

May 14, 1943

Miss Verla M. Pond,
1101 West Franklin Street,
Richmond, Virginia.

Dear Miss Pond:

I shall do my best to reply to your letter of May 11, and to give you certain articles and certain references to other articles that may be useful to you. I am not quite sure that I understand what you mean by "lead transfer." I assume that you mean the contamination of food material with lead compounds from any source. On that assumption, I should like to point out to you that not all of the lead found in foods and beverages is the result of contamination. Some of it is always natural lead, and in many instances the bulk of the lead found is present as a consequence of natural phenomena.

1. Now attempting to answer your questions, I should say that the matter of what is permissible in various foods and beverages is now somewhat confused from the legal point of view, by virtue of recent rulings and policies of the Federal Food and Drugs Administration. The tolerance for the lead content of sprayed fruit was increased some months ago, (more than a year, I believe), to the figure of 0.05 grains of lead per pound. This is equivalent to about 7 parts per million, and if this standard were to be applied uniformly to all food material, it would result in our ingestion of approximately 7 to 14 milligrams of lead per day per person. This, as you can well appreciate, is far above any permissible level from an hygienic point of view, and as a consequence of this fact, a special case has been made of fruit. In general, the policy of the Food and Drugs Administration is that it is unnecessary to contaminate most materials in the process of their preparation, and that due care must be taken by the manufacturer or the distributor ^{not} to permit such contamination. I am quite sure that the contamination of coffee in excess of a small fraction of a part of lead per million by weight would be regarded as unnecessary. Coffee beans probably contain less than 1/10 of a part of lead per million in their natural state. Such observations as we have would indicate that the lead concentration is considerably less than 1/10 of a part per million. Coffee made from such beans under suitable conditions should, therefore, be very much below the usual accepted figure of safety for drinking water. It is usually stated that drinking water is safe when it contains no more than 0.1 milligrams per liter. This, we believe, is an unnecessarily high figure. City drinking waters in general show concentrations well under this level, usually varying from 0.005 to 0.03 milligrams per liter. Coffee and all other beverages could certainly be maintained well under

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the concentration of 0.10 milligrams per liter. This information, I think, should give you a very good basis for determining what it is safe to have in soluble coffee.

2. In attempting to answer your question as to the effects of lead in foods, let me say that the effects of such lead will not be greatly different from the effects of lead taken into the mouth and swallowed as the result of other sources of exposure. As you will see from the articles which I am sending you, the intake of the average American varies between certain rather wide limits, with a mean value of approximately $1/3$ of a milligram of lead per day. The absorption of lead from this source is very slight, but some absorption does occur. The extent of the absorption depends upon the quantity of lead available, and it undoubtedly depends to some degree on the solubility of the compounds that are available. Even soluble lead is absorbed slowly and ineffectively from the alimentary tract, however, and therefore alimentary lead absorption while important is not as prompt as we previously believed. I am sending you an article giving some of our studies on the alimentary lead absorption of human subjects. I think you will see from this article the general facts concerning the rate of alimentary lead absorption under optimum conditions. The remainder of this experimental work has not been published, but certain rather fragmentary portions of it are discussed briefly in an article included in a symposium, a copy of which also is enclosed.

3. The lead that is taken in with food does accumulate in the body if the dosage from day to day is sufficient to upset the equilibrium that has been previously established between intake and output. Our studies lead us to believe that if the overall exposure to lead in food does not exceed $1/2$ a milligram or thereabouts per day, the accumulation in the body will be insignificant. This conclusion will have to be proved by direct observation before it can be accepted as entirely valid. However, it is supported indirectly by rather elaborate observations made over a period of years, and I have very little doubt that it will stand up under experimental study.

I trust that my letter with the articles which I am sending you will give you the information you require. If I can be of further assistance, I shall be glad to do so. Moreover, if you would like to send us some samples of the soluble coffee for analysis, we should be glad to analyze them. If by chance you should happen to have some coffee beans from certain definite sources, we should be glad to analyze them. We should be particularly happy to be able to find some coffee beans still within their covering in such a way that no possibility would exist for their contamination. This would enable us to make some observations on their natural lead content and so to obtain information,

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very little of which is available at present.

Very truly yours,

Robert A. Kehoe, M. D.

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Richmond, Virginia
May 11, 1943

Kettering Laboratories
University of Cincinnati
Cincinnati, Ohio

Attention: Dr. Kehoe

Gentlemen:

I am very interested in obtaining some information on lead transfer, and should appreciate your either giving me details on the following, or advising where they may be found:

First: What percentage of lead is allowable in soluble coffee?

Second: Where can full information be obtained as to the effects of lead transfer in foods

Third: Is lead transfer cumulative, or not?

Any information you can furnish on this subject will be greatly appreciated. I am particularly interested in soluble coffee, and the answer to the first question shown above.

Very truly yours,

Verla M. Pond

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1101 West Franklin Street

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