

April 1, 1953

Dr. S. L. Rankin
Medical Advisor, Petroleum Chemicals Division
E. I. Du Pont de Nemours and Co., Inc.
Wilmington 98, Delaware

Dear Stewart:

I enclose herewith the analytical results on the samples of rust and scale sent to us by Mr. Davis, as referred to in his letter of March 6 and yours of March 16. The results, as you will see, are expressed in terms of that proportion of the organic lead which could be distilled off with steam, and the lead which was inorganic in character. The percentages in both instances relate back to the original weight of sample subjected to analysis.

I might say that we do not always carry out the analyses in this manner, but rather we separate all of the different forms of organic lead from each other and from inorganic by extraction and then determine the lead content of the extracts and the residue. I asked that the analyses be done in this case after steam distillation, since the results of this procedure would convey clearly the magnitude of the hazard due to potentially volatile lead in the scale. Moreover, we have so many data on samples of scale that I felt certain that I could predict the outcome of the analyses. As I had good reason to anticipate, the results demonstrate the presence of only negligible quantities of tetraethyl lead and of organic lead compounds that are converted to tetraethyl lead under the conditions of steam distillation.

We found years ago that the organic lead content of scale from the sides (and top) of tanks used for the storage (or transportation) of leaded gasoline was of minute proportions, and that respiratory exposure to dust, when the rust and scale is dislodged by mechanical means in the dry state, is the only hazard of any significance, in connection with the cleaning or repair of such tanks. It was for this reason that we advised that the sides of tanks should be kept wet, during scaling procedures, or, alternatively, if the scale was to be removed in the dry state, that full respiratory protection must be provided during such operations for all persons within the tank and until it should have been freed of dust. Adequate dust respirators would do here, but we have believed it wise, generally, to use the air-line mask, so as not to confuse the issue as to the type of respiratory protection that is required in the conduct of tank cleaning generally.

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You will note that the lead content of the two samples was subject to appreciable variation. This might be due to several causes, such as the possibility that some paint may have been used on the inside surface of the tanks at some time in the past, or that the rate of rust formation varied, as it often does, in various parts of the surface of the tank, whereas the rate of decomposition of the tetraethyl lead in the gasoline at the surface of the tank is probably fairly constant. In any case, the concentration of lead in the scale was small in both instances. This concentration, however, is not unimportant, if the finely divided scale is suspended in the atmosphere of the tank in which men are working, by mechanical means. There is no hazard at all from this source so long as the material is wet.

I send a bill to cover the cost of these analyses, since I take it that you will wish to handle the matter separately.

In the matter of the other questions raised in your letter (I waited to reply to your entire letter at one time), I shall reply as well as I can, after making certain assumptions as to the origin of the contamination of the materials referred to.

1. I presume that the Stoddard or Paint Solvents in question were contaminated with tetraethyl lead, rather than inorganic lead, and that this occurred through the use of containers or transport equipment for leaded gasoline. I presume also that your reference to the concentration relates to parts per million by volume. Neither of these presumptions makes any great difference, quantitatively, but it seems best to indicate my line of thought. Actually the concentration involved here, expressed as one would express it in the case of gasoline, is equivalent to 0.0037 ml of TEL per gallon. This is below the limits of chemical precision (for the commercial determination of TEL content), and it is of no hygienic importance.
2. The contamination of the diesel fuel to the extent indicated in your second question, i.e. 0.02 ml per gallon, is likewise, of no significance. Under these circumstances you are at the lower limit of the detection of lead in the fuel (by standard methods), and from the aspect of contact in handling, inhalation of vapor, or quantity of lead in the combustion products, there is no detectable hazard. This, for example, in terms of volume, is 1 part in 184,250.

These matters reach their importance, principally, in relation to gasoline shipped in cars used for the transport of leaded gasoline, or to gasoline in contaminated pipe lines. I have taken the position that such gasoline should be regarded as non-leaded gasoline, for all the purposes for which gasoline is used ordinarily, when the lead content does not exceed 0.05 ml per gallon, this being about the limit of accuracy for the determination of TEL in gasoline. One has to have some specification, and

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this would seem, from every practical and hygienic viewpoint, a satisfactory one. Every effort within reason should be made to prevent the contamination of other commercial products with tetraethyl lead, and we must lean over backwards in the matter of food materials and beverages, but I see no reason for being concerned about the actual hazard associated with contamination of the order of magnitude to which you refer here.

I trust that these remarks cover the situation. If not, do not hesitate to call on me further.

Sincerely yours,

Robert A. Kehoe, M. D.

RAK ef

Enc.

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KETTERING LABORATORY
COLLEGE OF MEDICINE
EDEN AND BETHESDA AVES.
CINCINNATI 19, OHIO

April 1, 1953

To: E. I. Du Pont de Nemours and Co., Inc.
Wilmington 98
Delaware

Attention: Dr. S. L. Rankin
Medical Advisor
Petroleum Chemicals Division

For: Reimbursement of the Kettering Laboratory for
analysis of samples A-34 and A-37 (rust and
scale) for the determination of inorganic lead

2 analyses at \$10.00 each

\$ 20.00

KE 0009705

Materials:

Bust and Scale

Submitted:

3-19-53 by Mr. R. B. Davis, Supervisor of Operations,
Organic Chemicals Department, Petroleum Chemicals
Division, E. I. du Pont de Nemours and Company, Inc.,
Wilmington 98, Delaware

Required:

Lead Analyses

A-34

Analysis Number	- 53A-2008
Steam Distillable Lead	- 0.0001-%
Inorganic Lead	- 0.92%

A-37

Analysis Number	- 53A-2009
Steam Distillable Lead	- 0.0001-%
Inorganic Lead	- 0.27%

Reported: 3-31-53

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