

LEAD INDUSTRIES ASSOCIATION

60 EAST 42ND STREET
NEW YORK 17, N.Y.

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LEAD HYGIENE and
SAFETY BULLETIN
No. 128

To the Members of the Lead Industries Associations

HEALTH MAINTENANCE IN LEAD INDUSTRIES

An address with the above title, delivered by Dr. C. Richard Walmer, Managing Director of the Industrial Hygiene Foundation, Pittsburgh, at the annual meeting of our Association in April, included much that was worthy of serious consideration by all who are concerned with this subject. For those who did not hear Dr. Walmer, and as a reminder to those who did, his paper has been reproduced and a copy is enclosed. Additional copies are available on request.

INDUSTRIAL NOISE

To those faced with the problem of industrial noise, the single-sheet broadside on "Your Ear and Noise" also herewith, secured through the courtesy of the Research Center of the Subcommittee on Noise in Industry, 111 North Bonnie Brae Street, Los Angeles 26, California, will be of interest.

An excellent 24-page booklet with the title "Guide for Conservation of Hearing in Noise," is to be had in quantity from the same organization at small cost. While the limited supply lasts, single copies will be sent from this office, without charge, on request.

What is believed to be the most comprehensive and up-to-date compendium on this subject is the Industrial Noise Manual just published by the American Industrial Hygiene Association. This 192-page volume, well indexed, is priced at \$7.50. Copies should be ordered from Mr. George D. Clayton, Executive Secretary of the A.I.H.A., 14125 Prevoost, Detroit 27, Michigan

Manfred Bowditch

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Director of Health and Safety



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HEALTH MAINTENANCE IN LEAD INDUSTRIES*

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Health maintenance in any industry is contingent upon the practice of preventive medicine, and requires the meeting of problems in the "preclinical" stage, the elimination of hazards before they can inflict injury or illness, and the teamwork of specialists in several professional fields.

The lead industry offers a classic example of the importance of this approach. In many places where lead or its compounds are used there is potential hazardous exposure, yet most such industries operate safely by utilizing effective control measures. Toxicity is not synonymous with hazard where the medical, engineering, and supervisory personnel work together to provide an effective control program.

Environmental factors and medical findings go hand in hand in determining whether an actual hazard exists. Diagnosis of lead poisoning is a complex procedure, and cannot be based on symptoms alone, since these can be misleading unless differentiated from other disease entities; nor can an occupational history of potential exposure be confirming in itself. The examining physician must have a detailed knowledge of the individual processes and operations and their potential hazards and requirements. He depends on the industrial hygienist for an evaluation of the working environment and information on the magnitude of exposure. This information and the occupational history, coupled with clinical findings and with accurate laboratory analyses, enable the physician to make a proper diagnosis. The diagnosis, in turn, gives the engineer a basis for evaluating the effectiveness of control measures and pin-points areas where further steps must be taken.

The same interrelationship of activities among the various specialists in the industrial health field prevails not just where lead poisoning is concerned, but with other health hazards as well.

And, as the Director of Health and Safety of the Lead Industries Association recently pointed out, the health maintenance program in the lead industries must encompass more than lead poisoning. In a breakdown of hazards other than lead to which workers in principal occupations involving lead may be exposed, Mr. Bowditch listed as many as 43 health hazards in certain operations.

Lead poisoning is, of course, of primary concern. Therefore, control of this problem will be discussed to illustrate the ideal approach to health maintenance in industry.

*Presented at the 30th Annual Meeting, Lead Industries Association,
St. Louis, Mo., April 15-16, 1958



Determining Sources of Hazardous Exposures

The problem of lead poisoning must be studied from a number of distinct but related viewpoints. Since prevention is the goal, we need to know first how lead is absorbed by the body and what the principal sources of lead exposure are likely to be. The main source of lead absorption in industry is through inhalation of airborne lead compounds.

The handling of lead compounds, when composed of oxides, basic carbonate, sulphates, silicates and arsenates, may result in a lead hazard due to the lead dust disseminated into the air during such operations as blasting, crushing, grinding, mixing and sanding.

Lead fumes become a problem in such operations as metalizing, lead burning and smelting and refining at temperatures over 500°C.

Lead mist may occur during spray painting with paints containing a high lead content.

Absorption of lead through the skin is the most serious hazard connected with the handling of undiluted solutions of tetraethyl lead in its manufacture and in plants where it is mixed with gasoline, although this organic lead compound could also produce hazardous vapors at room temperatures.

Foresight in Engineering Design

Control of health factors in any type of industry is most effectively and economically accomplished by proper plant design. Armed with the knowledge of how an industrial contaminant is taken into the body and at which industrial operations there is potential exposure, the engineer can devise means to eliminate the hazardous situation or, where this is not entirely possible, to incorporate control measures.

In the industrial hygiene and air pollution field studies which Industrial Hygiene Foundation has been asked to conduct for its member companies a definite and encouraging trend can be noted to make health protection an integral part of operations. In one typical instance the Foundation's staff was asked by a primary metal producer to incorporate into the design of a new plant control of health hazards. Process equipment and plant layout and construction were redesigned to eliminate or minimize hazardous exposures. These changes increased the cost of the plant, but provided a firm basis on which to institute and maintain an effective hygiene control program quite beyond the practical possibilities of the old plant. The money expended on health measures will be more than offset by savings in compensation costs and by more efficient production, assuring the company a better position in a highly competitive market.

Ideal as it is to design adequate health measures into our plants at the start, often we are faced with adapting controls to existing facilities. Not only must contaminants be removed from the working environment but they must be collected

so that they do not create a community air pollution problem. One of the best examples of the preventive approach in this respect is the seasonal air pollution survey which has been conducted continuously by the Foundation for more than 20 years for St. Joseph Lead Company. These studies enable the company to appraise its responsibility with regard to the community air pollution problem. They also serve as a base line for corrective engineering measures.

A similar approach was taken for a chemical company even before its new plant was built, and these studies are continuing yearly.

Supplementing Engineering Control of Hazards

Where exhaust ventilation cannot completely remove contaminants from the air before they reach the worker, protective equipment and clothing should be employed. Respiratory protective devices should not be considered a substitute for control equipment, but certainly should be utilized as a temporary expedient or during infrequent maintenance operations. Occasionally it may be imperative to rotate workers to reduce individual exposure time, but this is a poor substitute for actual control and contradictory to the concept of health maintenance.

Workers should be adequately instructed and supervised in the proper handling of lead compounds and impressed with the importance of good personal hygiene. Proper locker, shower room and lunch room facilities should, of course, be provided. Needless to say, good housekeeping in the plant is essential also, and must be performed in such a manner that dusts are picked up, not stirred up and redisseminated.

The Preventive Medical Program

In conjunction with the control measures for reducing exposure, it is essential that a sound medical program be carried out with respect to the workers themselves. Even with the most efficient system of control, cases of lead poisoning could still occur unless there is strict medical supervision and continuous education of employees. In addition, such supervision furnishes the final evaluation of the effectiveness of the engineering measures.

The basis for the preventive medical program is the physical examination. The preplacement examination includes a record of past occupational history and past medical history in addition to the actual examination itself. It assures that an applicant will not be placed on a job which would be hazardous in the light of his present physical condition.

Periodic examinations are particularly important in the lead industry. They serve not only to indicate absorption of lead but may uncover other diseases.

Medical records are an essential part of the medical program and provide a valuable source of data for statistical analyses and evaluation and are also indispensable in medicolegal action.

The Clinical Diagnosis of Lead Poisoning

Certainly in the detection and diagnosis of lead poisoning the clinical history is an important first step. The physician's diagnosis must be based on careful medical appraisal of the whole patient. The typical symptoms of lead poisoning could actually be indicative of other disorders, such as acute appendicitis. Too often when a patient believes he has been exposed to lead-contaminants--when in reality his occupational history in this respect may be negative--the conclusion may be reached by a physician not familiar with the occupation or its hazards, that the physical findings are attributable to his work. Not only can such false conclusions result in medicolegal problems, but they delay proper treatment of the patient's true illness.

The most frequent clinical picture of lead poisoning is the gastrointestinal type, which is characterized by intermittent abdominal pain, cramps or colic. Less frequent is the neuromuscular type, which is characterized by weakness or perhaps paralysis of extensor muscles of the forearm and hand.

The first step in the treatment of lead poisoning is, of course, the removal of the patient from further lead exposures. Once a diagnosis of lead poisoning has been definitely established, the physician can proceed with the proper treatment to relieve the specific symptoms in each case and to cope with the disease itself.

Environmental and Biological Measurements

To make a clear-cut diagnosis of lead poisoning the physician must have supporting evidence from environmental measurements, laboratory tests and a conclusive history of exposure.

Quantitative determination of the concentration of lead in the air at operations where there is potential exposure should be done routinely by the industrial hygienist.

In air sampling, consideration must be given to variable environmental factors. A knowledge of the principles involved in both sampling and analysis is required and the choice of methods depends on the situation and the purpose. Different sampling procedures are used for collecting the three forms of air-borne lead--vapor, fume and dust. The activities of individual workers within an area must be taken into account, since exposure can vary within a small area depending on the nature of the work and the manner in which it is carried out. The duration and the intensity of the exposure enter into the picture also.

Biological measurements of lead absorption by exposed workers should be a part of the periodic physical examination for workers in hazardous operations. The results can be helpful in arriving at a diagnosis.

Blood or urine analyses may be used to supplement air analysis to obtain a more direct and precise measure of lead absorption. Meticulous care must be exercised in obtaining materials for examination to avoid contamination of the samples.

The choice of the analytical method itself depends on the kind and number of samples to be analyzed, range of lead concentrations anticipated, and availability of equipment. The spectrographic, the chemical and the polarographic methods each have their merits and their disadvantages. Suffice to say here that such laboratory studies require a high degree of knowledge and skill. The results must be properly interpreted. For example, there is no specific level of lead concentration in the blood in a single test which is diagnostically significant in itself. However, concentrations in excess of 0.08 mg. per 100 grams of whole blood are considered to be within an unsafe range, and removal from exposure or improved control measures should be instituted. Values within the upper range may indicate a cause and effect relationship between lead absorption and nonspecific symptomatology.

Likewise, there is no specific level of urinary lead excretion which can be interpreted as indicating lead poisoning. A value of 0.15 mg. per liter is usually accepted as an upper safe limit. However, concentrations considerably in excess of this have been found in the absence of any significant evidence of lead poisoning, and evidence of lead poisoning has existed in other cases despite concentrations below this level. Again, single results do not have diagnostic meaning. Repeated analyses, noting trends, and the findings in a group of exposed persons reveal more significant information on the magnitude of exposures.

This discussion is by no means a complete picture of the problem of lead poisoning in industry or of the health maintenance program in general. I hope that it has served to point out the need for teamwork among industrial health specialists in all fields, and the fact that each group has a responsibility which overlaps that in another area. These areas are: 1. evaluation of the working environment; 2. engineering control; 3. preventive medical program; 4. analytical tests; 5. health education of employees; 6. good housekeeping; and 7. good personal hygiene.

Most important of all is the interest and support of management, without which the industrial health activities cannot be welded together into a positive health maintenance program.

YOUR E.

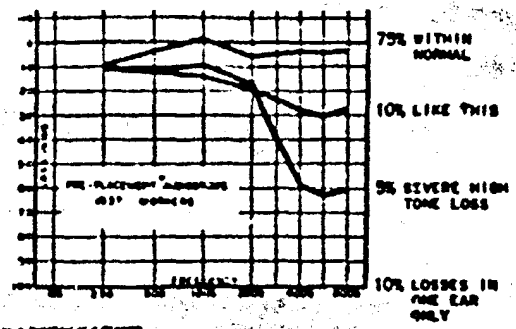
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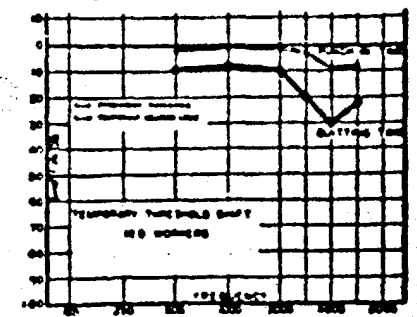
HOW MUCH HEARING LOSS DOES INDUSTRY BUY?

PRE-PLACEMENT RECORDS SHOW:



IN AUDIOMETRY IS A RECORD
OF A HEARING TEST

ON ANY GIVEN WORK DAY



THIS LOSS IS TEMPORARY--
IT WILL RECOVER.

WHY IS THIS IMPORTANT?

TEMPORARY LOSS CONTAMINATES
BASELINE AUDIOGRAM
AND MUST BE CONSIDERED
BEFORE EVALUATING PER-
MANENT HEARING LOSS.

1 OUT OF EVERY 4 MEN
HAS IMPAIRED HEARING
WHEN HIRED!

• • •

ONLY

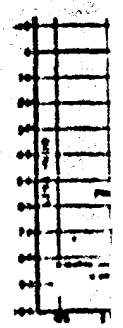
PRE-PLACEMENT AUDIOMETRY

WILL REVEAL THIS

AND PROPERLY ALLOCATE

RESPONSIBILITY

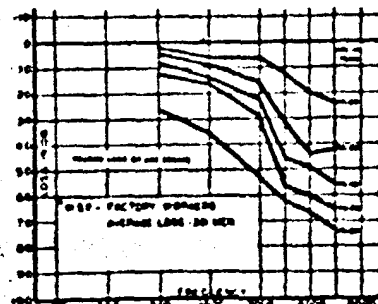
RESEARCH CENTER
SUB-COMMITTEE ON NOISE
IN INDUSTRY
111 NORTH BONNIE BRAD ST.
LOS ANGELES 24, CALIF.



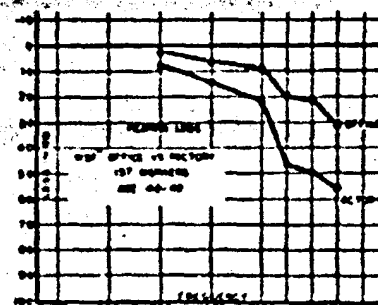
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ARCH CENTER
IN INDUSTRY, OF THE COMMITTEE
ON THE PREVENTION OF HEARING
LOSS
OPHTHALMOLOGY AND OTOLARYNGOLOGY
HEARING LOSS

AFTER YEARS OF WORK

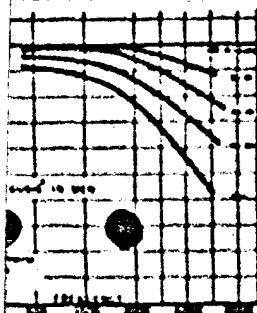


THIS LOSS IS IRREVERSIBLE
THERAPEUTIC MEASURES PRODUCE NO IMPROVEMENT



AVERAGE DIFFERENCE IN HEARING LOSS

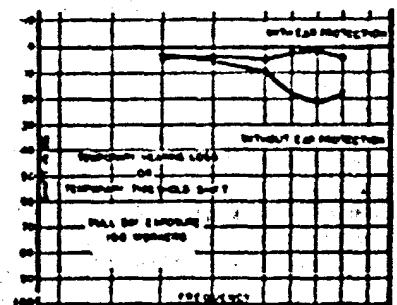
EFFECTS OF AGE



Source - Wisconsin State
Fair Hearing
Survey - 1964

HOW DO WE PREVENT
NOISE-INDUCED HEARING
LOSS?

WEAR EAR PROTECTION
EAR PLUGS - EAR MUFFS
OR
BOTH IN COMBINATION



PROTECTION WILL NOT PREVENT
COMMUNICATION IN NOISE

PROTECTION WILL NOT CAUSE
DISEASE OR INJURY TO THE EAR

PROMOTING EAR PROTECTION IS
NO MORE DIFFICULT THAN PRO-
MOTING OTHER SAFETY DEVICES

PREVENTION IS THE BEST CURE,
THE BEST EAR PROTECTOR IS
THE ONE THAT IS WORN.