

February 19, 1945

Dr. H. T. Glaser,
National Battery Company,
P. O. Box 911,
Zanesville, Ohio.

Dear Dr. Glaser:

I am afraid I did not make myself very clear in my previous letter to you, for you did not give me any information on what we might anticipate in way of numbers of samples from your plant. Under suitable conditions we would be willing to help you out from time to time in view of the difficulties of getting analyses made elsewhere. Moreover, I am afraid we will not find it possible to analyze any samples, except those collected in our containers in accordance with specific instructions to assure that they are satisfactory for analysis. I anticipated that you would reply if you were still interested and that I should then be able to provide you with instructions for carrying on in the future.

Unfortunately the sample which has already been received at the Laboratory is probably not suitable for analysis, for reasons which I shall point out, and therefore, we shall hold it without any attempt to analyze it until I have heard from you further. Perhaps I should have covered the situation somewhat more fully in my first letter, but since I did not, it is necessary to do so now.

The difficulties in the collection of samples of urine on industrial workmen are quite considerable. Even under the best possible circumstances it is not easy to obtain samples of blood and urine that have not been contaminated with lead to some degree. The quantities of lead which we are dealing with in these materials are so very small that they are quite beyond the comprehension of persons who are not familiar with micro-chemical techniques. For this reason such samples cannot be collected in an industrial plant in which lead compounds are handled or processed, and therefore it is quite impossible to obtain 24-hour samples of urine, except under conditions in which the employee is separated from his job, and in which after careful bathing and changing his clothes, he is kept in a lead-free environment during the period of the collection of the samples. Moreover, anything that comes in contact with the samples must be chemically cleaned, and this requires special procedures for cleaning glassware that are not available outside of special laboratories. We never analyze any samples

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unless we can be sure that they have been collected in such a way as to avoid contaminations. Otherwise, if we do, we obtain high results which are misleading and which, therefore, create trouble instead of helping to straighten out trouble. It is on this account that it is inadvisable to analyze the sample which you have sent in. There would be no means of interpreting the result, unless it happened to be so low as to be within normal limits. Therefore, unless you can assure me that precautions have been taken equivalent to those described in the instructions I am sending you, the sample had better be discarded. Meanwhile, however, we shall hold the sample until I hear from you.

In dealing with men who are engaged in occupations in which they are exposed to lead compounds it will be necessary for them to remove their clothing, bathe, and then present themselves in a clean room, which is free of dusts and which is not contaminated in any way with lead compounds. Here a sample of urine may be voided in the presence of the examiner, and if proper technique is carried out, it is likely that a suitable sample can be obtained. You must realize, however, that if the stopper or the inside of the container comes in contact with the hands of the employee, or with any other material that may have traces of dust upon it, the sample will certainly be contaminated and will not only be useless, but will be grossly misleading. In fact, unless you are in position to collect samples by means of practically faultless technique, you will be well advised not to bother with them at all. Results obtained in any other way will mislead you instead of helping you.

We are in the habit of obtaining samples of both blood and urine from the patient. The reasons for this are numerous, but the principal reasons are (1) that the variation in urine samples is fairly considerable from hour to hour while there is little or no variation in the lead concentration in the blood, (2) the blood samples provide us with reasonably good checks against the factor of contamination, (3) there is an occasional person who despite high lead concentration in the blood, fails to excrete lead in correspondingly high concentration in the urine. In general, we consider it inadvisable as well as unnecessary to try to collect 24-hour samples. It is much easier to obtain spot samples of urine of approximately 100 ml in volume, and there is less chance of contamination, since the entire process of collecting the sample can be supervised by the examiner. The results obtained on spot samples can be interpreted quite satisfactorily if a blood sample is taken at the same time, and with these two items of information there is much less reason for making a mistake. Unless some such check is provided, such mistakes are likely to be quite frequent. Since mistakes in technique usually give high results, it is important that they be avoided. In this

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connection I should point out to you that you are dealing here with one of the most sensitive and precise analytical procedures that is known to microchemistry, and certainly there is nothing else even remotely comparable to it in laboratory diagnostic procedures.

Samples collected in accordance with the instructions and sent to us by mail can be analysed promptly and reported on by wire or by mail. The whole matter can be handled within a few days. Twenty-four-hour samples on the other hand, have to be sent by express, and a great deal longer time is required to get the results. Under no circumstances is it possible to obtain a large sample and to send us only a part of it. The results under these circumstances will have no significance.

As I indicated above, I am enclosing herewith instructions for the collection of samples, and if you feel that you can comply with our requirements, you can let me know by mail or by wire what your requirements are in the way of containers. We cannot let you have more than a few needles and blood tubes at any one time, for we have continual need of these and cannot afford to have them tied up inactive. Moreover, as I indicated, we cannot comply with your wishes at all, unless the number of samples is certain to be small. We are crowded with work at the present time and we cannot take on more unless it is a very small amount.

Now with respect to our requirements in way of information. First of all I shall wish to know as much as possible about the work that is going on in your plant and about the general conditions which prevail with respect to the magnitude of the hazards of lead exposure. If you have had any plant survey which has resulted in a report or if there have been air analyses that give the current lead concentrations in the air in various parts of your plant, I should have this information. I should also know something about the number of employees, the number engaged in various operations, the length of hours per day and per week, the apparent incidence of lead poisoning in the group, and any other pertinent data which will give me some idea of the size of your problem. This information will be held in strict confidence. If no such information is available, I would appreciate your giving me enough general information about the plant to enable me to have some idea of how it compares with other storage battery plants with respect to hygienic conditions. I am quite familiar with the operation of storage battery plants in general, and therefore I would be able to interpret reasonably well any information you can give me.

With respect to each case that comes to our attention by reason of the sampling of the blood and urine, I shall want the complete

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history of employment, including the changes from one department to another, intervals of illness or unemployment from time to time, and the date on which the employee last worked just before the samples were taken. In other words, I want the whole story with reference to the individual's opportunities for exposure to lead, including when it began, when and for how long it was interrupted, and when finally it last occurred in relation to the sample. It may be that not all of this information will be precise to the day, but the best available information should be provided in each instance. This information should accompany the sample so that we will have on hand information that will enable us to interpret the results. No one who has not had extensive experience can properly interpret the analytical results, and therefore I want to give you the most assistance I can on the background of our broad experience.

From the point of view of clinical information, I shall want all that is available. I shall need to have the dates of the onset of any symptoms or signs of illness, of whatever character it may be, if it seems to have any relation to the illness under consideration at the time of the sample. All of the results of the physical examination should be recorded and forwarded to us, together with any other laboratory observations that may have been made. In other words, what I want is all of the occupational and clinical information that can be obtained case by case, for unless we can obtain such information, there is no point in our undertaking such work.

As you will notice in the instructions we ask for duplicate samples of blood. We analyze these samples by two different methods, but we charge for them as though they were one sample. Actually the charging of \$5.00 does not cover the cost of analyzing the two samples of blood, but we prefer to do it this way anyhow in order that we may minimize any errors of technique in the analysis of blood samples. Thus, if one is high and the other is low, we know that the sample has been contaminated in its collection. This gives us a clue to the care that is taken in following our instructions. We must have such a clue and such a check in medico-legal cases, since it is our responsibility to make sure that we do not provide misleading laboratory information. The one urine sample is charged for at the rate of \$5.00. Thus, this means an expenditure of \$10.00 per case for diagnostic purposes. It is apparent that this is expensive, but I repeat that this just barely covers most of the cost of doing this work.

If you find it possible to comply with our requirements and our instructions, and if you anticipate having only occasional cases for consideration, we may find it possible to work together in this manner. Please let me know your wishes and your requirements, and we shall be guided accordingly.

Very truly yours,

Robert A. Kehoe, M. D.

RAK ef
Enc.

specimen for determination
of lead -
1 cc. sample. (635 C.C.)

[REDACTED] - age 23
624 Putnam Ave.
Zanesville, Ohio

Sent by Dr. H. J. Glaser, M.D.
National Battery Co.
P. O. Box 911
Zanesville, Ohio

destroyed
9/12/59

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145 in
Specimen for determination of
lead -

24 hr. sample - 1170 c.c.

Patient - [REDACTED] - age 43
[REDACTED] St.

Zanesville,
Ohio.

Sent by Dr. W. T. Glaser, M.D.