ETHYL CORPORATION
RESEARCH AND DEVELOPMENT DEPARTMENT
RESEARCH LABORATORIES • 1600 WEST EIGHT MILE ROAD
FERNDALE 20, DETROIT, MICHIGAN

January 25, 1960

Dr. R. A. Kehoe
Kettering Laboratory, College of Medicine
University of Cincinnati
Eden Avenue
Cincinnati 19, Ohio

Dear Dr. Kehoe:

Enclosed are a group of our laboratory reports which deal with the evaporation of lead alkyls from gasoline. You may keep this group of reports and leave them with the air pollution people if you like, but for the time being at least, we would prefer that they not be published. If you should not desire to keep these reports, we would be glad to get them back since our supply of extra copies is rather low.

In addition to our own reports, one report from California Research also is included. This report was given to us at one of our meetings with them early last year, and probably you also received one then. As you know, we are not at liberty to pass this report on, since it is not our own work. However, it does contain some very interesting data on the relative lead concentrations above open containers of gasoline, and in Table IV shows TML-TEL ratios decreasing with increased height above the vessel.

The reports enclosed are as follows:

Ethyl Reports:

LTD 36-18, The Evaporation of Leaded Gasoline
LTD 36-19, The Distribution of Lead in Engler Distillates as Affected by Blending with Alcohol
LTD 38-20, Evaporation of Leaded Gasoline
LTD 39-21, Simple Distillation of Leaded Gasoline
LTD 39-22, Distillation of a Leaded Gasoline into Ten Cuts of Equal Octane Number
LTD 39-38, Fractional Distillation of Mixed Lead Alkyls Diluted with Naphtha
LTD 41-28, Evaporation of Gasoline Containing Tetraethyllead and Methyl-Ethyl Lead Alkyls
LTD 41-53, Simple Distillation of Gasoline Containing Tetramethyllead

LTD 44-37, The Effect of Rerunning on the TEL and Bromine Content of Aviation Gasoline
LTD 44-57, The Air Evaporation of Leaded Aviation Gasoline
LTD 46-47, The Air Evaporation of a Binary Solution of TEL and a Volatile Diluent
RM-104, Evaporation of TEL-Gasoline Mixtures

California Research Corp. Report:

Lead-in-Air Analysis, Comparison of TML and TEL, File 121.102, Jan. 27, 1959

It might be useful to call your attention to the specific reports which present the amounts of TEL and TML which come off with the initial fraction of the gasoline. These data were the basis for our interpretations of the lead vaporization hazards discussed in Mr. Scales' letter of Jan. 15:

LTD 39-21 gives the percentage of total lead which comes off in 10% cuts of a gasoline during simple distillation. The first 10% of the gasoline gives the following values:

	Calculated	Experimental
% of TML in first 10% of gasoline	3.6	3.0
" " TEL " " " " "	0.08	0.1

When less than 10% of the gasoline comes off, less than the proportional amount of TML comes off, as shown by calculated data in LTD 38-20:

	Calculated
% of TML off with first 1% of fuel	0.25
" " " " " " 10% of fuel	3.57

The calculations of LTD 38-20 are verified by experimental data in LTD 41-28. Only TEL and mixed alkyls were used in this experimental work, and TML was not included. However, the previously mentioned experimental work on TML from LTD 39-21 is in good agreement with the TML calculations of LTD 38-20.

Of course you are well aware that throughout these reports the vaporization of TML relative to TEL is considerably higher than the data from the San Francisco taxicab garage tests would indicate. We feel that this demonstrates that other factors in actual practice, such as spills or droplet vaporization, tend to modify the picture along the lines expressed in our January 15 letter.

In respect to the practical significance of vapor losses, we have made some further calculations based on the January 15 letter. The 51 lbs of Pb, estimated as a possible vapor loss of TML (if all Los Angeles gasoline

were treated with TML rather than TEL), can be divided by the daily dispersion air volumes for Los Angeles published in "Second Technical and Administrative Report on Air Pollution Control in Los Angeles County", Air Pollution Control District, County of Los Angeles, 1950-1951. These dispersion volumes are as follows:

Clear weather (2000-foot inversion), 4.2×10^{13} cu. ft.
Severe smog (500-foot inversion), 6.46×10^{12} cu. ft.

The 51 lbs Pb as TML in these volumes gives the following Pb concentrations:

Clear weather - 0.0195 micrograms Pb/cu. meter
Severe smog - 0.127 " " "

There doesn't seem to be much reason to send along our file copies of any of these reports, since their legibility is about the same as the copies enclosed. As you mentioned over the phone, it might be that your own files would contain somewhat better copies than ours.

Very truly yours,

D. A. Hirschler

DAH:mew

Encl.

cc: H. J. Gibson
R. K. Scales
H. E. Hesselberg
W. B. Ligett