

LEAD INDUSTRIES ASSOCIATION

60 EAST 42ND STREET

NEW YORK 17, N. Y.

October 27, 1958

LEAD HYGIENE and
SAFETY BULLETIN
No. 131

To the Members of the Lead Industries Associations

HYGIENIC GUIDES LEAD AND ITS INORGANIC COMPOUNDS

The American Industrial Hygiene Association, leading membership organization of industrial health workers, includes in its services to industry the preparation and dissemination of Hygienic Guides on the more important industrial toxic hazards. The most recent of these is that on Lead and its Inorganic Compounds, a copy of which is herewith. Within the limits of so condensed a publication, it is both authoritative and complete, and should prove most useful to our members as a basic text.

Sixty of these Hygienic Guides, on subjects ranging from Acetaldehyde to Zinc Oxide, have been issued to date. A list, and the guides themselves, at 25 cents each, are obtainable from George D. Clayton, Executive Secretary of the A.I.H.A., 14125 Prevost, Detroit 27, Michigan.

"LEAD POISONING IN CHILDREN"

Hardly a week passes without some published statement, in the press or elsewhere, on the vexing problem of childhood lead poisoning. An increasing number of these are in the form of leaflets issued by governmental agencies at all levels. Perhaps the best of them to date, in that it is brief, clear, and free of unwarranted "scare" features, is Public Health Service Publication No. 566, 1958, the second enclosure herewith.

LEAD HYGIENE CONFERENCE Chicago, November 6-7, 1958

Third and fourth enclosures are (a) the program of our Lead Hygiene Conference, to be held at The Drake, Chicago, on November 6th and 7th, and (b) a reproduction of an editorial, engendered by the announcement of this meeting, in the New England Journal of Medicine. An editorial of this nature in a leading medical journal is as unusual as it is gratifying.

Manfred Bouditch

Manfred Bouditch
Director of Health and Safety



11:00 Progress Report on an Experimental Investigation of Factors Which Influence the Responses of Human Subjects to Finely Divided Lead Compounds in the Atmosphere

Robert A. Kelus, M.D., Director, Kettering Laboratory, U. of Cincinnati College of Medicine, Cincinnati, Ohio

11:20 Discussion, led by

D. John Loner, M.D., Medical Director, Jones & Laughlin Steel Co., Pittsburgh, Pa.

11:35 Adjournment

12:00 Luncheon

Gold Coast Room

1:00 A Summation of the Conference Proceedings

Thomas L. Shipman, M.D., Health Division Leader, Los Alamos Scientific Laboratory, Los Alamos, New Mex.

AFTERNOON ROUND TABLE

Grand Ballroom

In the event that there is a call for more extended discussion of subjects presented at the conference, an informal round table will be held in the afternoon. Otherwise, final adjournment will be at the close of the summation.

LEAD HYGIENE CONFERENCE

THE DRAKE
CHICAGO

NOVEMBER 6-7, 1958



LEAD INDUSTRIES ASSOCIATION
60 EAST 42nd STREET
NEW YORK 17, N. Y.

N 358.01

LEAD HYGIENE CONFERENCE

THURSDAY, NOV. 6

8:30 Registration
French Room Foyer

MORNING SESSION

Grand Ballroom

Chairman

Manfred Bawditch, Director of Health and
Safety, Lead Industries Association

10:00 Introduction

Robert L. Ziegfeld, Secretary-Treasurer,
Lead Industries Association

10:05 Welcome

Felix F. Warner, Vice President,
Lead Industries Association and St.
Joseph Lead Co., New York, N. Y.

10:15 Clinical Control of Health in the
Storage Battery Industry

Elton L. Belknap, M.D., Director,
Dept. of Occupational and Environmental
Medicine, Marquette U.
School of Medicine, Milwaukee,
Wis.

10:35 Discussion, led by

William M. Paffia, Manager, Safety
and Hygiene, Electric Storage Battery
Co., Philadelphia.

10:50 Health Control in the
Ceramic Industries

Russell W. Frank, Safety Director,
Ferro Corporation, Cleveland, Ohio.

11:10 Discussion, led by

C. H. Hine, M.D., Clinical Professor
Preventive Medicine, U. of California
Medical Center, San Francisco,
Calif.

11:25 Hygienic Lead Standards

Helmut H. Schrenk, Ph.D., Research
Director, Industrial Hygiene Foundation,
Pittsburgh, Pa.

11:45 Discussion, led by

May R. Meyers, M.D., Consultant
New York, N. Y.

12:00 Adjournment

12:15 Luncheon

Gold Coast Room

AFTERNOON SESSION

Grand Ballroom

Chairman

Leonard C. McGee, M.D., Medical Director,
Hercules Powder Co., Wilmington, Del.

2:00 The Lead Content of Waters from
Red Lead Painted Tanks

Henry R. Elkins, Ph.D., Director,
State Division of Occupational
Hygiene, Boston, Mass.

2:20 Discussion, led by

Dr. Herbert E. Stokinger, Chief,
Toxicologic Services, Occupational
Health Program, USPHS, Cincinnati,
Ohio

2:35 An Evaluation of Blood Lead Analyses

William H. Myers, Chief, Analytic
Services, Occupational Health Program,
USPHS, Cincinnati, Ohio.

2:35 Discussion, led by

Kenneth W. Nelson, Director, Dept.
of Hygiene, American Smelting and
Refining Co., Salt Lake City, Utah

**3:10 Precautionary Labeling
of Lead Products**

John H. Foulger, M.D., Director of
Medical Research, E. I. duPont de
Nemours & Co., Inc., Wilmington,
Del.

3:30 Discussion, led by

Louis W. Spolyar, M.D., Director,
State Bureau of Preventive Medi-
cine, Indianapolis, Ind.

**3:45 Common Errors in the Diagnosis
of Plumbism**

Rutherford T. Johnstone, M.D., Con-
sultant on Industrial Toxicology,
Los Angeles, Calif.

4:05 Discussion, led by

Sherman S. Pinta, M.D., Medical Di-
rector, American Smelting and Re-
fining Co., Tacoma, Wash.

4:20 A Lawyer Looks at Lead

Theodore C. Waters, LL.B., Miles and
Stuchbridge, Baltimore, Md.

4:40 Discussion, led by

Arthur S. Johnson, Vice President,
American Mutual Liability Insur-
ance Co., Wakefield, Mass.

4:45 Adjournment

5:30 Social Hour and Refreshments

Parlors C, D, E, F and G

FRIDAY, NOV. 7

**8:30 Registration, for those not present on
Thursday, French Room Foyer**

MORNING SESSION

Grand Ballroom

Chairman

George M. Wheatley, M.D., Third Vice Pres-
ident, Metropolitan Life Insurance Co.,
New York, N. Y.

**9:30 The Effect of Temperature
on Lead Poisoning**

Anna M. Baetjer, Sc.D., Associate Pro-
fessor of Environmental Medicine,
The Johns Hopkins School of
Hygiene and Public Health, Balti-
more, Md.

9:50 Discussion, led by

J. Julian Chincolin, Jr., M.D., Assistant
Professor of Pediatrics, The Johns
Hopkins School of Medicine, Balti-
more, Md.

**10:05 EDTA Therapy in Persons with Exces-
sive Lead Absorption from Indus-
trial Exposure**

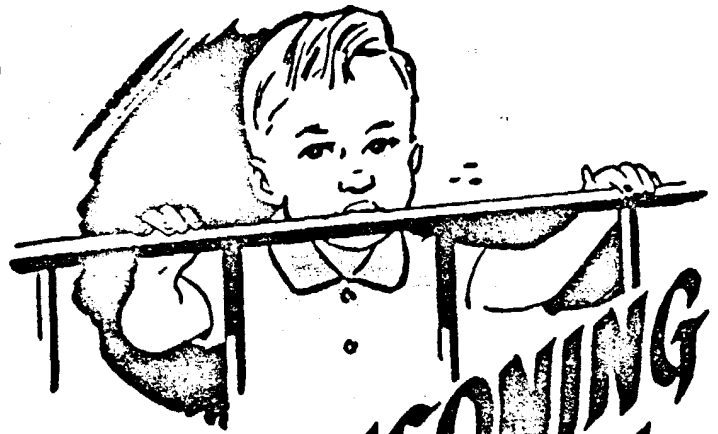
Lee H. Miller, M.D., Kettering Lab-
oratory, U. of Cincinnati College of
Medicine, Cincinnati, Ohio

**10:25 Lead Poisoning in Children
and Its Therapy with EDTA**

Hugo D. Smith, M.D., Dept. of Pedi-
atrics, The Children's Hospital,
Cincinnati, Ohio

10:45 Discussion, led by

Harriet L. Hardy, M.D., Associate
Physician, Chief, Occupational
Medical Clinic, Massachusetts Gen-
eral Hospital, Boston, Mass.



LEAD POISONING IN CHILDREN

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service

N 358.02

LT111021

THE DANGEROUS AGE

Lead poisoning happens most often in children who are between 1½ and 3 years old.

HOW CHILDREN GET POISONED BY LEAD

Children of this age (1½ to 3 years) sometimes chew on window sills, cribs, high chairs or other furniture, or toys. Children may also eat dried paint flakes. Floors, walls, porch railings, and so forth are often painted many times, and when the paint gets old it cracks and flakes off. Young children can scratch off pieces and eat them.

IT IS SERIOUS

Although lead poisoning is infrequent, in one city, out of every five children who did have lead poisoning one child died. When the child with lead poisoning does not die he may suffer lasting harm.

WHAT TO LOOK FOR

Any of the following may be signs of lead poisoning. Only your doctor can tell.

1. Severe stomach ache
2. Frequent vomiting
3. Constipation
4. Frequent headaches
5. Fretfulness
6. Convulsions

IT NEED NOT HAPPEN

You can keep your child from getting lead poisoning by following a few simple rules.

WHAT YOU CAN DO TO PROTECT YOUR CHILD

1. Give the child a clean teething ring or hard rubber toy to chew on.
2. When you buy paint for INDOOR work always ask the man at the store if there is lead in it. NEVER buy lead paint to use indoors.
3. Scrape off the old paint from places like window sills (places a toddling child can reach) before putting on new paint. (The old paint may have lead in it.)
4. Outdoor paint has lead in it. If you have such paint left over from outdoor work NEVER use it for indoor work.
5. If you think your child may have eaten paint with lead in it call your local health department. They will send someone to investigate.

ACT QUICKLY

The earlier lead poisoning in a child is found and treated the better the chances are that he will recover. If you wait too long before going to the doctor your child may die, or his brain may be harmed.

Public Health Service Publication No. 596

For sale by the Superintendent of Documents, U. S. Government Printing Office
Washington 25, D. C. — Price 50 per 100

U. S. GOVERNMENT PRINTING OFFICE: 1959-10-000000



The New England Journal of Medicine

FORMERLY THE BOSTON MEDICAL AND SURGICAL JOURNAL — Established 1828

VOLUME 239

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NUMBER 43

HEAVING THE LEAD

THE multiple and increasing uses of lead have made it, in addition to one of the metals first worked by man, second in importance, probably, only to iron in relation to industry. Its malleability, its atomic weight and its resistance to corrosion first recommended it to its early primitive employers; in modern times its physical and chemical combinations have given it an almost unlimited field of usefulness.

Lead's characteristic shortcoming in the way of biotability was significantly noted by Coleridge in reference to his ancient mariner's albatross, which sank like lead into the sea, and lead has been used by other mariners, before and since, for "plumbing" the depth of water. White lead has long been a basic material in the manufacture of enduring paint, and the red oxide was undoubtedly used by frontiersmen, cowboys and college students when they painted the town in that color. Lead pipe has been manufactured by the mile, although a section scarcely a foot long is all that is necessary for a close-range weapon of considerable striking power.

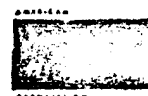
It is well known, however, that lead has other and more subtle toxic properties and it is in relation to these hazards that the conference on lead hygiene, noted elsewhere in this issue of the *Journal*, is to take place early next month in Chicago.

LEAD HYGIENE CONFERENCE

The Lead Hygiene Conference, sponsored by the Lead Industry Association, will be held at the Drake, Chicago, November 6 and 7.

Attendance at the Conference will be limited to 150 persons. Those who wish to attend should notify, by postcard or otherwise, as promptly as possible. Reservation applications for rooms at the Drake will be sent only to those who have done so. Admission will be by badge only.

N 358.03



Hygienic Guide Series

HYGIENIC GUIDE SERIES

Lead and its Inorganic Compounds

I. Hygiene Standards

A. RECOMMENDED MAXIMUM ATMOSPHERIC CONCENTRATION

(8 hours): 0.2 mg per cubic meter of air.

(1) Basis for Recommendation: Human experience.

B. SEVERITY OF HAZARD:***

(1) Health: Moderate, for brief exposure; high, for prolonged. Lead dust and the dusts and fumes of all but the most insoluble compounds (e.g. sulfide, chromate), are readily absorbed on inhalation, and to a lesser degree after ingestion. Lead and its inorganic compounds are not ordinarily absorbed through the skin. The first detectable clinical result of excessive lead absorption is an increase in the lead content of the urine, followed shortly by an increase in the blood. A rise in the urinary coproporphyrin may subsequently occur. The early symptoms of lead intoxication are most commonly gastrointestinal disorders, colic, constipation, etc. The presence of stippled cells, (re-

cept in tetraethyl lead poisoning) followed in time by anemia, may be noted. Weakness, which may go on to paralysis chiefly of the extensor muscles of the wrists and less often of the ankles, is noticeable in the more serious cases. Involvement of the brain (encephalopathy), the most serious result of lead poisoning, is frequently noted in children, but rarely (except from organic lead) in adults.

(2) Fire: None.

C. SHORT EXPOSURE TOLERANCE: Not known quantitatively, but is a factor of dosage & time.

D. ATMOSPHERIC CONCENTRATION IMMEDIATELY HAZARDOUS TO LIFE: Not known, in case of inorganic compounds. The minimum lethal dose of a soluble salt, by ingestion, is about 10 gm.

II. Significant Properties

Elementary lead is a dense silvery metal.

Chemical symbol:	Pb
Atomic weight:	207
Specific gravity:	11.34
Melting point:	327°C.
Boiling point:	1612°C.

III. Industrial Hygiene Practice

A. RECOGNITION: Lead and alloys of high lead content are widely employed where properties of softness, high density, low melting point, and resistance to corrosion are needed. Lead is also a common minor component of many bronzes and free-machining steels. Lead compounds are found in paint pigments, ceramics, plating, insecticides, and storage batteries.

B. EVALUATION OF EXPOSURE:

(1) Direct instrumentation: None available.

NOTE: The American Standards Association Z37.11-1943 Standard is being revised. The Subcommittee on Lead of the Z37 Technical Committee has recommended the adoption of 0.5 mg Pb M³ as the maximum acceptable atmospheric concentration for lead chromate and lead sulfide, and 0.2 mg Pb M³ for metallic lead and all other inorganic lead compounds.

Mr. Manfred Howditch (Lead Industries Assoc.), Dr. Harriet L. Hardy (Massachusetts Institute of Technology), and Dr. R. A. Kehoe (University of Cincinnati) assisted the Hygienic Guide Committee in the development of this Guide.

(2) Chemical: Collection of fumes or dust with electrostatic precipitator, filter, or impinger, followed by analysis by polarographic, spectrographic, or distillation procedure.^{1,2}

C. RECOMMENDED CONTROL PROCEDURES:

Maintain workroom atmospheric concentrations below 0.2 mg M³ in processes involving melting of metallic lead (such as soldering), since rather than fume is usually the major problem. Lead fumes will be evolved at red heat temperature. Handle powders of lead compounds in closed systems, or under exhausted hood. Practice good housekeeping and personal hygiene when using lead powders (storage battery plants, paint factories). Grinding and spraying of lead and solder and the spraying of lead paints require good ventilation and/or personal protection for the worker.

IV. Specific Procedures

A. FIRST AID: Usually not important.

B. SPECIAL MEDICAL PROCEDURES:

(1) Preplacement examinations. Perform urine and blood analyses for lead.^{3,4} Normal values are:⁵

Urine (spot sample):

0.01-0.12 mg liter

(sample of large volume):

0.01-0.06 mg liter

Blood:

0.01-0.06 mg 100 gms.

(2) Periodic examinations (preventive): Perform lead analyses on blood and/or urine.^{6,7} The blood content is the more significant index of absorption, with levels in excess of 0.06 mg Pb 100 gms of blood (not less than two results obtained by methods having a precision of ± 10 per cent) indicative of excessive absorption and the need for cessation of further exposure. When the blood level approaches 0.06 mg per 100 gms, the employee's exposure should be reduced. This is a reliable index and if properly used, lead intoxication can be completely prevented by modifying the duration and severity of exposure. Urinary values are more variable and therefore, less reliable as an index of excessive exposure, but urine analyses should be made at the same time blood analyses are performed, for maximum medical control, since the

average rate of the urinary excretion of a group of comparably employed persons is the best indication of the severity of their current exposure.

(3) Periodic examinations (diagnostic): When clinical symptoms are present, perform urine and blood analyses for lead. It may be desirable to supplement these with coproporphyrin estimation in the urine,⁸ and hematocrit and stippled red determinations of the blood.

(4) Treatment: Remove immediately all cases of lead intoxication from further exposure until the blood level is reduced to a safe value. Immediately place the individual under medical management and give supportive treatment as indicated. The intravenous administration of the calcium salt of ethylene diamine-tetraacetic acid (Ca EDTA; calcium disodium versenate; edathamid, calcium disodium) is of value.⁹ However, its use must be rigorously controlled because of harmful effects.

V. Literature References

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7. FAIRHALL, LAWRENCE T.: *Industrial Toxicology*, 2nd Edition. The Williams & Wilkins Company, Baltimore, 1957.
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11. PATTY, FRANK A.: *Industrial Hygiene and Toxicology*, Vol. II. Interscience Publishers, Inc., New York, 1949.