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Memo to: Dr. Zavon

From: Dr. Kehoe

Date: January 15, 1963

Subject: Reply to inquiry of December 19th, 1962

The publication or promulgation of a threshold limit for either tetraethyllead or tetramethyllead, in the conventional manner of expression as the tolerable concentration in the air of industrial establishments, is hardly likely to contribute anything useful to industrial hygiene or public health. Therefore, in my view there is no good reason for doing so.

First, let me say that there is no sound basis for such a standard. The data acquired by analyses of the air in the manufacturing plants are not related directly or with sufficient relevance to the actual exposure of workmen, since the samples are not collected at the breathing zone of the workmen, but at strategic points at which the condition of operating equipment can be ascertained. (The analyses are not intended to check the exposure of the workmen, except in a very general way, but to reveal the adequacy of maintenance operations). These data are not correlated with those derived from the analyses of the urine of the men, and, therefore, they are not strictly relevant as a basis for hygienic standards.

Second, there is no satisfactory means of applying threshold limits toward the achievement of good industrial hygiene in any of the other operations in which tetraethyllead is involved. Such limits have no practical significance in relation to the transportation of antiknock compounds containing tetraethyllead, to the handling of these compounds in the mixing installations in gasoline refineries, to the commercial handling of leaded gasoline, or to the interior environment of gasoline storage tanks that are to be cleaned.

In view of the foregoing facts, which arise out of the manner of achieving safety in the operations referred to above, and which are equally applicable to the handling of tetramethyllead, I can see no virtue in setting threshold limits at this time, and I can foresee certain very real disadvantages. The procedures of industrial hygiene in this industry, exclusive of the manufacturing operations, are based upon the avoidance of exposure to these organic compounds of lead. Any suggestion that such exposure need not be avoided would contribute to a laxity of performance and, under the circumstances, would contribute to danger.

With respect to the use of a threshold limit in the manufacturing plants, "there is a rule of thumb," established many years ago, that the air sampled (under conditions and at the sites chosen to check the proper operations of the process equipment) should not contain more than 0.075 mg. of Pb. per cu. meter. I would not like to see this concentration adopted as a threshold limit, for there is no satisfactory evidence that it is a correct expression of human safety in association with occupational exposure

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over a long period of time. There is no other threshold limit that relates to the air, that can be advanced on the basis of human experience.

There is, however, a standard which has been established firmly on solid evidence - namely, the level of the concentration of lead in the urine of individuals and groups of individuals. This is the standard which should be promulgated, rather than a conventional standard of concentration in air. The former is sound, while the latter is not; the former is applicable under all of the circumstances which now exist or can now be foreseen, while the latter is largely inapplicable for practical reasons. I see no good reason for the inclusion of these compounds among the lists of chemicals for which a threshold limit can reasonably and advantageously be set.

In general support of these comments I refer you to the literature on the behavior of tetraethyllead and tetramethyllead, in which no level of tolerance has been established on an experimental basis. I refer you further to the chapter on lead in the last edition of the second volume of Industrial Hygiene and Toxicology (edited by Patty) as perhaps the best expression of the criteria for safe exposure to lead (tetraethyllead) as defined by the urinary concentration of lead.

R. A. K.

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