

Dr. Kurz
May 14, 1941

Dr. R. F. Kurz
Western Cartridge Company
East Alton, Illinois

Dear Doctor Kurz:

In accordance with your request, I am writing to indicate what advantages might be involved in observations on the hygienic conditions in the plant in which you are working.

We have had some experience with the operation of plants of this type, and I am quite certain that the conditions of exposure can be significantly hazardous. No doubt there are certain opportunities for the production and dissemination of finely divided lead in the form of dust and fume. The degree to which exposure will occur will depend upon the quantities of material handled, the type of apparatus involved, the general quality of housekeeping and the opportunities afforded for cleanliness and general care among the men. At this time, when a high rate of production seems to be the most necessary factor, occupational conditions are likely to be more hazardous than they are normally. It is all the more necessary, therefore, that precautionary measures be taken since illness and disability among the workmen represent a serious problem from the point of view of production, as well as from a human point of view.

There are several ways of approach to the study of the hazards existent in your various operations. It is possible, of course, by comprehensive air sampling to determine the character and the extent of the atmospheric contamination with particulate lead. Such a method of procedure will point out the most serious foci of exposure, and will enable one to see the most important points of attack. The advantage of this method of study is very great under certain conditions and much less definite under others. If various parts of a plant are well isolated from each other, such results are very significant. However, if the operations of a plant are varied and subject to change from day to day, and when the exposure varies with general weather conditions and a variety of

other factors, it is quite difficult to evaluate it by methods of air sampling alone. Generally speaking we do not feel that this is the method of choice in connection with a single plant survey, although it is very useful as a means of making periodic observations after the general picture has been fairly well developed by other means.

In our experience the most adequate way of studying lead exposure of a plant is to study the workmen. The men themselves have experienced the exposure in a very practical way. Whatever is going to happen to them in the way of lead absorption under the conditions which have prevailed, will have left its mark upon them and, therefore, if one has the means of determining the extent of their lead absorption, as a consequence of their exposure, he will be able to determine the characteristics of the plant very clearly. It has been shown quite clearly that the degree of lead absorption of an individual can be determined by an adequate study of his urinary lead excretion. The same thing is shown to a somewhat less effective degree by studies of the lead in his blood. All that is necessary, therefore, is to exercise care and judgment in the selection of workmen whose experience will adequately represent the conditions to which they have been exposed. That is to say, one needs to study carefully the different jobs in the plant, and to select men who have been occupied in those jobs to the exclusion of other activities, so far as possible. If care is used in this respect, and if it is possible to cover the operations of the plant through a study of carefully chosen men who will cooperate in the study, one can obtain very precise and very useful information as to the hygienic significance of the lead exposure involved. I shall not bother you at this time with illustrative data, but if for any reason you would like to see an illustration of the significance of this type of work, I can send you some experimental results which we have obtained.

Thus far I have referred only to a study of the lead content of blood and urine. I should also make mention of the fact that samples of feces obtained on representative workmen will clearly demonstrate the magnitude of their exposure within the period of the past few days. For example, when men are working in a dust-laden atmosphere, a considerable proportion of the particulate lead compound is collected in the upper respiratory tract, is subsequently swallowed with the pharyngeal secretions and appears in the alimentary tract, to be evacuated with the feces. The determination of the quantities of lead occurring in the feces of representative workmen in different parts of the plant, will show exactly the same kind

of results that can be obtained by analysis of the air, except that in this instance, the sampler has been working automatically throughout the working hours, and it portrays just what happened. The lead content of the feces of such groups of men varies according to the lead contamination of the atmosphere in which they have worked, and one is, therefore, able to use this method of studying the atmospheric contamination. In the study of the lead excretion, therefore, one has the means of determining the present magnitude of the exposure, as revealed by the lead in the feces, as well as the general exposure over a considerable period of time, as demonstrated by the urinary lead excretion and the blood lead content.

Information of the type I have indicated above, can be and should be rather closely correlated with clinical information on individual men. Presumably such clinical information is available in part, and the remainder of it could be collected in the regular operation of your medical department. Certain additional laboratory observations with respect to the microscopic blood changes might well be made, and these might be correlated with the analytical findings. All told, by judicious selection of men to be examined and methods to be employed in their study, one can obtain in a comparatively short time a rather precise and comprehensive picture of the magnitude and the hygienic significance of the lead exposure. We have been able to demonstrate quite clearly that lead excretion within certain limits is compatible with complete safety, whereas at certain levels and above, the danger of lead poisoning begins and increases according to the increase in lead exposure. It can now be said with sound practical assurance that dangerous conditions can be found and can be readily differentiated from safe conditions, and that by this means one can establish where effort needs to be exerted to eliminate exposure. One can also determine by the application of the same means, when the exposure has been reduced to safe limits.

If you require any additional information on any of these points, I shall be glad to send them along to you. However I do not want to be in the position of urging any action on your part, and I will wait until I hear from you before writing or going further. However it would appear to me that if your people are interested in making a study of their lead exposure, it would be advisable for me to visit you, or for you to visit me to discuss the whole situation and to decide what could be done. In this connection, I think it might save time and trouble if I were to visit you and see the plant, since I could familiarize myself, at least roughly, with the conditions

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which have to be met, and would be able to make certain suggestions of a practical nature for carrying on observations in the most convenient and least expensive way.

Finally, let me say that I am very glad to have made your acquaintance, and I regret that we did not meet some time before you left Cincinnati.

Cordially yours,

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Robert A. Kehoe, M.D.

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