May 27, 1941

Dr. George Calingaert
Ethyl Gasoline Corporation
1600 W. Eight Mile Road
Detroit, Michigan

Dear George:

In replying to your request of May 19, for tolerance levels for lead in gasoline to be burned in the Army stove, we have gone over our figures and arrived at the following.

For every milliliter of gasoline burned in the stove, about 110 liters of air pass through the equipment. Consequently, when gasoline that contains 3 ml. of T.E.L. per gallon (3.18 gm. of Pb) is burned, the effluent will contain about 0.8 mgm. for every 110 liters of effluent. This is equivalent to about 76 mgm. of lead for every 10 cu.m. (cubic meters) of effluent. The usual accepted tolerance level for lead in air is 1.5 ml. per 10 cu.m., this representing the approximate volume of air that a man will breathe in an 8-hour day when at work. Omitting for the moment consideration of the fact that some lead is removed in the filter and in the stove, to bring gasoline to a safe lead content prior to combustion, 90 ml. should not contain more than 1.5 mgm. or approximately 0.0165 mgm. per ml. of gasoline, (0.0620 gm. per gallon). If we assume that the filter and generator tube will remove lead in the same proportion from gasoline containing small amounts of T.E.L. as it does when 3 ml. per gallon are used, we then might say that 90% of the lead will be removed by the stove and consequently 11 times the above amount may be considered allowable (approximately 0.68 gm. per gallon). We have no experimental evidence to indicate that the filter will work just as effectively at low concentrations of lead.

We may conclude therefore that if the lead content of gasoline can be reduced to 0.06 gm. per gallon, the unit will be safe even if the filter is not used, and that if the filter works effectively at low concentrations of lead in gasoline, as much as 0.6 gm. per gallon would be a safe concentration.

All of the above calculations are based upon the lead content of the effluent from the stove and do not consider any natural ventilation or admixture with room air. These are probably very extreme conditions and could come about only in a hermetically sealed room. For practical purposes we could assume with propriety a dilution factor of the effluent of at least 10 to 20 fold under conditions of average ventilation. Because of the high temperature of the effluent gases, ventilation would have to be at least that good for work to be possible near the stove.

Cordially,

WM:vr

Willard Machle, M. D.