

Tell
Bowditch
Lead Industries

See letter 6/20/52 to
Dr. Case Grut & Dr.
Harred Plettig in fuel
file

June 20, 1952

Mr. Manfred Bowditch
Lead Industries Association
420 Lexington Avenue
New York City 17

Dear Manfred:

Thanks very much for the material for Doctor Grut. It has gone forward to him with your greeting as well.

In the matter of the use of leaded gasoline in blow torches, referred to in your letters of May 23 and June 9, while I am not familiar, specifically, with the Clayton and Lambert Model, I may say that this problem, generally, has been under scrutiny, along with that of gasoline stoves, lanterns and like pieces of equipment, for many years. (I shall make inquiry about this torch, which seems a bit out of the usual pattern, in that it is stated in the advertising that it employs no filter and requires no treatment of the gasoline.) The technique of certain other manufacturers is suggested by this advertising, in that two procedures have been relied upon to dispose of the lead, - namely, (1) that of removing the lead by preheating the fuel, passing the vapors through a filter (which takes out the finely divided decomposition products of tetraethyl lead) and thence to the burner; and (2) that of treating the gasoline to remove the lead before introducing it into the fuel tank. The problem which has confronted the manufacturers and distributors of such equipment is that the combustion orifices become plugged with combustion products of the tetraethyl lead (lead oxide, sulfate, carbonate, chloride and bromide), thereby interfering with the proper operation of the burner. The hazard of exposure to air contaminated with finely divided lead compounds has also been considered, principally by ourselves and U. S. military personnel (Quartermaster Corps), and has been investigated carefully, in relation to several items of military equipment. Incidentally the British used high octane gasoline in their ordinary gasoline stoves throughout the last war, and so far as I was able to establish while in London during the war and by inquiry since, they had no significant difficulties. The danger, except in unusually enclosed quarter, is not very great, partly because of the intermittency of the operation of such equipment, and partly because there must be air movement to enable the combustion to continue efficiently. Under these conditions there is a minimum of accumulation of combustion products in the vicinity of the stove.

Ethyl Corporation, through its Research Laboratories (Detroit),

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has rendered every assistance, when the opportunity presented itself, to manufacturers of equipment of this type, in overcoming the technical difficulties, and thus has been pretty well on top of developments. We in this Laboratory have had a source of information, therefore, and have given advice and assistance too, in the avoidance of hygienic difficulties. I am not disregarding the problem, therefore, nor minimizing it, since, as you know, I feel strongly on the subject of avoiding unnecessary exposure to lead, especially in the household and in other places where toxic hazards are not expected and, therefore, not guarded against.

We have also done what could be done to convince the distributors of gasoline of the necessity of maintaining adequate supplies of non-leaded gasoline on the market. Despite this, the supply is short in many places and almost, if not quite, non-existent in others.

Let me thank you for calling this to my attention. I shall follow it up and ascertain the facts about this equipment. If I discover anything of interest, I'll pass it along.

I should comment on your comments in your letter of May 23.

First with reference to your item #1, Skin Absorption. I would have expected you to know, despite the rather small amount of published information on the subject, that the absorption of tetraethyl lead through the skin out of gasoline containing only the permissible concentrations of tetraethyl lead is of no significance. That is one of the reasons for the limit set on the concentration of lead in gasoline. As tetraethyl lead is diluted progressively with gasoline its ability to penetrate the skin is reduced disproportionately, and at any concentration less than 1 part per 1000 parts of gasoline by volume, the percutaneous absorption becomes too minute to be measured. Actually, such absorption, for all practical purposes, ceases when the concentration is lower than 1 part in 600 parts of gasoline. This has been tested carefully in animal experiments and in relation to prolonged human exposure of great severity over extensive areas of the skin. Two articles are available (Am. Jour. Hyg. 13, 487, 1931; J. Ind. Hyg. 16, 108-109 et seq.) on this matter, and much more unpublished work has confirmed the conclusions arrived at in these articles in relation to animals and men.

Item #2. Apparently it is not appreciated that the inhalation of vapors of leaded gasoline, apart from conditions which favor the complete evaporation of thin layers (or spray) of gasoline (this occurs to some extent when there is spillage, but the quantities spilled are generally small throughout the gasoline

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industry, and the actual quantities of tetraethyl lead so vaporized are minute. Such exposure is intermittent moreover) results in the inhalation of essentially negligible amounts of tetraethyl lead. Approximately 90 per cent of the lead remains unvaporized after 40 per cent of the gasoline has evaporated, while the first 10 per cent of the gasoline contains lead in such minute concentrations that special methods of analysis are required to measure it.

The above physical features of leaded gasoline, noted in the early experiments, are the major factors which have permitted its use. But for these properties, in relation to the low effective concentrations in gasoline for antidetonant purposes, leaded gasoline would have been as dead as the dodo bird for the past twenty years. It must be recognized by those who think about this problem at all, that there could not be any significant lead hazard in connection with the use of lead in gasoline. No responsible business organization would dare risk the exploitation of the product, and no petroleum distributor would dare distribute it, if the facts were otherwise. One must realize that there has been no case of lead poisoning in the entire automobile, aeroplane and petroleum industries as the consequence of the use of leaded gasoline as a fuel, during the entire history of such use, so far as we can determine by careful and continuous search for information. This speaks volumes for the thesis that leaded gasoline is no more dangerous, in commercial practice, than is ordinary gasoline. I do not say that the mishandling of leaded gasoline has not caused illnesses and fatalities, for I know to the contrary. These cases resulted, however, from the amazingly abnormal conditions of military handling, which could hardly be duplicated by the most utterly irresponsible commercial distributor of the product in ordinary times. In fact, the conditions of which I speak arose out of emergencies which presented such urgent threats to survival that exposure to tetraethyl lead was a relatively safe prospect.

I should not be making these remarks to you except for the fact that there has been a much too casual acceptance of the actuality of the public hazard associated with the use of this fuel. What has not been realized, and there is no reason why it should be, except by the experts, is that these hazards have never been of greater than theoretical importance, and that the occupations associated with the handling and distribution of leaded gasoline, with the exception of that concerned with the cleaning and repair of gasoline storage tanks, do not involve the risk of lead poisoning. The persons who deal continuously with the equipment in which the fuel is burned, namely those whose daily job is to remove carbon from motors, grind valves and the like, as well as those who may be engaged continuously in the operation and maintenance of a conventional gasoline stove or burner, may

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rarely incur a significant hazard through the inhalation of air containing finely divided lead compounds. Fortunately, the conditions surrounding the maintenance of such equipment are such that the exposure is usually intermittent, and therefore our observations have shown that their lead absorption is just a little above the normal range and well below the level at which illness occurs.

This seems to have developed into an unduly long letter. May apologies be due you, therefore, for an unintended encroachment of your time and attention.

Sincerely yours,

Robert A. Kehoe, M. D.

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