



## Criteria Air Pollutants: Lead (Pb)

Office of Air Quality - Air Programs Branch

(317) 232-8603 • (800) 451-6027

[www.idem.IN.gov](http://www.idem.IN.gov)

100 N. Senate Ave., Indianapolis, IN 46204

### Description:

- Lead is a soft, dense, naturally occurring metal that has long been used in a wide variety of applications.
- Exposure to lead in the ambient air can be harmful to human health, with young children being at the highest risk for lead poisoning.
- Lead is commonly used in the manufacture of building materials, lead-acid batteries, ammunition, weights, medical equipment, and coatings for high-voltage power cables.
- Sources that contribute to lead in the ambient air include smelters, mining operations, waste incinerators, battery recycling, and the production of lead shot and fishing sinkers. Lead is also released by the burning of coal, oil, solid waste, and the use of leaded aviation gasoline in piston engine powered aircraft. Prior to the phase-out of leaded gasoline between 1973 and 1996, motor vehicles were the largest source of lead in the atmosphere.

### National Ambient Air Quality Standards (NAAQS) for Lead:

- The federal Clean Air Act (CAA) requires United States Environmental Protection Agency (U.S. EPA) to set National Ambient Air Quality Standards (NAAQS) for six "criteria" pollutants that are considered harmful to public health and the environment. The criteria pollutants are lead, as well as carbon monoxide, nitrogen dioxide, ozone, particulate matter, and sulfur dioxide.
- The NAAQS set limits for the criteria pollutants in the ambient air. Limits established to protect human health are referred to as "primary standards." Limits established to prevent environmental damage are referred to as "secondary standards."
- The CAA requires periodic review of the science upon which the NAAQS are based, as well as the standards themselves. NAAQS were first established for lead in 1978, with the primary and secondary standards set at the same level. The NAAQS for lead was last updated in October 2008.
- The 2008 lead NAAQS set a limit of 0.15 micrograms of lead per cubic meter ( $\mu\text{g}/\text{m}^3$ ) of air for a rolling three-month average over a three-year period (three calendar years plus the two previous months). To attain the standards, any three consecutive monthly averages (January-March, February-April, March-May, etc.) must not exceed 0.15 ( $\mu\text{g}/\text{m}^3$ ) within a three-year period.
- U.S. EPA designates areas that meet the standards as "attainment" and areas that violate the standards as "nonattainment." Nonattainment areas must take steps to attain the standards. U.S. EPA uses three complete, consecutive years of air quality monitoring data to determine whether air quality meets the standards.
- In addition to being regulated as a criteria pollutant, lead is also a toxic air pollutant (also referred to as a hazardous air pollutant) that is regulated under U.S. EPA's National Emission Standards for Hazardous Air Pollutants.

### Environmental Impacts:

- Exposure to airborne lead typically occurs when a person breathes in or swallows lead dust or other lead-containing particles, such as contaminated soil.
- Lead may enter the environment from past uses. High levels of lead are most often found near roads, older homes, old orchards, power plants, factories, mining areas, landfills, and hazardous waste sites. The U.S. banned consumer uses of lead-based paint in 1978; however, older buildings still are of particular concern because they often contain surfaces coated with lead-based paint. If not maintained or properly removed, this paint can produce lead dust.

- Children and people who work with lead constitute the two highest risk groups for lead exposure:
  - Because of children's smaller size and unique metabolism, their bodies absorb proportionately more lead than those of adults. Typical childhood activities such as playing in the dirt and putting their hands and other objects in their mouths increase the chances of inhaling and swallowing lead dust or contaminated soil.
  - People who have jobs in metalworking, rubber and plastic molding, construction, or home remodeling or other activities involving lead-containing materials are also at high risk. The most common route of exposure for these workers is inhalation.
- Once in the body, lead accumulates in the soft tissues and the bones, where it may continue to enter the blood stream over a period of years. Studies indicate that long-term exposure can cause muscle weakness and loss of coordination, and permanently lower IQ in children.
- Other symptoms and effects of lead poisoning include abdominal pain, anemia, decreased appetite, weight loss, hypertension, muscle twitches, and reproductive problems for both men and women.
- Lead released to the outdoor air can deposit onto soils and sediments. Elevated lead levels in the environment can result in decreased growth and reproduction in plants and animals, and neurological effects in vertebrates.

### **IDEM's Role:**

The Indiana Department of Environmental Management (IDEM) is responsible for protecting human health and the environment while providing for safe industrial, agricultural, commercial, and governmental operations vital to a prosperous economy. IDEM works in many ways to improve air quality and protect public health:

- Implements federal, regional, and state control measures and air quality regulations.
- Operates an extensive, statewide air quality monitoring network to gather data on pollutants in the ambient air, identify air quality trends, and provide quality assured data to U.S. EPA for air quality designations.
- Provides the public with ambient air quality monitoring data for criteria pollutants, including lead.
- Issues permits to regulated sources that detail restrictions on lead emissions.
- Works with communities in nonattainment areas to implement programs to achieve the standards as quickly as possible.
- Educates citizens and businesses about their roles in improving air quality.

### **Citizen's Role:**

As IDEM works to protect Indiana's air quality, there are many actions citizens can take to avoid exposure to lead and protect children from its harmful effects.

- First, be aware of the possible danger from either inhalation or ingestion of lead.
- Also be aware that lead-based paint in older homes and buildings can cause lead dust and contamination to soil; plumbing in older homes and some distribution pipes can cause contamination in drinking water; and certain consumer products and hobbies also can pose a risk.
- Use recommended precautions if the presence of lead is suspected.
  - Buildings constructed before 1978 likely have lead-based paint under top coats of non-lead based paint, or may even have lead-based paint as top coatings. If lead-based paint is disturbed by construction or damage, harmful dust is released into the air. Deterioration of lead-based paint over time results in lead-contaminated paint chips or smaller lead-contaminated residue depositing on surfaces. Such residue can harm a small child if ingested, even in tiny amounts. Maintain painted surfaces and keep homes free from dust, especially around high friction areas such as windows and doors. Wash toys and pacifiers often. Teach children to wash their hands often. Soil can contain harmful levels of lead and be tracked into buildings. Remove shoes before entering to avoid tracking contaminated soil inside where children crawl and play.
  - The plumbing in some older buildings may contain lead pipes, or lead solder may have been used to fuse pipe joints, particularly in buildings and homes built before 1986. Distribution systems may include lead service lines. Lead from pipes can enter water, primarily when the pipes wear away or corrode. Recommendations include flushing pipes before filling glasses and cooking pots, and

using cold water for drinking, cooking, and making baby formula. In some cases, it may be advisable to have water tested for lead by a certified laboratory. Individuals should use good judgement when deciding whether tap water from a particular source is safe for drinking. Contact the local water utility for recommendations in your community. Contact the local health department concerning recommendations for a private well.

- Products of all kinds may contain lead, so care should be taken to buy from trusted sources. Extra care should be taken when choosing items to prepare and store food, such as ceramic dishes and crystal glasses that are handed down from previous generations or imported. Be aware of the potential for lead in painted toys, toy jewelry, imported candies and foods, imported mini-blinds, cosmetics, and folk remedies.
- Examples of hobbies that may involve lead-containing materials include but are not limited to making stained glass and pottery, refinishing furniture, and making lead bullets and fishing sinkers. Research and follow safe practices. Keep lead objects away from children.

#### **Additional Information:**

- IDEM's website provides additional air quality information including:
  - Overviews for the criteria air pollutants including lead, and state implementation plans for attaining the NAAQS: [www.in.gov/idem/sips/common-criteria-pollutants/](http://www.in.gov/idem/sips/common-criteria-pollutants/).
  - Air quality monitoring data and reports: <https://www.in.gov/idem/airmonitoring/air-quality-data/>.
  - The nonattainment status for Indiana counties and townships: [www.in.gov/idem/sips/nonattainment-status-of-counties/](http://www.in.gov/idem/sips/nonattainment-status-of-counties/).
- U.S. EPA's website provides air quality information including:
  - The NAAQS process: [www.epa.gov/naaqs](http://www.epa.gov/naaqs).
  - Lead air pollution: [www.epa.gov/lead-air-pollution](http://www.epa.gov/lead-air-pollution).
- IDEM provides information concerning drinking water and lead at: [www.in.gov/idem/cleanwater/drinking-water/drinking-water-compliance-section/water-systems/drinking-water-and-lead/](http://www.in.gov/idem/cleanwater/drinking-water/drinking-water-compliance-section/water-systems/drinking-water-and-lead/).
- The Indiana State Department of Health provides information concerning lead in the home at: [www.in.gov/health/public-health-protection-and-laboratory-services/lead-and-healthy-homes-division/](http://www.in.gov/health/public-health-protection-and-laboratory-services/lead-and-healthy-homes-division/).
- For questions and concerns, feel free to call IDEM's Office of Air Quality at (317) 233-0178 or (800) 451-6027, option 4.