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July 20, 1939

Dr. Robert A. Kehoe
College of Medicine
University of Cincinnati
Cincinnati, Ohio

Dear Dr. Kehoe:

I am transmitting to you herewith two copies of a brief report on preventive measures from the viewpoint of the engineer, for consideration of members of the American Public Health Association Committee on Lead Poisoning. You will note that rather than repeat detailed methods, I have referred to sources of such information since I do not believe that it is advisable to burden the present report with a mass of specific data. I trust that you have all the publications to which reference is made but if you do not I will be pleased to loan you my personal copies.

In addition to the report on preventive measures I had some of my friends in the automobile industry review the report which the committee made to the American Public Health Association in 1929 particularly the part on Standards of Industrial Control. The reason for using the 1929 report rather than the 1930 report is that the 1930 report does not contain any information on engineering control. While I do not agree with all the opinions expressed in these comments, I believe that they may be helpful if you desire to revise the standards contained in the report of the committee for 1929. Of course my own brief report which I am enclosing is written in the same form as the report which was contained in the American Public Health Association Yearbook for 1930.

If there is anything further which I can do, do not hesitate to call on me.

Cordially yours

William P. Yant
Director of Research and Development

WPY-27-KAM

I admit that the report I am sending is very brief. If you desire more details or amplification of the topics I will endeavor to prepare suitable copy. Yant

The basic methods and standards for prevention of lead ingestion and control were outlined in Part III of the Report of Committee on Lead Poisoning in 1929. The progress which has been accomplished in engineering control of lead poisoning since the date of that report has been principally in application of the suggested standards to industries having a lead hazard. In reality, very little has been done which is genuinely novel. Consequently, it is not felt advisable to reiterate in this report methods of dust control which have been adequately described in other places but rather to direct the reader to sources of such information. However, the committee desires to call attention to a number of reports containing detailed information on how inhalation or ingestion of lead in various industries has been prevented in order to emphasize the fact that lead poisoning can be controlled by application of available knowledge and standards, and also to point out some of the apparatus and methods which make it possible for the engineer to secure quantitative information on the amount of lead in the atmosphere.

The control of lead poisoning by engineering methods has been reviewed in a recent publication with examples of actual measures in various industries and occupations adopted to control lead exposure (1). Another excellent resume of dust control measures is contained in the National Silicosis Conference Report on Engineering Control, United States Department of Labor, Division

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(1) Lead Poisoning in Industry and its Prevention, New York State Department of Labor Special Bulletin, No. 195 (1938)

of Labor Standards, Bulletin No. 21. While this report is concerned with control of silica dust, most of the discussion is also applicable to lead dust. Of course, it would not be pertinent to control of lead fumes (such as smokes) and vapors of organo-lead derivatives.

A number of publications are available on design and construction of exhaust systems (2) (3) (4) (5).

The effectiveness of control measures in a storage battery plant is shown in a recent paper by G. A. Coburn (6). He indicates that over a period of ten years no serious cases of lead poisoning have occurred in his plant. A sharp reduction in lead poisoning in the pottery industry is reported by the Public Health Service owing to successful application of control measures (7). While these reports seem to indicate that lead poisoning can be eliminated in the same degree that control measures are instituted it must be remembered that new and difficulty controlled hazards are continually

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(2) "Design of Industrial Exhaust Systems for Dust and Fume Removal," John L. Alden, The Industrial Press (1939).

(3) Design of Exhaust Hoods. Air Hygiene Foundation of America. Preventive Engineering Series Bulletin No. 2, Part 4.

(4) Design of Duct Work for Exhaust Systems, Air Hygiene Foundation of America, Preventive Engineering Series, Bulletin No. 2, Part 5.

(5) Industrial Dust, Philip Drinker and Theodore Hatch, McGraw Hill (1936).

(6) Control of Hygienic Exposures, G. A. Coburn, American Journal of Public Health, 29, 505 (1939).

(7) Silicosis and Lead Poisoning among Pottery Workers, Public Health Bulletin No. 244.

arising. For example the introduction of free machining steel alloys containing .2 percent lead offer a hazard of unknown extent especially the possibility of encountering lead fumes in welding and metal burning operations.

Especial interest has been manifest in substitutes for lead and in use of less soluble lead compounds, for example, introduction of fritted glazes containing lead in the form of lead silicate in place of glazes containing more readily soluble lead compounds in the pottery industry (7). In the automobile industry the use of lead-free putty in "putty glazing" and the use of lead free solder for metal finishing have been reported (8). Although lead paints are still widely used in the painting industry there is a gradual acceptance of titanium dioxide and leaded zinc for general use and of aluminum and iron oxide for coating of metal surfaces (9).

To determine the amount of lead in the atmosphere the engineer needs methods which will secure a representative sample of air-borne lead and accurate but rapid methods of chemical analysis. Recently there have been a number of interesting developments in equipment for collection of lead samples, especially a small portable electrostatic precipitator for lead fumes (10). This has been particularly important since it has been demonstrated that the impinger

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(8) The control of Lead in Duluxing and Metal Finishing Operations, Grant L. Bird, Industrial Medicine, 7, 510-515 (1938).

(9) Recent changes in the Painter's Trade, Bulletin No. 7, United States Department of Labor, Division of Labor Standards.

(10) An Electrostatic Dust Weight Sampler, E. C. Barnes and G. W. Penney, Journal of Industrial Hygiene and Toxicology, 20, 259-265 (1938).

is inefficient for collection of lead fumes (11).

Also the United States Bureau of Mines has announced a convenient form of impinger suitable for collection of lead dust, (12) (13) and several investigators have reported improved methods for rapid analysis of lead (14) (15) (16).

Personal respiratory protective devices as a means of controlling lead exposure have made rapid progress in the past few years. The Bureau of Mines approval schedule for dust fume and mist respirators was promulgated in August, 1934 (17). Since that time

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(11) Efficiency of Impingers for Collecting Lead Dusts and Fumes, Bureau of Mines Report of Investigation 3401.

(12) Bureau of Mines Midget Impinger for Dust Sampling, Bureau of Mines Report of Investigation 3360.

(13) Dust Sampling with the Bureau of Mines Midget Impinger, Using of New Hand Operated Pump. Bureau of Mines Report of Investigations 3387.

(14) A Practical Method for the Rapid Determination of Lead When Found in the Atmosphere, G. C. Harold, S. F. Heek, and F. R. Holden, Journal of Industrial Hygiene and Toxicology 18, 724-732.

(15) Dithizone Methods for the Determination of Lead, P. A. Clifford and H. J. Mickmann, J. Assn. Off. Agr. Chem. February 1936. PP. 150 - 156.

(16) Determination of Lead in the Air, Air Hygiene Foundation of America, Preventive Engineering Series, Bulletin No. 2, Part 6.

(17) Procedure for Testing Filter Type Dust, Fume, and Mist Respirators for Permissibility, United States Bureau of Mines Approval Schedule No. 21.

the requirements of the Bureau of Mines have been adopted by the American Standards Association (18). A number of filter type respirators have been approved by the Bureau of Mines for protection against mechanically generated lead dust and one approval has been issued for a lead fume respirator. By this Bureau of Mines approval system a consumer can be assured that respirators he buys will conform to certain minimum requirements that are considered essential for protecting the health of the worker.

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(18) American Standard Safety Code for the Protection of Heads, Eyes, and Respiratory Organs, National Bureau of Standards Handbook, H-24.