August 24, 1951

Mr. H. A. Thiemann, Engineer
Hartford Accident and Indemnity Company
Hartford 15, Connecticut

Dear Mr. Thiemann:

In reply to your questions concerning the practical hazards of the present use of lead naphthenate and lead phthalate in the manufacture of paints, enamels and the like, I can give you no definite answers in terms of experimental data or experience. I can, however, make a few comments that may be pertinent to the general problem.

First, with reference to the solubility of these materials in the alimentary tract, with the exception of a few compounds which for all practical purposes are almost wholly insoluble in the various parts of the alimentary tract, this factor is of minor importance. There is no compound of lead that is readily absorbed in the alimentary tract, whether soluble or relatively insoluble. Even under the most favorable conditions the introduction of lead into the alimentary tract in low to moderate dosage results in little absorption percentagewise (less than 10 per cent). This does not make ingestion of lead totally unimportant, but it does make it of relatively small importance, as compared to inhalation. Therefore, my point is, of course, that we simply cannot use the solubility of lead in the alimentary tract, as arrived at by indirect observations, as a basis for determining occupational hazard.

As to skin absorption, I must take exception to your statement that lead acetate and lead oleate are "readily absorbed through the skin." This is simply untrue. Lead oleate is absorbed slowly and ineffectually, while lead acetate can scarcely be said to be so absorbed at all. Tetraethyl lead, on the other hand, really is absorbed rapidly, as are also some other liquid alkyl compounds of lead, so far as they have been studied. Of the compounds now employed in industry, tetraethyl lead is the only one that poses a real problem in that regard.

We have made a few observations, recently, on lead octoate. It is absorbed so slowly as to be of negligible importance in this regard. We should be glad to examine the two compounds of which you speak if someone is interested enough to support the cost of such an investigation. If this were to be done, it would be well to study

lead oleate at the same time, so as to obtain a basis for comparison. The problem here is one of comparative rates, and the differentiation of that which occurs to a limited degree which is of only theoretical importance (in relation to the understanding of the mechanisms) from that which is of real significance. My prediction is that neither of the compounds to which you refer will be absorbed through the skin at any very significant rate, unless they are maintained on the skin in comparatively high concentrations (several per cent) in some solvent that really helps them, so to speak, to penetrate the skin, and over periods of hours at a time.

It may well be that these materials may give rise to dermatitis if they come in contact with the skin frequently or over considerable periods of time. I can't speak from experience with them, but only from some observation of some of the other lead compounds, as for example, the styphnate.

The real problem, if the compounds are to be used in the dry state, or if they are used under conditions that will result in the contamination of areas in which work is conducted, will probably be that of their inhalation. At least, that would be my guess. This problem can be dealt with, of course, by the same methods that are employed in dealing with other lead compounds that can give rise to dust in the air. Moreover, the detection of hazardous occupational absorption of lead from this source does not differ in principle or method from that associated with the use of other lead compounds in industry.

Finally, I should not be unduly concerned about the special hazards of the use of these materials in the manner you have described, but if I had reason to require real information, I should study, (1) experimental animals exposed to skin contact with them - by a method which we have developed for the purpose, and (2) men, whose occupational exposure to lead was limited to these compounds (if such could be found).

I hope these remarks may be somewhat helpful.

Cordially yours,

Robert A. Kehoe, M. D.

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