

December 15, 1964

Mr. I. L. Barker, Resident Metallurgist
Cerro Corporation
300 Park Avenue
New York, New York (10022)

Dear Mr. Barker:

I have been remiss in delaying so long a reply to your courteous letter of October 21. Unfortunately, I have been hard-pressed for time, and have been compelled to attend to urgent matters of correspondence only.

I am gratified by your satisfaction with our attempt at collaboration in cross-checking the analytical findings. If this procedure has benefitted you and your associates, I am pleased.

I think, however, that I should make certain comments on the results which you provided, including our contribution.

(1) It need not surprise you and your people, that the results of parallel analyses of the urine will not correspond. There is a greater variability than I would expect to find in the results as reported. There are also differences in the average values that are larger than they should be - for example 0.103 mg. per liter vs. 0.03 mg. per liter. Something went wrong here, either in the sampling (which I would expect to find) or in the analyses (which seems unlikely in view of the fairly satisfactory results on the blood). As a type of comparison between the three laboratories, these results are worthless.

(2a) With respect to the comparative results on the blood, the correspondence is not as good as it should be, or could be made. First of all, the results that can be obtained by spectrographic means, within the limits of quantity and concentration involved here, are not as precise as those obtained by the application of a well chosen, dithizone method. You will note that our two series of results vary, the spectrographic results, in this instance, being lower than the dithizone. As a rule, the reverse is true, i.e. the spectrographic results are higher, but this is a matter of chance in a small series.

Second, this variability is of little practical consequence excepting as it obscures, somewhat, the point of differentiation between safety and danger. For example, the values obtained in Lima, on samples #5, #7, #8, #11, #13, #14 and #16, are above the threshold of danger as we have established this by our own experience, and the men who are so identified, should be removed from further exposure to lead in order to reduce the risk of the onset of plumbism. If, however, you consider our results in these same instances, employing either the dithizone results, or the averages of our two results, only #7, #8 and #10 fit into this category. By the same criterion, your two sets of results, taken independently, would convict

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#2, #4, #7, #8 (Oroya only), #9, #10 and #16.

The figure which we have taken as established by our experience as the threshold value is 0.08 mg. per 100 grams of whole blood. You will recognize therefore, that, at this level of concentration a small difference in the analytical result is crucial, in its relation to medical action. If the error of analysis is ± 0.01 , a result of 0.08 may mean 0.07 or 0.09. This is why we carry out two parallel analyses - i.e. to check on the possibility of contamination, and to find out, as nearly as possible, the trend of the analytical error. Such variation in the application of analytical methods as are found in these data are therefore highly significant.

There is no value in carrying out these analyses on persons who are near the danger line, unless action is initiated by the findings. This is the essential purpose of these costly procedures of industrial hygiene. It is necessary, therefore, to know the range of the analytical error, and to take it into account in every case that is near the threshold. A relatively large and variable error makes no difference when the concentration of lead in the blood is obviously high, as in the case of sample #10, for none of the methods are sufficiently in error to miss this. On the other hand your result on Sample #16, calls for immediate action, whereas none is called for by either of our results or by yours as obtained by the Research Laboratory.

Somewhat, or other, your people will have to arrive at standards and interpretations that will coincide with the facts of life, or you and your employees will be in trouble.

Sincerely yours,

RAK:vr

Robert A. Kehoe, M.D.

Original and one copy sent to Mr. Barker.

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