ETHYL GASOLINE CORPORATION

CHEMICAL RESEARCH LABORATORY

1600 WEST EIGHT MILE ROAD

DETROIT, MICHIGAN

January 3, 1941.

Dr. Willard F. Machle
College of Medicine
University of Cincinnati
Cincinnati, Ohio

Dear Bill:

Mr. Neal reported to me this morning verbally, on his visit to your laboratory yesterday, and I am pleased to hear that everything seems to line up pretty well for your test. The following are my comments on the few points reported to me by Neal:

1. The attached copy of my letter to Pope takes care of your requirements for analyses of gasoline. I understand that as an additional safeguard, you wish to analyze the gasoline remaining in the tank before and after use. I am practically certain that you will find no significant variation in lead content, but far be it from me to recommend against your satisfying yourself on that point.

2. The preliminary work which we have done shows about 30% of the lead input unaccounted for, and I presume that your first concern will be to locate this. The fact that three filters in series catch no more lead than one, and that all the lead retained is on the first filter, strongly suggests that the loss is in the form of lead which goes right through the filters. This may possibly be extremely finely divided solid, or more likely, a true vapor. If the latter, it seems to be either undecomposed TEL or lead halides, if the temperature is high enough. I understand that you are going to analyze the exhaust gases for this lead. My suggestion along this line is to leave out any attempt to meter air to the burner, and leave out as well any attempt to catch quantitatively all the exhaust gases. I would consider a method consisting of taking a sample of the gases somewhere above the burner. These will contain the products of combustion admixed with an indefinite amount of outside air. An analysis of this gas for $CO + CO_2$ will give a direct measure of the fraction of the total combusion products which this aliquot constitutes (assuming the gasoline to be CH_2). The lead in the sample should probably be precipitated by means of fine filters, followed by a cottrell, and the figure obtained for lead multiplied by an adequate factor should give the corresponding figure for the total combustion products.

3. Unless a chemical method of absorption is used, it should be possible to determine whether the lead present in the combustion

former, better results might be obtained if the cracking of the fuel prior to combustion is increased in severity. This could be accomplished in accordance with your suggestion of using a longer "converter" tube. An alternate to this is to maintain the tube right in the flame during the whole operation instead of holding it somewhat outside of the flame, as is done now, once the burner has been started up. In either case, the problem of course, will be to find operating conditions drastic enough to insure complete decomposition of the TEL and at the same time not so drastic as to crack the fuel to the point where a large amount of carbon is formed.

4. I think that our work here is about completed, so that you may count, for the time being, on our own supply of generator tubes as being your spares. If and when these run out, we will make arrangements to obtain additional supplies from the Army.

5. If you should ever feel like experimenting with three filters instead of one, we shall be glad to send you our extra large filter case.

6. There are some data in the literature on the vapor pressures of $PbCl_2$ and $PbBr_2$, and I will try to get those out for you.

7. We have no phenyl resorcinol, we find no reference to this material in catalogs, and only one article in the literature, J.A.C.S. 61, 166 (1939). I would suggest that you try Dow Chemical, at least for information.

Very sincerely yours,

George Calingaert

GC:AMC
Encl.
cc: Dr. Graham Edgar