

*Attach copies of report to this and put back in file
2 copies of newly typed copy of 5 sent to Rankin
with my letter of August 14 1952*

SAFETY DEPARTMENT

November 10, 1944

Mr. D. V. Stroop
American Petroleum Institute
50 West 50th Street
New York 20, New York

Dear Dave:

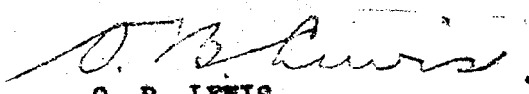
I have a preliminary report on the potential lead hazards associated with the cleaning and repair of tank ships and barges used in the transportation of leaded motor fuels. This came to us under date of November 7, 1944 by Dr. R. A. Kehoe, Kettering Laboratory of Applied Physiology, College of Medicine, University of Cincinnati, Cincinnati, Ohio.

Dr. Kehoe does not indicate that this preliminary report is to be distributed; however, I feel his conclusions would be of interest to you and the A.P.I. Tank Ship Committee. at least to the extent of being a progress report. Therefore, I am quoting the last two paragraphs of Dr. Kehoe's report.

"Just as the organic lead content of the material taken from tankships was relatively low, so was the inorganic lead content. One is tempted to conclude that the maintenance of the cleanliness of tankships is the factor of importance here. No doubt, however, it is wise to await the results of a larger series of analyses before hazarding any explanation of the findings.

"No further breakdown of the data seems to be required at this time, since none of the results obtained thus far has given evidence of the existence of any very serious lead hazard. One might postulate the creation of an hazard from contamination of the atmosphere with particulate lead compounds in the process of scraping and welding operations. The evidence now available is such that the existence of such an hazard should neither be affirmed nor denied, but at present it would not appear to be of very significant proportions."

Yours very truly,


O. B. LEWIS
Manager

WB

cc: Dr. R. A. Kehoe

KE 0006610

N 7626

PRELIMINARY REPORT ON THE POTENTIAL LEAD HAZARDS
ASSOCIATED WITH THE CLEANING AND REPAIR OF TANKSHIPS AND
BARGES USED FOR THE TRANSPORTATION OF LEADED MOTOR FUELS

From time to time questions have been raised concerning the extent of the lead exposure that might be incurred by workmen engaged in the cleaning and repair of tankships and barges employed for the transportation of leaded gasoline. No cases of lead poisoning have been recorded in connection with these occupations and fairly extensive enquiry has failed to bring forth reports or hearsay accounts of the occurrence of such cases. There are, moreover, certain differences in the conditions of storage of leaded gasoline in these vessels, as contrasted with those known to exist in shore tanks, that militate against the creation of lead hazards quantitatively comparable to those of shore tanks. Nevertheless, in view of the seriousness of the dangers of cleaning shore tanks, and in consideration of the precautions taken to overcome such dangers, careful investigation of the potential hazards involved in the operation and repair of tank vessels and barges is amply warranted. Such investigation was initiated in England in the latter part of 1943, and shortly afterward similar observations were begun in this country. The scope of these investigations need not be discussed at this time, nor is it necessary to describe the program adopted for the collection of information about tankships and barges in connection with the sampling of scale and sludge therefrom. When sufficient information and analytical data are available to justify the issuance of a comprehensive report,

these matters will be presented in detail.

The present report is justified only by the fact that questions concerning the progress of the investigation are being raised with considerable frequency. Some few data have been collected. These are presented for what they are worth as an indication of the extent of the potential lead exposure encountered thus far. More investigation and a considerably greater number of samples will be required to answer the questions at issue.

Experimental Procedure and Results

Twenty-two samples of scaly deposits have been obtained from five barges and twelve similar samples have been obtained from four ocean-going tankships. Information has been assembled on each of these vessels in an effort to portray its history up to the time of the cleaning and sampling. The organic and inorganic lead content of the sludge samples has been determined by methods similar to those employed in the investigation of stationary storage tanks. The results of these analyses are given in tabular form, merely to show the range of values that have been obtained.

The Distribution of Analytical Results Obtained
on Samples of Sludge (Scale) from Tankships and
Barges Employed in The Transportation of Leaded
Gasoline, with Respect to Organic and Inorganic
Lead Content

(Results expressed in percentage of Pb
without regard to exact chemical composition)

<u>Organic</u>			<u>Inorganic</u>		
<u>Pb in %</u>	<u>Frequencies</u>		<u>Pb in %</u>	<u>Frequencies</u>	
	<u>Tankships</u>	<u>Barges</u>		<u>Tankships</u>	<u>Barges</u>
0.000 - 0.0039	12	13	0.00 - 0.39	12	7
0.004		5	0.40		7
0.008		1	0.80		1
0.020		1	1.20		3
0.044		1	1.60		1
0.048		1	2.00		1
			2.40		2
Number	12	22	Number	12	22

Discussion

Several points of interest are demonstrated by these data.

First, and most important is the fact that the organic lead content of these samples as a group is lower than that of samples of sludge from stationary storage tanks. The mean concentration of lead as organic lead in the latter samples was 0.04 percent, whereas the highest lead concentration found in the present series of samples is seen to be 0.048 per cent and only two exceeded 0.02 per cent. In view of the small number of samples available for comparison with the comprehensive data on the stationary tanks, this difference must not be taken as conclusive, but it is suggestive.

Second is the fact that the organic lead content of samples from barges is considerably less than that of samples from tankships. This is in keeping with the general manner and

frequency of cleaning barges, so far as available accounts indicate, but it would be presumptuous to give undue weight to this factor at present. There is a further fact that is of interest in this connection, in that the two highest results on samples from barges, which are fairly widely divergent from any of the others, were obtained on samples taken from an essentially new barge. This barge had transported only two cargoes since its construction, both of these being 100-octane gasoline. The quantity of sludge in this barge, mainly if not entirely scale, was quite small and the entire quantity of organic lead available must be regarded as insignificant. Moreover the concentration of organic lead was less than half of that found previously in association with demonstrable hazardous lead exposure. No very significant conclusion is justified by these high results, but they justify the exercise of considerable care in collecting comprehensive information on cargoes in relation to future sampling.

The third fact of consequence is the high concentration of inorganic as compared to organic lead in these samples. This is no new phenomenon, since a similar observation was made in the case of stationary tanks. The source of the inorganic lead is conjectural, but in all likelihood some of it was derived from tetraethyl lead by the decomposition of the latter. The range of values is low in comparison with that found in stationary tanks, and it is of interest to note that there were no really high values denoting excessive settling of an insoluble "sweetening" agent (litharge or sodium plumbite). This, perhaps was to

be anticipated from the fact that such materials would have had previous opportunity to settle out.

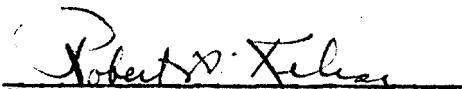
Just as the organic lead content of the material taken from tankships was relatively low, so was the inorganic lead content. One is tempted to conclude that the maintenance of the cleanliness of tankships is the factor of importance here. No doubt, however, it is wise to await the results of a larger series of analyses before hazarding any explanation of the findings.

No further breakdown of the data seems to be required at this time, since none of the results obtained thus far has given evidence of the existence of any very serious lead hazard. One might postulate the creation of an hazard from contamination of the atmosphere with particulate lead compounds in the process of scraping and welding operations. The evidence now available is such that the existence of such an hazard should neither be affirmed nor denied, but at present it would not appear to be of very significant proportions.

From the Kettering Laboratory of Applied Physiology, College of Medicine, University of Cincinnati, Cincinnati, Ohio.

Analytical work by: J. Cholak

Approved:


Robert A. Kehoe, M. D.

Nov. 7, 1944

KE 0006615