

May 24, 1961

Professor Harry V. Warren
Department of Geology
University of British Columbia
Vancouver 8, Canada

Dear Doctor Warren:

I am returning to you herewith the articles which you sent to me with your letter of April 30. I have been a bit slow in getting them back to you and I hope this will not have given you any concern. I've been hard pressed for time, and even now I should be working on a manuscript. I had Mr. Cholak look over your articles and comment on them, since, as you may know, he has carried out or directed the analytical work, having been associated with me for many years. Several comments of his are included in what I have to say, but in general, in spite of our very different technical backgrounds, we have noted and queried the same things.

First let me say that I do not regard your findings to be remarkable. This is not said in disparagement of their significance, for I am pleased to note their number and variety. Rather, I do not have difficulty in including them within the realm of our experience and expectations. Neither I nor Cholak find fault with them. Cholak does not consider that they justify much doubt on the score of the analytical precision. (He does not regard the methods used to be the best, in terms of precision, and he is not clear as to one or two technical points, but he believes the results to be generally satisfactory. He has not suggested that I do so, but you may find a booklet on methods, which I am enclosing, to be useful. He put these together for APILA, and I contributed to certain aspects of the procedures of sampling and the reasons for them.)

We consider it reasonably certain that quite a number of your high results, especially those on foliage, are an expression of external contamination. Viewed in this manner, they are not surprising. It is presumed, of course, that these samples were analyzed as received, without being decontaminated on their surfaces.

The contamination of vegetation near sources of effluents is not surprising. We have obtained such evidence repeatedly in the vicinity of industrial plants. Incidentally there is virtually no gaseous lead in the air on or near highways. The organic lead compound in gasoline is destroyed quantitatively by combustion and is converted, for the most part, to lead chlor-bromide by the scavenger introduced into the anti-knock preparation for that purpose. So little of the organic lead escapes from the entire engine system by evaporation that only minute quantities can be found at the points of origin by sampling at the proper time and place. When a gasoline tank is filled, the vapor so replaced contains organic lead, and spillage with evaporation releases lead vapor to the air. The

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total effect of this is negligible, and you would have the devil's own time in finding any organic lead in the atmosphere along a highway. There are quantitative data, however, on the levels of concentration at certain points (refinery loading racks, filling stations within a few feet of the filling nozzle, etc.), and the small magnitude of the values reveals all that need be known of the significance (or rather the insignificance) of this problem.

We are not surprised at the London data. The lead in these samples is not due solely to automobile exhausts. Much of it is derived from the combustion of coal, and other factors are provided by the weathering of paint, solder and roof flashings. Lead has been mined for a long time, and much of that which has been dug out and used is lying around in bits and pieces on the surface of the earth in towns, on highways, and elsewhere. The investigation of the problem of lead-containing dusts in London in 1928-29, led to the conclusion that one would never be able to trace any one factor with any degree of precision.

In connection with the data submitted, one finds very high values for ash in some samples in which the lead content is relatively low. Such findings need elucidation. They suggest some form of gross contamination as by soil or by industrial effluents.

On the whole there is little to criticize in your data, and I would not hesitate to accept them. I must discount, however, your concern as to their hygienic significance. The results of themselves do not disturb me, for they have little or no necessary relationship to the over-all consumption of lead by your people. We have been investigating this matter for many years, during which the lead content of American food (generally speaking) has decreased rather than increased. I am sending you a report put together for a specific purpose which will interest you in this connection. We have only a few data that relate specifically to Canadians, but I cannot believe that there is anything remarkably different in your situation. This is worthy of investigation, of course, and we would welcome direct information on the matter. Incidentally I gave a series of lectures in London (The Harben Lectures) in October, in which I attempted to put together many of the facets of this problem. These will appear soon in the form of a monograph, and I shall be glad to see that you receive a copy.

I believe that you will be interested in the results of our investigations of the characteristics and the quantities of lead which are discharged into the air from automobile exhausts. I have some extra copies of this article, and am sending one to you. You will find in the perusal of the several reports on various phases of this subject, that much is known, and while there is much yet to be learned, there is nothing in the situation which is alarming in any way.

Finally, with respect to the publication of your article on the lead in potatoes, I am at some loss to advise you. It will be difficult to get this into any of the journals that are widely distributed. If I were to submit such an article to an American journal, I would send it to the A.M.A. Archives of Environmental Health. It has a very modest circulation,

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but it is a good medium for such article. There are also the Journal of Nutrition and the American Journal of Hygiene. It would be futile to send it to the J.A.M.A. You would do well, I think, in any case, to assemble as much information as possible in an article which would simply add this to the information available on the sources of lead in food, without entering into any very extensive discussion of the hygienic significance of the facts presented. They will speak for themselves, to a very large extent, in this relationship.

Sincerely yours,

Robert A. Kehoe, M. D.

RAK:ss

Enclosure

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April 28, 1961

Professor Harry V. Warren
The University of British Columbia
Department of Geology
Vancouver 8,
CANADA

Dear Doctor Warren:

I find myself very much interested in the information in your letter of April 19th, and especially in your statements concerning the unusually high lead content of rocks in relation to the lead content of soils and of vegetation grown thereon. I am not surprised by this phenomenon in the rocks and soils, but I am intrigued by the uptake of lead by vegetation, which generally is not very responsive beyond modest limits, to this environmental factor. I am even more surprised, and I may say skeptical, as to the meaning of your findings with respect to the lead from automobile exhausts. I wonder if this is actually a factor, or whether it is not a too facile interpretation of some unusual findings. It hardly seems likely that you would have been able to find evidence of this type in an area in which the use of leaded gasoline is much less than it is in many parts of the United States, while such evidence has been hard to come by here. Since you disclaim experience in this field, I may, without affront, I hope, suggest that your conclusion may not be entirely justified. I have no basis for questioning your methods of investigation or your conclusions, but since any article along this line is likely to be submitted to me for review, perhaps you would not object to my reviewing the data before you offer them for publication.

I think I should point out to you that we have been engaged in the investigation of the potential hazards due to the use of lead in industry, and arising from natural causes for more than 30 years. During that time we have never located a significant hazard to the public health in association with the discharge of lead from the exhausts of automobiles. You may have come upon some unusual situation by pure chance, but perhaps you will grant my right to be skeptical.

I shall be very much interested in your findings, and, I will in any case, offer some suggestions for the publication of your results. I suggest, however, that it is much better to have your findings looked at for credibility before their publication than after their "wide circulation". This is not a matter on which one should "take a flyer" and hope for the best.

Sincerely yours,

Robert A. Kehoe, M. D.