

Lead & Health

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CONTACT

Research Division

Email research@arb.ca.gov

Phone (916) 445-0753

What is lead?

Lead is a relatively soft and chemically resistant metal. Lead forms compounds with both organic and inorganic substances. As an air pollutant, lead is present in small particles.

Why do CARB and U.S. EPA focus on lead?

It has been known for many years that lead can accumulate in the body, especially in the bones, and that a variety of adverse health effects can develop if the amount of lead in the body is sufficiently high. At the time the ambient air quality standard for lead was promulgated ambient air was the source of a significant portion of people's total lead exposure due to emissions from motor vehicles that ran on leaded gasoline. The Air Resources Board adopted an ambient air quality standard for lead to protect the public from these adverse health effects. In 1976 CARB passed a regulation that led to a phase-out of lead in gasoline over several years. Since 1993 lead has been regulated under the Toxic Air Contaminant Program, although the state ambient air quality standard remains in force.

What are the sources of lead in ambient air?

In the past, motor vehicle exhaust was the major source of lead emissions to the air. Since lead has been removed from gasoline air emissions of lead from the transportation sector, and particularly the automotive sector, have greatly declined. However, because it was emitted in large amounts from vehicles when leaded gasoline was used, lead is present in many soils (especially urban soils) and can get resuspended into the air. The major sources of lead emissions today are ore and metals processing, particularly lead smelters, and piston-engine aircraft operating on leaded aviation gasoline. Other stationary sources include waste incinerators, utilities, and lead-acid battery manufacturers.

What kinds of harmful effects can lead cause?

Once taken into the body, the blood carries lead throughout the body and it is deposited in the bones where it accumulates. Because lead is only slowly excreted, exposures to small amounts of lead from a variety of sources can accumulate to harmful levels. Lead can adversely affect multiple organ systems of the body and people of every age group. Young children are particularly at risk of lead poisoning. They are usually exposed to lead through the normal hand-to mouth behavior that occurs through crawling or playing on the floor, and putting their hands, toys, and other items in their mouths. In children, adverse health effects of lead exposure are often irreversible and include brain damage and mental retardation. Lead poisoning is often unrecognized in children, and if undetected, it may result in behavioral problems, reduced intelligence, anemia, and liver or kidney damage.

Lead is also harmful to adults. Excessive lead exposure in adults is most often the related to exposure in occupational settings or to unsafe home renovation procedures. Lead poisoning can cause reproductive problems in men and women, high blood pressure, kidney disease, digestive problems, nerve disorders, memory and concentration problems, and muscle and joint pain. There is also evidence that lead exposure can result in cancer in adults. If a pregnant woman is exposed to elevated levels of lead, it can cross the placenta into the baby's blood, increasing risk of adverse developmental effects, particularly in the brain and nervous system.

Who is at the greatest risk from exposure to lead?

Infants and young children are especially sensitive to even low levels of lead, which may contribute to behavioral problems, learning deficits and lowered IQ.

How does lead affect the environment?

Lead is persistent in the environment and accumulates in soils and sediments through deposition from air sources, direct discharge of waste streams to water bodies, mining, and erosion. Ecosystems near point sources of lead demonstrate a wide range of adverse effects including losses in biodiversity, changes in community composition, decreased growth and reproductive rates in plants and animals, and neurological effects in vertebrates.

Is lead a problem indoors?

The main source of lead pollution indoors is lead-based paint, which could arise, for example, from paint flecks or chips or sanding during home renovations. In these cases, the particles are generally too large to be inhaled. Instead, exposure is primarily through ingestion. Young children are at greatest risk in this case due to hand-to-mouth transfer of paint flecks or sanded paint that are then swallowed. This can lead to an elevated level of lead in the body, increasing risk of neurological, behavioral, and learning deficits. Care should be exercised when renovating older homes to prevent inhalation or ingestion of lead-based paint residue.

What are the Ambient Air Quality Standards for lead?

	30-Day Average	Rolling 3-Month Average
National Ambient Air Quality Standard	None	0.15 µg/m ³
California Ambient Air Quality Standard	1.5 µg/m ³	None

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(800) 242-4450 | helpline@arb.ca.gov
1001 I Street, Sacramento, CA 95814
P.O. Box 2815, Sacramento, CA 95812

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