October 21, 1937

Dr. Carl M. Hillenbrand
Plant Physician
Harrison Radiator Division
Lockport, New York

Dear Doctor Hillenbrand:-

Thanks very much for your letter of October 13th with the information on [redacted] and [redacted], and also on the samples of [redacted] and [redacted]. This gives me all the information which I require and I hope soon to have the final report in your hands. Just now not only I but all the other people in the laboratory are swamped with work, and for the moment the report will have to wait.

In reply to your question about the value of spot samples, it is true that the large sample of urine, if collected without contamination, is more useful than the spot sample. Urine collected at any one moment represents only a short period of secretion and the variations from hour to hour are of considerable significance. These variations tend to be smoothed out in a large sample and, therefore, the latter represents a more characteristic picture of the level of lead absorption in the patient. On the other hand, the large sample is more likely to be contaminated with lead in the process of collection. Moreover it takes longer to collect and longer to analyse. Therefore the spot samples are useful particularly when one is working at a distance, because the samples can be obtained quickly and with less danger of contamination, and they can be analysed and reported promptly, which is sometimes of importance. For example, immediately or shortly after a serious lead exposure, the spot sample will show very high results. If a blood sample is taken at the same time the two high results will be very significant in relation to any symptoms which may develop. The same is true in the recognition of an episode of lead intoxication which comes on rather suddenly. In this instance both a high result on a spot sample of thine and alsonn a sample of blood will serve to make the diagnosis. Low results on both samples, on the other hand, would make it fairly evident that the condition was not due to lead. Obviously here I am referring to the diagnostic value of such analyses taken with other suitable clinical information. The analyses

themselves naturally do not make the diagnosis.

Within the next day or two you will receive a number of containers for spot samples of urine, and a few tubes and needles for the collection of blood. I suggest that you leave these sealed in the box in which they are sent until you need them, so as to exclude any dust.

In the matter of the microscopic equipment, I think you will find it difficult to obtain sufficiently high magnification with a 5-X eye piece. It takes fairly high magnification to see fine granules in the erythrocytes, and we use a 10-X eye piece regularly. It seems probable to me that your difficulty results from an insufficient definition of objects in your high power field. I am sorry that this problem was not discussed with me in complete detail when I was at the plant, for I should have advised against the use of either Spencer or Bausch and Lomb lenses for work of this sort. The equipment which we have was selected especially with attention to the definitive properties of the lenses, and there is no question about the superiority of Zeiss lenses over any other for this purpose. Any type of stand will do, provided proper lenses can be mounted on it. I distinctly prefer Zeiss lenses and in general I regard Spencer lenses as the worst obtainable on the market. This is not true of every one of their lenses. Obviously I am not saying this for publication, nor would I say it to a representative of Bausch and Lomb whose equipment in many fields of work is very good indeed. I find it a little difficult to advise you what to do, but I am very sure that you will not be able to obtain in a medium priced set of lenses any such definition as we obtain with our microscopic equipment. I dare say Miss Millar is quite right in feeling that her high power equipment is not as good as that used by Dr. Duvall. Actually Duvall's lenses were picked by me as the best obtainable in the entire category of microscopic equipment.

The Zeiss binocular equipment which you have should be entirely satisfactory with 10-X compensating eye pieces. We use this with a No.90 Zeiss fluorite objective with a numerical aperture of 1.25. The condenser which is a very important part of the apparatus is a Zeiss aplanatic. The combination of such a condenser with an objective at least as good as the one I have described is necessary to obtain sharp definition in looking for stippling, since this is one of the most difficult of the structural changes of blood cells to see clearly at high magnification. Such high magnification is necessary if the structure is to be seen at all, but sharp definition is equally a necessity

and must be obtained if one is to do satisfactory work of this kind.

The Bausch and Lomb representative, if he knows enough, should be able to suggest such improvement in your equipment as will give you what you need. However, if you wish to send your entire equipment on to me for examination, I should be glad to look it over and I will try to tell you what is wrong with it. I suspect, however, that your optical equipment, that is the condenser and your oil immersion lenses, is not good enough for the purpose.

With kindest personal regards,

I am

Cordially yours,

RAK:is

Robert A. Kehoe, M.D.