlers of gasoline containing TML within the refineries. We have searched carefully for the more hazardous occupations in a refinery (Richmond), on the presumption, strengthened by information from those responsible for the operation of the refineries, that the operations of this refinery are characteristic (or, at their best, are not less potentially hazardous in the respect involved here) of those in the other refineries of this Company. We have also considered, as carefully as possible, the manner of choosing other sites (service station and garage) and other personnel. We are satisfied to have the further selection of sites and personnel in the other refineries (especially Bakersfield and El Segundo) and in the Los Angeles area (service stations and a garage, presumably the Pershing Square garage) made by representatives of the Company, on the same type of information and criteria applied in the San Francisco area. It seems likely that additional persons, substantially equivalent in total number (but not necessarily of all types) to those listed above, will be selected in the Bakersfield and El Segundo refineries and in the Los Angeles area. This will bring the total number of persons to be investigated up to approximately

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75 persons. (In order to have 40 suitable service station attendants in each of the two major areas at the end of the period of investigation, it may be necessary to have half again that number at the start. This would bring the total number of persons involved in the initial survey up to about one hundred. This number, in view of the general importance of this survey, would not be excessive.) It is essential that this investigation shall not lapse into insignificance because of an unduly limited consideration of the potential hazard, or because of the smallness of the numbers of persons who remain to be examined on the second round. Certain limitations are now apparent, in that, under the conditions established by the operations of this one Company, the potential hazards of this commercial development will not reach the peak that could result from the use of TML in all of the gasolines or even all of the premium gasolines in these urban areas. These limitations must not be permitted to assume any greater importance through our failure to recognize and to appraise any of the significant features of the present commercial operations. The experience of the California Company, throughout its area of operations, will have to be scrutinized carefully, therefore, from time to time during this survey.

Medical Examinations

In view of the fact that all but a very few of the persons to be examined are employees of Standard Oil Company of California, it is recognized that the medical policy involved in this investigation is the primary responsibility of Dr. L. E. Curtis. Dr. Curtis has expressed the view that the medical examinations should be and can be carried out by physicians whom he will select and direct. There is no reason, whatever, to question the propriety or correctness of this view, and the willingness of Dr. Curtis to assume this responsibility solves one of the problems of the

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e survey in a manner which is most acceptable to The
oratory. One aspect of it, however, requires a degree of
with this Laboratory, in that the arrangement and study of
data, for the purpose of a formal report, can be greatly
the use of a record form which has been employed in prior
of this type on which a great deal of preparatory statistical
tc.) has been done. The problem here is very different, in
se, from that of carrying out examinations to determine the
ss of men for initial or continuing employment. In this
minutes of the San Francisco meeting of April 8 refer to the
at the second round of medical examinations may not be found
in some instances in the judgment of Dr. Curtis. Dr. Curtis
dication that this is his view, and it is believed that this
minutes in error. In any case, it should be recognized by all
the second round of examinations for the record is an absolute
re would be no point whatever in the initial examinations if
sequent examination of comparable thoroughness. This aspect of
on of the taxicab garage was passed over lightly because of
the observations (and for other valid reasons which need not be
in the present investigation of personnel, the physicians are
stigators, who, therefore, must exercise every possible care to
rd, in the second round of examinations, any deviations from
servations made in the first round. Both the observations and
e observations on both occasions must be expert and precise,
the interpretation which the physician makes in his complete
y man (such interpretations must be made, since they have their
tance) or groups of men, the ultimate clinical findings of the

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analytical or clinical findings, should be brought to the attention of The Kettering Laboratory promptly, in order that any investigation which might be indicated for the record or for medico-legal purposes may be pursued with vigor and thoroughness, in full accord, of course, with the wishes and advice of Dr. Curtis and his Company's management.

It is recognized that the contribution made to the investigative program by Dr. Curtis and his associates in the Medical Department of the California Company is a large and important part of this undertaking. In it will be included such observations of the clinical laboratory (hematologic, etc.) as will add significantly to the appraisal of the status of the workmen individually and collectively.

Environmental Survey

The schedule of environmental observations (air analyses) required to provide the background on which the investigation of the responses of the personnel is to be based, has been worked out for the San Francisco Bay area (subject to certain choices) in accordance with a memorandum (attached) provided by Mr. Cholak as the result of the meeting in San Francisco on April 13th. In so far as this schedule can be extended to the other areas yet to be surveyed in detail by the appropriate personnel of Standard Oil Company of California, it would seem to provide a satisfactory basis for assignment of the work (which is to be shared approximately equally by technical representatives of E.I. duPont de Nemours Company and Ethyl Corporation, according to the tentative plan).

Mr. Cholak has covered the subject with apparent adequacy in his memorandum, including the approximate cost of the work to be done in The Kettering Laboratory. No further discussion or comment seems to be required except in two respects. It appears that there is some doubt in some minds as to the desirability of making the observations tentatively outlined with

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respect to the Union Square Garage in San Francisco. There is also some apparent objection to the idea of carrying out even the minimum of observations concerning the general pollution of the atmosphere in San Francisco, lest there be some public reaction of concern about "smog" there, or perhaps about the contribution of lead thereto.

First, with respect to the observations that may be made in the Union Square Garage, it is agreed that these could be dispensed with, in all probability, without bringing serious criticism upon ourselves. No valid reasons have been given for not making these observations, however, and there can be little doubt that, in the long run, some factual data on the air pollution within this garage and in the atmosphere elsewhere will serve a very useful purpose. The industries concerned here will have no first-hand information otherwise on this situation as it relates to San Francisco. This would be unfortunate, and it could become so unsatisfactory as to require a "crash program" to establish facts which can be obtained as a matter of course and at little expense in this survey. Second, with respect to exciting public apprehension in connection with the making of certain observations concerning the extent of lead in the air of San Francisco, observations are now being made there by others, and the issue, therefore, cannot be avoided. Moreover, public apprehension is always at its greatest in relation to unknown or speculative hazards. The facts always dissipate concern about the unknown, and bring people beyond the point of fruitless anxiety into that of considering appropriate action if any is required.

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Estimate of Cost of Work of The Kettering Laboratory:

1. The analysis of biological materials.

(1) Analysis of urine

Maximum number of samples of urine (4 per person for the 100 persons (approximately) to be included in the investigation)

400 at \$12.50* per sample \$5,000.00

(2) Analysis of blood

Maximum number of samples of blood (2 per person) for 100 persons to be investigated

200 at \$12.50* per sample 2,500.00

2. The analysis of samples collected from the air.

(1) Samples collected according to complete program of proposed environmental survey at unit cost* per analysis as indicated (Mr. Cholak's memo)

11,960.00

(2) Samples collected according to certain limitations of the program (Mr. Cholak's memo)

(a) Reduced number of analyses through elimination of samples from Union Sq. Garage

9,960.00

(b) Reduced number of analyses through elimination of samples from general urban atmosphere

7,960.00

(c) Reduced number of analyses through both eliminations indicated in (a) and (b)

5,960.00

3. Other Roughly Estimated Expenditures of The Kettering Laboratory:

(1) For traveling expense of personnel**

1,500.00

(2) For the expense of shipping equipment

500.00

(3) Study of data (including services of statistician) and preparation of report

1,500.00

4. Total Cost of Work of The Kettering Laboratory:

(1) Maximum cost (not including any unforeseen contingencies)

22,960.00

(2) Minimum cost

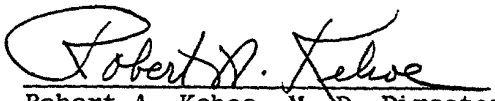
16,960.00

* The unit charge indicated in each instance gives a reasonably adequate representation of the overhead cost associated with the composite type of work involved, with the exception of shipping costs. It does not include the cost of collecting samples.

** All travel expense of Laboratory staff in conducting this project, hereafter, will be as so charged.

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It is anticipated that the cost of the work done by The Kettering Laboratory will be divided among the sponsors according to agreement by their principals, that a full accounting will be made to each sponsor, and that the share of each, according to the agreement, will be billed to each sponsor at quarterly intervals in advance, adjustment to be made in the final payment as indicated by the expenditures.


Robert A. Kehoe, M. D. Director
The Kettering Laboratory

Date: April 19, 1960

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