May 25, 1949

Dr. H. Brieger,
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1025 Walnut Street,
Philadelphia 7, Pennsylvania.

Dear Doctor Brieger:

The questions raised in your letter of May 20 are easy to answer in one way and quite difficult in another. I shall answer the easy part first. There are two methods of dealing with the cost of analytical work of this type, according to our system. When a rather large volume of work is involved regularly, we take into account the amount of time spent by individuals in the performance of the work and charge for their salaries on the basis of the proportion of their time spent on the specific job. To this we add all of the overhead expense of operating the Laboratory, plus any direct charges, such as telegrams, express charges, and the like. Our entire budget is broken down into a series of items, including salaries, laboratory supplies and equipment, books and publications, telephone and telegraph, etc. We find, generally speaking, that the overhead expense is about 50% of the cost of salaries. The other procedure is that of determining the overall cost of the operation of our analytical laboratory, dividing that by the number of analyses of a specific type, and calculating the cost per analysis on this basis. Our cost for lead analyses is approximately $5.00 per analysis, and therefore when we carry out a scattering of analyses for any one person or group we make a charge on a unit basis. Our cost per analysis is probably a little lower than it would be in a smaller laboratory, since we are equipped to economize on man-power. Regardless of which method we use we send out bills at intervals of not less than three months. Generally speaking, however, we prefer to carry out the work at an agreed upon tempo, so far as possible, and have the funds supplied to us in advance.

The more difficult part of the problem is that of determining when analyses should be made. We do not do any more work than we have to, for professional reasons, of the purely diagnostic type. Since this is primarily a research laboratory, we try not to engage in routine diagnostic work for fees. Rather we gather detailed information on environmental conditions, clinical information on the men, and we undertake to study the data in relation to clinical and occupational conditions so as to be able to interpret our findings as completely as possible, both for scientific purposes and for the benefit of the industry in question. For this reason I am somewhat skeptical of the necessity, or the advisability of carrying out such numbers of analyses as you have referred to. The purpose of such analyses, in my philosophy, is to measure the environmental conditions with the

utmost precision and to determine whether they are safe. If they are not safe, one can never make them safe by multiplying the numbers of analyses. Rather it is necessary to use them as a lever for obtaining the engineering control that will result in safe conditions. If the conditions are made safe, the analytical data on individuals will not need to be gathered monthly, but only at considerably longer intervals.

In order to establish the facts with reference to the maintenance of satisfactory environmental conditions, I recommend the selection of a group of representative employees in each occupation in an industrial plant, these to be followed systematically at not less than quarterly intervals. As the mean results on these individuals grouped by occupation are found to vary up or down, one has evidence of the status of the plant and of specific occupations, with reference to current lead exposure.

In addition to the above program I advise the comprehensive sampling of the personnel at intervals, in order to avoid missing out on the occasional individual whose exposure is significantly different from that of his fellows in the same or similar operation. By the combination of this procedure with the quarterly sample one can give comprehensive coverage.

A third procedure relates to the diagnosis of illness or alleged illness. Here I like to resort to the analysis of both blood and urine, since the occasional individual shows such a variation in the urinary concentration as to yield untrustworthy information for diagnostic purposes. The urinary values for groups of individuals are pretty sound, but the variability of the lead concentration of small samples is too great to provide that degree of accuracy that is suitable for interpretation of the individual case.

There is just one other point which I think is of importance. In connection with the high and, at times, excessive cost of analytical work in the lead trades, if the environmental conditions can be brought under reasonably satisfactory control, so as to be predominantly safe, one can use a screening test on fresh samples of urine that will enable him certainly to exclude all of the persons who are within safe limits of exposure, and thereby give his more concentrated attention to those whose exposure is potentially unsafe. The method we have devised for this purpose is highly accurate, except that one may obtain occasional high results, due to the presence of interfering metals. It never gives low results if carried out as designed. This method will permit one to complete a series of analyses in something like one-tenth of the time that would normally be required, thereby reducing the cost of the work proportionally. I consider this test a highly useful one and in some instances quite necessary, since otherwise the excessive cost of the work will result in its abandonment as a practical hygienic procedure.

I realize that I have given you some gratiutous advice in my reply, but I know something of what you are up against in this instance, and I am anxious to be as helpful as I can.

With kindest personal regards,

Sincerely yours,

Robert A. Kehoe, M. D.

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