

LEAD INDUSTRIES ASSOCIATION, INC.

292 MADISON AVENUE

NEW YORK 17, N. Y.

August 7, 1962

LEAD HYGIENE and
SAFETY BULLETIN
NO. 144

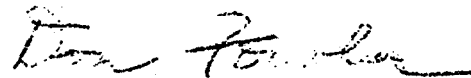
To Members of the Lead Industries Association, Inc.:

ANTIKNOCK COMPOUNDS AND PUBLIC HEALTH

The attached reprint from ETHYL NEWS, May-June 1962 issue was prepared by Dr. Robert A. Kehoe of the Kettering Laboratory and is a short summary of his work to date. We think you will find this to be a timely and positive statement about the subject and is in Dr. Kehoe's usual clear and authoritative manner.

The potential hazards due to the use of lead have been investigated more intensively and extensively than almost any other material known today and such impartial analyses as that made by Dr. Kehoe invariably indicate that the hazard is well under control.

We believe you will find this article to be most interesting and useful. We have a limited number of extra copies if you should need them.



Don G. Fowler
Director of Health and Safety

DGF:md
Enc.

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ANTI-KNOCK COMPOUNDS AND PUBLIC HEALTH

Intensive medical studies show
that lead alkyls in gasoline and
lead compounds in automobile
exhaust create no hazards

By Robert A. Kehoe, M.D.

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Antiknock Compounds and Public Health

AT THIS TIME of increasing interest in the cleanliness and purity of the air—particularly in and around the country's larger cities—the amount and composition of automobile exhaust discharged into the atmosphere is widely discussed. Since tetraethyl lead, tetramethyl lead and related lead alkyls are used as antiknock compounds in practically all motor gasolines, questions have been raised about the amount and possible effects of lead compounds that may be finding their way into the air through exhaust.

Despite impressions to the contrary, lots of information is available on the concentration of lead compounds in the atmosphere and on their relation to public health.

Tetraethyl lead and other lead alkyl antiknock compounds have been among the most thoroughly studied industrial products, from the standpoint of public health, in the last 35 years. Since leaded gasoline came into general use in the mid-1920s, more time, money and effort have been devoted to their medical aspects than to any other contemporary product, except the practical application of atomic energy.

Manufacturers Sponsor Research

Most of the medical research into antiknock compounds has been sponsored and financed by antiknock compound manufacturers and much of it has been done by The Kettering Laboratory in the College of Medicine at the University of Cincinnati. Findings have been published in scientific and medical journals and have been made available to investigators and to public health authorities.

These findings have demonstrated consistently that:

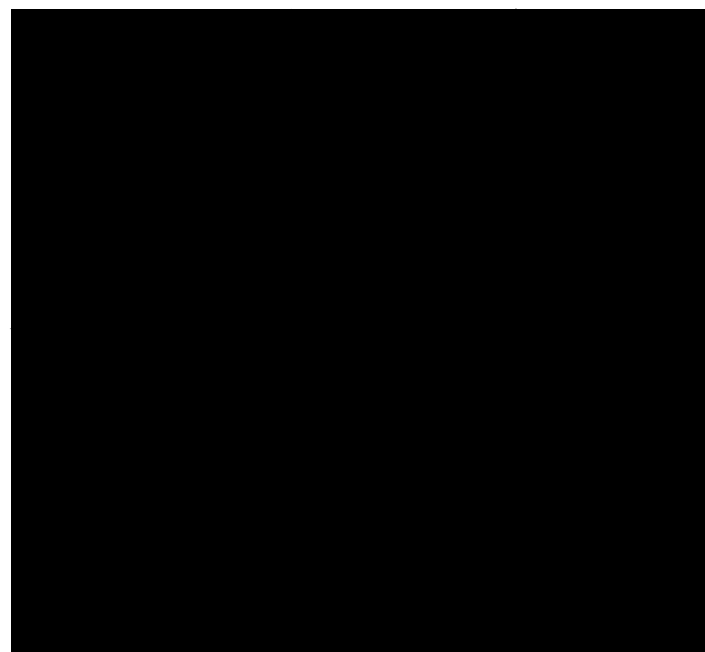
- Lead compounds discharged from the exhaust of automobiles have not created a hazard to the health of the public.

- The concentrations of lead from all sources generally found in the air of American cities are low.
- The amounts of lead to which the general population is exposed from all sources—including foods and beverages—are below hazardous limits.
- There has been no demonstrable change on the part of the average American, either in his intake or output of lead, or in the amount retained in his body, in the last 20 years or more.

An understanding of the sources of lead and of the body's intake and absorption of it makes these statements more meaningful. Here are facts to help provide such an understanding:

First, lead antiknock compounds are only one source of the total lead in the atmosphere. Just how much of a source, it is difficult to estimate since accurate measurement methods were not

In studying lead concentrations in the atmosphere, The Kettering University of Cincinnati College of Medicine has analyzed thou



developed until after leaded gasoline had come into widespread use. However, it is a well known fact that lead in the air comes from the combustion of wood, coal and vegetable matter, from lead in the soil, from man-made products containing lead, and from lead in meteorites.

Second, far more lead is taken into the body from food, water and other beverages than from the air. In many observations it has been found that lead intake from food and drink averages one-third of a milligram a day, while intake from breathing is as little as one-twentieth of that amount, or as much, perhaps, as one-fourth of it, depending on where and how the hours of the day are spent. (The amount of lead in the air varies greatly in different areas of the same city and respiratory volume varies greatly with the size and activities of an individual.)

However, the amount of lead *absorbed* by the body as well as the amount that *enters* the respiratory and digestive systems should be carefully considered.

Generally, less than 10 percent of the lead swallowed is absorbed in the digestive tract. On

the other hand, from less than 35 to as much as 50 percent of the lead in typical city air may be absorbed by the respiratory tract. But remember, the amount of lead taken in from food and drink is from four to 20 times greater than that taken in from the air.

Absorption from Food and Air

As a result, the average person in the general population may, in an ordinary day, absorb about 30 micrograms (0.03 milligrams) of lead through his digestive tract and somewhat more or less (usually less) from the air. In other words, lead in food and beverages is just about as important as lead in the air in contributing to day-to-day absorption by the general public.

But regardless of the source of the lead which the average person takes in, it has been found in repeated thorough studies that the quantities of lead ejected from the body daily so nearly equal the quantities injected that any accumulation—even in a lifetime—is too small to be detected. These accumulations, therefore, have little if any physiological significance.

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housands of air samples.

The low concentrations of lead alkyls in commercial gasoline insure that
there is no hazard of lead absorption in usual procedures of distribution.

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Speaking of the amount of lead which is inhaled, it has been found that concentrations in urban atmospheres vary widely. From time to time, unusually high values have been reported and have occasionally been given more significance than they deserve. Generally, however, the lead content of the air of representative American cities is very low.

In this connection, it has been found that the atmosphere of individual American cities may contain an average of from one to six micrograms of lead per cubic meter of air, although it is doubtful that the average is as high as six in any one city.

These averages are far below the concentration of 200 micrograms per cubic meter which is the accepted U. S. specification for safe concentrations of lead in the air in industrial plants.

This specification does not apply to the general atmosphere, of course. Instead, it takes into consideration the shorter and more intermittent occupational exposure to lead (approximately 40 hours a week) of workers, as opposed to constant exposure to the general atmosphere by the population as a whole.

The real criterion of safety, insofar as human exposure to lead is concerned, is freedom from a rate of intake and absorption that will cause progressive accumulation of lead in the body over a long period of time. Under present general conditions of exposure, outside the lead industries, no such accumulation occurs.

Looking ahead, it is possible to recognize any potential threat well in advance of its possible materialization and there is ample time and satisfactory experimental means for obtaining information required to establish a standard that will provide a suitable margin of safety.

In considering the part lead compounds from automobile exhaust play in the overall lead content of the atmosphere, the results of periodic and fairly comprehensive investigations in the city of Cincinnati are quite revealing. Since the late 1940s, while there has been progressive in-

creases in consumption of gasoline and in vehicular traffic, there has been a significant reduction in the lead content of the air.

The reduction can be traced, in part, at least, to reduction in airborne lead contributed by coal combustion. It appears that the amount of lead in the Cincinnati atmosphere from the combustion of coal had at one time been at least the equivalent of that from automobile exhaust. This fact alone helps put the subject of lead in the air in more balanced perspective.

Of perhaps even more pertinent significance are these findings:

- Available data indicate that there is no evidence that groups of people living in Los Angeles, a so-called "smog" area, are absorbing lead into their bodies at a rate significantly greater than are corresponding groups in Cincinnati.

- Studies of men working in outdoor areas of comparatively heavy automobile traffic repeat the pattern of "normal" findings on the American scene for the last 20-odd years, so far as lead absorption is concerned.

Of further interest—especially to the oil industry—is the fact that while lead from automobile exhaust has created no public health hazard, neither has unburned leaded gasoline.

The low concentration of lead alkyls in commercial gasoline insures that there is no hazard of lead absorption in association with the usual procedures of its commercial distribution. No case of tetraethyl lead poisoning has occurred among the thousands of persons who have transported and dispensed leaded gasolines in the ordinary operations of the American petroleum industry.

Similarly, antiknock compounds, as such, are not found in the ambient atmosphere of cities in more than minute traces, since all but very minute quantities are burned to inorganic lead in the internal combustion engines of automobiles. Accordingly, these compounds, of themselves, present no hazard to the public health. •