June 6, 1963

E. A. Irvin, M.D., Medical Director
Ford Motor Company
The American Road
Dearborn, Michigan

Dear Bud:

I enclose herewith a brief memorandum on my visit to Norfolk last week, together with an expense account and a bill for my services. Such services, as I indicated to you previously, and as set forth in my memorandum on the financial policies of the Kettering Laboratory (forwarded to Mr. Ross and by him to your Company Foundation), when engaged in matters which are of direct concern to the Kettering Laboratory, and are the product of its work, are set so as to reimburse the laboratory for the time lost from the day's work. The cost, of course, takes into account the time spent in the preparation of reports or other services on behalf of the Company concerned. I call your attention to this only because it illustrates the principle on which we operate, and not because you are likely to concern yourself unduly about the fee as such. I retain the expenses, but turn over the fee to the Laboratory, in which I am employed full-time.

I have written to Mr. Morano, sending him certain publications (the Harben Lectures, and the bulletin of A.P.H.A. on analytical methods, which was prepared for the Committee by Cholak, with some paragraphs on methods of sampling by myself). I have also invited him to carry out some check analyses, and although I suspect that the availability of time is his problem, rather than cost, I have offered to pay for the cost of the analyses, if he wishes. As a public official he will probably find this undesirable, but there is no harm in offering to defray the expense of the work we ask him to do.

As soon as I hear from him, I shall communicate further with Mr. Toth, and set up some cross-analyses. I will keep you informed as to how we come out in these matters. I sent copies of the Harben Lectures to both Dr. Maddock and Dr. Miller, in the belief that they would find them of interest at this time when the subject is hot.

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It was a pleasure to see you again and to meet the other people who were involved in this matter. It is a nice group, and it is good to work with such people.

With kindest regards.

Sincerely,

Robert A. Kehoe, M. D.

RAK:ss

Enclosure : Memorandum
Statement of Account

Memorandum on Visit to a Plant of Ford Motor Company

at Norfolk, Virginia

On May 28th in the evening, a trip was taken to Norfolk, Virginia, and on the morning of May 29th the plant of the Ford Motor Company at Norfolk was visited for the purpose of visualizing the general nature and scope of the operations of this plant which were productive of potential occupational exposure to lead.

Some time was spent in surveying the plant and the relevant operations, and observing the performance of the groups of employees engaged in operations (in the course of which much pertinent information was obtained, principally from the safety engineer at the plant.)

A conference was then held, attended by members of the management of the plant, the plant physician - Dr. M. M. Miller, a consultant internist - Dr. R. K. Maddock, the chief industrial hygienist of the Ford Motor Company - Mr. Paul Toth, and the Medical Director of the Ford Motor Company - Dr. E. A. Irwin. At this conference the case histories and medical records of several employees of the plant were reviewed in some detail, with special reference to the findings of Dr. Maddock, who had been consulted for his opinions as to the nature of the complaints and illnesses and the general medical status of these employees. At this time, also, the analytical findings of the Laboratory of the Ford Motor Company in Detroit and of the State (Virginia) Laboratory, as submitted by the Toxicologist, Ramon A. Morano, tabulated in their proper sequence in relation to pertinent events (onset and course of illness, and institution and termination of therapy), in the occupation and illness of the employees, were reviewed and discussed.

After this discussion, a visit was made by Drs. Irwin, Miller and Maddock, Mr. Toth, and the undersigned, to the office of Mr. Morano, with whom the cases of illness and the analytical findings, together with the significance of the pertinent facts, were discussed.

A detailed account of these observations, conferences and discussions is hardly justified, but the outstanding facts may be summarized briefly. The observation of the operations and of the men at work conveyed little real information concerning the degree of the hazard of the absorption of lead that might be associated with the work. It was evident, however, that opportunities existed whereby men who were not habituated to the avoidance of exposure could readily absorb appreciable quantities of lead. No example of overt acts of this type were observed, but it is likely that workmen would be on their good behavior when a group of persons were making the rounds. The lead dispersed, generally, in the atmosphere of the area in which the abrasive work on car bodies is carried out by men who do not wear respirators, as reported by the safety engineer, appeared to be controlled adequately. There can be little doubt, however, that sharply localized conditions exist from time to time - e.g., when an abrasive wheel is used on soldered areas - characterized by higher concentrations of particulate lead in the air. As judged by the results of the analyses of the blood of the men as a group who work in this area, hazardous conditions exist rarely and for only short periods of time, so that very few of the men have shown a significant degree of elevation of the lead content of their blood at any time.

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Nevertheless, two of the men who were the subject of the current discussion had been found to have high and potentially dangerous concentrations of lead in their blood - one of them fleetingly, and the other repetitiously. (It was believed on clinical and analytical grounds that the latter man may have suffered a mild episode of lead poisoning. There was no certainty in this regard, for the clinical state of the man hardly justified that diagnosis, but with the evidence at hand of a significant degree of absorption one could not say that such had not been the case.) The importance of these unusual findings (unusual within this group of workmen) lay in the irrefutable evidence which they provided that hazardous absorption of lead could occur under the conditions of the day's work. This provided a background on which any complaint of one of these employees might well be taken by the average physician to be an expression of lead intoxication. In a situation of this sort it is not enough, for even the most competent and experienced physician, to conclude and to maintain that the illness complained of is not plumbism; on the contrary, he must be able to demonstrate the true cause of the illness, and to convince his medical colleagues as to the correctness of his demonstration.

In order to avoid a repetition of such a situation, which can certainly lead to concern among the workmen, and to diagnostic difficulties in local medical circles, it is advisable to eliminate all of the opportunities that may give rise to a potentially dangerous degree of absorption of lead, insofar as they can be observed and identified. If this can be done by means of better environmental control, it should be done; if it can be done by better supervision

and indoctrination of workmen in the conduct of their work and in matters of personal cleanliness (the spotty character of the high analytical findings among the workmen and in individual workmen suggests that personal habits of work and personal hygiene are factors in this matter), this must be done. Moreover, if the conditions are such that some men are subjected to dangerous exposure from time to time, despite the efforts indicated above, such men will have to be removed from exposure for a time which will permit them to eliminate a significant proportion of the lead absorbed from occupational sources. It is imperative that such men be removed before they are in actual danger, since, otherwise, any complaint of any type of illness in a man whose blood lead is at a potentially dangerous level will be suspected of being an expression of lead poisoning, and, as indicated previously, can be proved not to be due to lead only if the true cause of his complaint can be ascertained.

There is here a vulnerable position on the part of the medical program of the Ford Motor Company (I am told that the position of the major manufacturers of automobiles is uniform in this respect, and if this is true, the industry is following an unwise policy that can hardly fail to yield trouble.) The criterion that is taken at present to be the point of departure between safety and danger, with respect to the absorption of lead by workmen, is that of 0.09 mg. (90 micrograms) of lead per 100 grams of whole blood. It can be argued that cases of lead poisoning will be extremely rare if everyone who reaches this level of concentration of lead in his blood is removed from his work as soon as this fact has been demonstrated and confirmed.

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This is almost certainly true, but it is also true that cases of poisoning occur at a level of 0.08 mg. (80 micrograms) and that any one who develops a vague and non-specific type of illness, particularly involving the gastro-enteric tract, while his blood is at that level, is an almost certain subject for compensation for lead poisoning, if his claim is presented therefore. Other features of this situation are open to discussion (such as the sensitivity and reproducibility of the methods of analyses employed in a specific and competent laboratory), but the fact remains that if one intends to follow a standard of safety it is unwise to set this standard at a dubious and probably incorrect point. For many years, I have used and advocated in the literature the critical level of 0.08 mg. (80 micrograms) as the point at which the occupational exposure to lead of workmen should be terminated. It may be that there is that much difference between the average values obtained in the Kettering Laboratory and in the analytical laboratories of the automobile industry (specifically in Mr. Toth's laboratory). Even if this should turn out to be true, after some cross checking, the threshold value of 0.09 mg. per 100 grams of blood is too high, in my judgment.

It is believed that, with a reasonable amount of attention to certain precautionary measures on the part of the workmen in the relevant operations of the Norfolk Plant, the opportunities for exposure to lead can be decreased in certain operations, and that the present occasional incidents of unusual exposure can be eliminated. To this end, certain recommendations are made below. If these are put

into effect, in whole or in part as may seem feasible at this time or in the near future, improvement in the conditions should result. If such improvement is not achieved, it may be necessary to go to somewhat greater lengths to accomplish the desired end. Certain other things can be done, such as the establishment of a regimen of bathing at the end of the work of the day or shift, with complete change from work clothing to ordinary clothing. It would seem, at present, that this should not be necessary, and it is recognized that such a regimen will prove to be troublesome and costly. In various occupations in the lead trades it has been found to be essential, however, and it may be the case here. Before making such a recommendation, however, the writer would prefer to test the benefit of less drastic procedures.

Recommendations

1. Inasmuch as it appears that certain individuals, within a group that perform a similar type of work, have absorbed somewhat unusual quantities of lead, it may be presumed that these individuals do not do the same kind of work, or that they do it in a different manner, or that they are somewhat less than careful in matters of personal hygiene. While it may be difficult to determine what differences in performance are responsible for the observed differences in the absorption of lead, without producing the impression that something akin to spying is being done, I would recommend the observation of men at their work in search of unusual opportunities for exposure.

2. Situations which suggest the advisability of taking air samples at certain sites, for relatively short periods of time, will probably be found through observation of the work. This is advisable, in my opinion, in order to verify the existence of unusual types of exposure which arise out of brief, normal or unusual, operations.

3. A careful examination of the data obtained by analysis of the air and by analysis of the blood of employees, on the background of the familiarity of the Safety Engineer with the men and the operations, may indicate the source of some unusual form or severity of exposure, or single out the persons who are not performing satisfactorily.

4. The facilities for washing up should be examined critically, and by careful observation, their intrinsic adequacy and the regularity and efficacy of their use should be appraised. The same should apply to the manner and place of eating. There should be no opportunity for the ingestion of lead because of the uncleanliness of men in handling food, beverages and tobacco. It may not be assumed that these facilities are satisfactory or that they are being maintained and used properly. In these days, attention is often focused upon air-borne lead to the exclusion of the ingestion of lead in a variety of ways. These matters require careful design and maintenance of equipment, and meticulous attention to the indoctrination of workmen in appropriate procedures of cleanliness and hygiene.

KE 0005176

5. The threshold value of lead in the blood, as the signal for the termination of the occupational exposure of a workman to lead, should be reduced to 0.08 mg. per 100 grams.

6. The status of the analytical procedures of the Industrial Hygiene Laboratory, as applied to the blood, should be cross-checked with the Kettering Laboratory, so as to establish the relationship to each other of the results obtained in these two laboratories. This will have advantages from the aspect of industrial hygiene, and it might turn out to have considerable medico-legal significance.

7. Some cross-checking with the laboratory of Mr. Morano should also be done. (Correspondence has resulted in a somewhat more liberal attitude on Mr. Morano's part than was manifested on May 29. He has agreed to co-operate in several such cross-analyses.)

After an attempt has been made to follow these recommendations (plus any other procedures that may appear to others to be advisable), it would be wise to assemble the resultant information and to consider what, if anything, further, should be done.

Robert A. Kehoe, M.D.

June 11, 1963