September 21, 1964

Walter B. Mayer, M.D.
The Nalle Clinic
1350 South Kings Drive
Charlotte, North Carolina

Dear Doctor Mayer:

I hasten to answer your letter of September 15th, for the reason that I am more than a little concerned - not necessarily apprehensive, but concerned - to clarify certain questions which are raised or at least implied by your remarks. I am the more impelled to do this for the reason that I cannot, with my present commitments, get to Charlotte as promptly as I would wish.

From this distance, I cannot offer any satisfactory explanation for the occurrence of the high levels of lead concentration in the blood of certain workmen who have been employed only a short time. It may be that they came to your plant from another occupation involving exposure to lead, or it may be that the jobs in which they engaged involved severe exposure. (I have seen severe intoxication in persons whose occupational exposure had been limited to four weeks, and we have followed industrial operations that resulted in an highly dangerous degree of absorption in two weeks.) There can be no doubt, however, of the direct relationship between the rate and extent of the absorption of lead and the concentration of lead in the blood.

Neither can I (or anyone else) tell you when the danger of intoxication (as represented by the concentration of lead in the blood) will be converted into the fact of intoxication. The lack of correlation between anemia and stippling and of outright toxic clinical effects is not surprising; rather, it is an old and expected phenomenon. All one can say about the concentration of lead in the blood is that, (1) no illness or other signs of intoxication will occur when the concentration of lead in the blood is below 70, 75 or 80 micrograms per 100 grams (the precise figure depending upon the precision of the method of analysis); and (2) that lead intoxication occurs in an industrial population among persons who have lead in their blood in a concentration at or above 80, 85 or 90 micrograms per 100 grams (again dependent upon the analytical error of the analytical method); and (3) that the incidence and severity of the intoxication tends to increase fairly rapidly, as the concentration in the blood increases above the theshold level. At the same time, it must be appreciated that there will be persons at high levels of concentration (lead in blood) who do not, at

any time, have symptoms of intoxication. This latter fact is the thing that is baffling you, as it does many other physicians. It is part of the clinical problem that has made lead poisoning the commonest form of industrial poisoning - that is, the onset of lead poisoning, under the usual conditions of occupational exposure, is unpredictable; the eventual occurrence of lead poisoning within a population, however, is predictable, in the terms I have stated above, and this is the cornerstone of preventive medicine in this field of occupational medical practice. If the industrial physician waits until illness occurs, he is not a sound practitioner of occupational medicine, the goal of which is the prevention - not the recognition, but the prevention - of occupational disease.

I have made the above statement flatly and emphatically. I am not unaware of the fact, however, that one must proceed gradually and conservatively in his professional performance in this matter. I can speak authoritatively, from a very broad experience, and my position is such that my advice can be taken or rejected without damage to me or to the truth. The physician who is practicing in a situation that is bad, and has been bad, for a considerable period of time, but without serious consequences in terms of real or prolonged disability among the workmen, is in an awkward spot. He must proceed cautiously. I am not criticising you, therefore, for not following my advice to remove persons from further exposure to lead when they are in danger. This is the proper procedure, with which to prevent the occurrence of lead poisoning in industry. It is not open to question, because it has been proved to be correct by the experience and results of many years. It is difficult to carry out, however, for a number of good reasons, and the physician must have the management and the workmen behind him - solidly behind him - in order to handle the situation properly. I have been through this whole sequence of events many times, and there is nothing new or unusual in your situation. I can assure you, therefore, that there will be cases of lead poisoning of unpredictable severity within the group of men for whom you are medically responsible, if the conditions under which they are now working are permitted to persist. What you may choose to call "mild intoxication" if allowed to recur in a man or a group over a period of years, is very likely, one of these days, to turn up in a seriously disabling form in one or more of these men. A single bout of lead intoxication (of the usual type) has little likelihood of leading to prolonged or permanent disability. (This also is one of the sources of difficulty in preventive medicine. That is, lead poisoning, as a simple, single event, is usually self-limited in its duration, and is unaccompanied, in most instances, by any sequelae. It is therefore, to the experienced medical diagnostician, a relatively minor disease. What is not often recognized by clinicians is that, in the case of persons who work for many years under hazardous conditions, in which they absorb fairly large amounts of lead, there are repeated minor episodes of intoxication. These occur, as a rule, when for some reason, the person absorbs lead, for a time, at a rate that is appreciably higher than that which he has been absorbing, usually because of overtime work or some operating change that has altered the

conditions of exposure. This is the background, as a rule, of the case of encephalopathy, or of extensor paralysis, which comes unexpectedly and often tragically. It is impossible, so far as I know, to prevent the occurrence of such cases, from time to time, unless actually safe working conditions are maintained constantly, or unless every man who reaches the point of danger is removed from dangerous exposure, and is prevented from resuming such exposure, until he has returned to an essentially normal state with respect to the lead content of his tissues.

I shall be glad to discuss these matters with you further when opportunity is afforded, and I shall provide you with documentary evidence in support of my statements. It has seemed to me to be advisable, however, to state the problem and its physiological solution, in simple terms, in advance of our meeting in person, especially since the latter must be delayed for a time.

Sincerely yours,

RAK:vr

Robert A. Kehoe, M.D.