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KETTERING LABORATORY
DEPARTMENT OF ENVIRONMENTAL HEALTH

May 27, 1971

Mr. Vaughn Baird
Industrial Hygiene Supervisor
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P.O. Box 11299
Salt Lake City, Utah 84111

Dear Mr. Baird:

I hasten to answer your letter of May 21st, in view of your interest in my refresher course, given at Toronto, and in my views as to certain aspects of your work.

Let me begin by saying that I consider the correction of the results obtained by the analysis of the urine, in the manner which you describe, and, in fact, by any method based on arbitrary considerations of the specific gravity of the urine, to be an unsatisfactory procedure in industrial hygiene. The fact is that this matter was put up to me many years ago. I failed at that time to have at my fingertips the data which would have demonstrated the fallacy of the procedure, and I did not bother to assemble such data later. The trouble is that in the case of specimens of urine which are in greatest need of correction, the procedure is entirely misleading, while those which deviate very little from a proper value are in little need of any kind of correc ion. I simply would not trust the correction of a result obtained by the analysis of either a highly concentrated or a highly dilute specimen of urine. In practical terms, no very great harm would result from increasing the value obtained on a very dilute sample, but one dare not accept the corrected value of a concentrated sample. The reason for this is that the variation in the specific gravity is not the only factor at issue. There are several others. It is better, therefore, to discard all results when the specific gravity of the urine is quite high, and to disregard the significance of all samples with unduly low specific gravity.

Actually, however, a much more useful procedure is that of analysing the blood. I never depend upon the results of the analysis of the urine only, in situations involvi the exposure of men to inorganic lead, for the significance of the concentration in the blood is so much greater than that in the urine. For example, any man whose blood lead approaches 80 micrograms of lead per 100 grams of whole blood (or 100 milliliters,of volume). (Weight is a much better unit to work with for purely practical reasons, in that one does not have to measure the volume but can rely upon the weight of a tared tube of blood after the sample of blood has been removed.)

We have to use the urine specimen in dealing with persons who are subjected to exposure to the alkyl lead compounds, for the reason that these compounds (and their intermediate decomposition products) are not held (bound) by the erythrocytes, and, hence, the blood does not reveal their concentration in the body. We are able to do this by collecting specimens at the right time of day to avoid those of unusual specific gravity. (This depends upon the circumstances, especially those concerned

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with the avoidance of the end of the daily shift.) If, however, a specimen is either unduly high or low in its specific gravity, we discard it and obtain another more suitable sample. I do not recommend the urine as a medium for the investigation of the exposure of men to inorganic lead, because it simply is not the best, easiest and cheapest means of finding out what you wish to know. Neither does any of the experienced people in this field. It was a method which we had to use before the analytical precision of dealing with the blood had been developed to its present level. Incidentally, it is hardly proper to speak of this type of monitoring of workmen as "secondary." It is the primary method, while monitoring the lead in the air is not basically sound as applied to the safety of individual workmen. It is an engineering device through which an approximation to safe environmental conditions (which do not always apply) can be achieved.

I am sending you a reprint of the Harben Lectures, and also another booklet (a reprint of the chapter in Patty's book on Industrial Toxicology and Industrial Hygiene) which may be of some help to you in considering this matter.

Sincerely yours,

Robert A. Kehoe, M.D.
Professor Emeritus of
Occupational Medicine

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