June 1, 1965

Robert T. P. deTreville, M.D.
Managing Director
Industrial Hygiene Foundation of America, Inc.
Mellon Institute, 4400 Fifth Avenue
Pittsburgh, Pennsylvania 15213

Dear Bob:

I regret that the deadlines for the submission of theses to The Graduate School (after the kind of editing that is required for educational purposes) has kept me hopping during the past several weeks. This and certain other immediate demands on my time, have made it impossible for me to do anything, until just now, about the hygienic problem on which I consulted with you at the Monaco plant of St. Joseph Lead Company.

At last, I have been able to put together a brief memorandum containing my observations and recommendations for such use as you may see fit to make of them. (Your letter to Mr. Gahagan has enabled me to be brief.) In addition to my memo, I am sending two copies of each of the following booklets, which should be available to these people: - 1) the Harben lectures (paperback), 2) the chapter from the second edition of Volume II of the work originally edited by Frank Patty, and 3) the Report prepared for A.P.H.A. on analytical methods. The last two are intended for the two analysts with whom we talked; items 1 and 2 are to go to Dr. Mitchell and Mr. Kunkle.

I have indicated in my memo that, in my view, the analytical work being done on the urine is insufficiently precise to be useful, in view of the significance that can now be attached to precise determinations of the lead in the blood. One must weigh what is being done on the basis of what can be done and on the comparative cost of the two procedures. By these standards this work, as now being done, is unsatisfactory and unduly costly. It should be abandoned in favor of precise methods of analysis

applied for the most part to the blood. I believe that if this matter is approached properly (with a recognition of the competence of these men and their interest in doing the best job that can be done), the desired result can be obtained. We, of course, would be pleased to collaborate in any cross-checking that might be desired by them.

I hope my suggestions will be helpful and acceptable, for I would like to see this plant put in a good state.

With best regards,

Sincerely,

Robert A. Kehoe, M.D.

RAK:meh

Enclosures

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MEMORANDUM ON THE SMELTER OF ST. JOSEPH LEAD COMPANY AT JOSEPHTOWN, PENNSYLVANIA

(From the Aspect of the Conditions with Respect to Hazards Due to Lead)

At the time of a visit to the industrial plant, in the company of Robert T. P. deTreville, M.D., Managing Director of the Industrial Foundation of America, Incorporated, on March 30, 1965, certain discussions were entered into, during a tour of inspection and afterward, with representatives of the local management, with R. E. Kunkle, Industrial Hygiene Engineer, and with the principals in the analytical laboratory.

Since Dr. deTreville has commented, at some length, on the conditions encountered at the time of the visit, and on certain analytical results obtained in this Laboratory since the visit, as well as on the results of clinical examinations of a selected group of six employees, this memorandum is to be regarded as a supplement to his previous comments and immediate recommendations.

1. With reference to the analytical findings reported and interpreted by Lester W. Sanders, M.D., of the staff of the Kettering Laboratory, it should be emphasized that, whereas the findings, in the case of [redacted], give a clear indication of the actual hazard associated with the environmental conditions and the manner of his performance of the day's work - [redacted]

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experience reveals the potential hazard of the job, whether or not it is realized fully by other workmen - the other men, engaged in similar work (whether for comparable periods of time per week or week or month, is not evident) have absorbed some lead while at their work, but not to a dangerous extent. It would be useful, therefore, to look into this situation, and to determine, if possible, why the experience of Mr. [redacted] is so different from that of the other men. (This difference is considerably greater than the analytical figures, of themselves, would suggest. I would suspect, on the face of the evidence, that Mr. [redacted] has spent much more time, daily, and regularly, in this area, than have the others, or that his specific work has involved much greater exposure, for many months at a time. As an incidental, but important, bit of factual information, these results of the analyses of (simultaneously obtained) samples of the urine and blood of these men demonstrate the relative value of the urine and the blood, when analysed by precise methods, in portraying the status of workmen with reference to the hazard associated with their work over the prolonged periods of time that are often involved in industrial employment. Note, for example, that the concentration of lead in the urine increases from man to man in the descending order of the list, while the concentration in the blood of [redacted] is about three times (average of 2 results), that of either [redacted] or [redacted] and more than twice that of the next highest man, [redacted] One could never have learned the facts made available

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by one set of analyses of the blood, through repeated analyses of the urine. The reason for this fact is that the urine reveals, predominantly, the effects of the last day (or few days) of occupational exposure to lead, while the blood demonstrates the general level of the concentration of lead in the tissues of the body as a whole.

It may be doubted that these 6 men have yielded results that are representative of the working conditions in the lead-using areas of the plant. It may be, but is by no means certain, that they portray the worst of these conditions. If so, it is especially important to determine the cause of the situation represented by the experience of Mr. [redacted] Certainly, whether or not this is possible, the survey of the lead-using areas should be extended, by obtaining specimens of blood from a larger number of the employees, with special attention to finding and testing the most severely exposed persons. One should know the extent and distribution of the risk before spending considerable sums of money in attempts to combat an irregularly distributed risk. The irregularity may be due (this is not probable) to the habits and manner of performance of individuals, rather than to a generally or spotty distribution of potentially dangerous conditions.

2. There may be defects in the equipment designed for and employed in eliminating lead from the air of the work areas. These, in general, may be assumed (by me) to have been designed satisfactorily. If they fail in their performance, because of

the wear and tear of their use, or because of quantitative inadequacies, corrections can and should be made. One suspects that they are not wholly adequate now, (it is not certain that they were adequate at one time) for the reason that workmen are required (or so it has seemed) to wear dust masks constantly while engaged in certain jobs. If this is true, the control of environmental conditions is not adequate and should be improved. Workmen should not have to wear respiratory protective equipment except in the performance of occasional jobs, or jobs of brief duration. Any all-day job that calls for the use of a dust mask throughout, is in need of restudy, and either rearrangement of the job or redesign of equipment for control, on the basis of qualitative or quantitative defects.

3. Aside from the foregoing considerations, which are of first importance, but are not precisely in my province (from the aspect of expert critique), the most striking fault in the environmental conditions in this plant relates to the housekeeping. Much of the plant in the area of the operations and in the surrounding yards and approaches is dirty. Men walk to and fro and operate vehicles over terrain and aisles (spaces in between buildings and fixed equipment) which is grossly contaminated with lead-bearing material that is readily converted into dust to be dispersed into the atmosphere. This condition is common in smelters and in plants concerned with the reclamation and refining of metals, but it is not necessary. It provides

unpredictable opportunities for unpredictable degrees of exposure to lead, and in this case, to bismuth and zinc, as well. The premises within the operating area should be cleaned up thoroughly, and provision should be made for maintaining cleanliness, once it has been achieved. There are long neglected areas which will require the removal of truck-loads of metal-containing debris; in others, vacuum cleaning equipment should be used. A detailed survey should be made with the idea of adapting satisfactory methods to the needs of the situation. There is no value in the use of vacuum cleaning equipment, unless the provision of smooth floors and surfaces is made in advance. There is no doubt that this can be done, for it has been done, with salutary effects, in a few smelters. The need here is for a willingness to depart from previously accepted conditions and standards in the smelting of ores and the refining of metals. Present hygienic specifications are concerned with much smaller amounts of material, in more highly dispersed state in the atmosphere, than were those of earlier times. Such specifications must be achieved in American industry if the present toll of lead poisoning in these industries is to be avoided. This situation at Josephtown is not highly hazardous, but it is not as good as it should be.

3. With respect to the work of the analytical laboratory at the plant, it is believed, despite the apparent competence of the personnel concerned, that the effort is largely wasted. This is said with considerable reluctance, for purely

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interprofessional reasons. The fact is, however, that I would not rely on the findings of this laboratory for guidance in handling the personnel or in considering the possible need for more effective environmental control. To be specific, I would not be willing to move a man from his work on the analytical evidence that is now being obtained. The accuracy of the analytical results is not sufficient for my purposes, and, moreover, the wrong material is being analysed. There can be no doubt that the staff of the laboratory is capable of carrying out precise analyses within their present facilities. They are laboring under the mistaken idea that this is not necessary. What they are achieving by the present methods of screening, is not sufficiently useful. Since these men are expert analysts rather than physiologists, this is not remarkable, but their mistaken course should not be allowed to continue. There will be little or no difficulty in shifting from the urine to the blood, or in analysing both urine and blood with precision, in suitable instances. The samples of blood will have to be obtained in the medical department under full medical responsibility for supervision. This can be done, and on the basis of full information, the responsibility for the handling of personnel can be assumed (as it should be) by the physician, to whom alone all analytical reports should be made, as additional data in confidential medical records. The analyses can be done much less frequently, provided the plant can be put in such hygienic order

that the location and extent of the risks are predictable under normal operating conditions. A schedule for the analytical work can be developed in such manner as to provide complete assurance to the physician, and through him to the operating personnel, that everything is in a satisfactory hygienic state. Should there be an unusual situation resulting in excessive exposure, it can be spotted promptly, and dealt with without casualties.

This, in my view, is the only appropriate objective of the analytical regimen, in relation to biological specimens, that justifies expenditures for such analytical purposes. Unless the guess-work can be taken out of the situation, it is not worth what it costs. The guess-work will never be removed by approximately quantitative results, for the reason that, in the case of the blood, the threshold between safety and danger, as represented by the concentration of lead therein, is sharp and critical, and the analytical error must, therefore, be small and definitive.

The recommendations that would flow automatically from these comments need not be separated out and put in a series of short sentences. They are advanced for the consideration of all concerned, with the assurance that such advice as may be required to implement them will be provided gladly.

Signed Robert A. Kehoe

Robert A. Kehoe, Director
Kettering Laboratory

Dated: June 1, 1965