



**Polluted Highways,
Poisoned Waters
Lead in Wheel Balancing Weights**



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Introduction

Lead is a stunningly toxic metal. A long list of problems has been linked to lead exposure: lowered intelligence, behavior problems, cancer, strokes, high blood pressure, kidney problems, anemia, cavities, and delayed puberty. Children are particularly susceptible to lead's toxic effects.

While lead is a mineral that occurs naturally in our soils, people's activities have caused our exposure to lead to dramatically increase. Levels in our environment are about 1000 times what they were a few hundred years ago.

This report describes the enormous quantities of lead that are used and left on city streets every day. The source of this lead is all around us and part of our ordinary activities, but one that most of us never notice: wheel balancing weights on cars and trucks.

These wheel weights frequently fall from tires. Once on roadways, they disintegrate into dust and can end up washing into streams or reservoirs and contaminating sources of drinking water.

Facts about Wheel Weights

Wheels on cars and trucks need to be balanced in order to function safely and efficiently. A wheel that is out of balance vibrates, causing the tire to wear out sooner than it should and making the vehicle difficult to handle, especially at high speeds. Wheel weights are used on about 80 percent of cars and trucks in order keep wheels balanced.

Wheel weights have been made out of lead since the 1930s. Lead is a popular material because is a relatively cheap metal, and also because it's easy to work with lead. Typically, lead wheel weights are made of a mixture of 95 percent lead and 5 percent antimony, another metal.

According to a report published by the U.S. Geological Survey, about 65,000 tons of lead wheel weights are in use on the over 200 million cars and trucks that are driven in the U.S. About 2,000 tons of these weights fall off of vehicles every year, and fall into roadways. Most weights are lost on city streets when vehicles hit curbs, bounce over potholes, stop or accelerate suddenly, or turn sharply. Once lost from the vehicle, the wheel weights drop onto the road. There they are worn down by traffic, and the lead is eventually spread around by wind or water.

A scientist who has researched accumulation of lead wheel weights on urban roads describes their impacts in simple, but far-reaching terms: "Small lead particles from abraded wheel weights likely contribute to the lead found in urban runoff. Storm water can sweep this lead into nearby culverts and arroyos, and ultimately washes it into nearby waterways where it can adversely affect water quality and aquatic ecosystems." The small lead particles can also be tracked into homes where they add to the lead burdens of people who live near busy streets.

Wheel weights can be made out of materials other than lead, including steel and zinc. Lead wheel weights have been banned in Europe since 2005.



Lead in California Rivers and Streams

Based on the number of miles that vehicles drive in urban California, or the number of vehicles registered in the state, about half a million pounds of lead wheel weights fall on California roadways every year. Because quick stops and sharp turns cause wheel weights to fall off of vehicles, most of these fallen wheel weights are in urban areas.

As part of a national water quality monitoring program, the U.S. Geological Survey has measured lead levels in several California watersheds: the Sacramento River watershed and the Santa Ana River watershed.

In the Sacramento River watershed, lead concentrations in streams and rivers draining urban areas were ten times the concentrations found in samples taken in agricultural areas. A similar pattern was found in the Santa Ana watershed; no agricultural streams were sampled, but lead concentrations were higher in urban streams than in streams and rivers draining mixed use areas.

Important sources of lead in these urban streams include lead paint, leaded gasoline and lead wheel weights. The first two of those lead sources have been dramatically reduced in the last several decades, leaving wheel weights as an important source of lead contamination. Action to reduce the pollution caused by lead wheel weights is overdue.

Not Good for Kids

Lead has a profound ability to damage children's intellectual and behavioral development. Children who have been exposed to higher levels of lead score lower on IQ tests than children with less exposure. Children with higher exposures are also more impulsive and have shorter attention spans.

Recent research shows how pervasive these problems are. For example, research from Duke University published this month showed that low levels of lead exposure in early childhood were linked to lower test scores when children reach fourth grade. Another recent study looked at children who participated in a national monitoring program at the Center for Disease Control and Prevention. The study showed that lead exposure may be responsible for Attention Deficit Hyperactivity Disorder (ADHD) in almost 300,000 children.

Childhood lead exposure has effects on our mental function that persist into adulthood. Doctors in the Cincinnati Lead Study, using magnetic resonance imaging (MRI) technology, have looked directly at the brain activity of young adults. This research, published last September, showed that young adults who were exposed to more lead as children had visually different brain activity than young adults without as much lead exposure.

Because of these kinds of problems, the state of California has identified lead as a chemical that causes developmental toxicity.

Not Good for Adults

Lead also causes a wide spectrum of health problems in adults.

One significant disease caused by lead exposure is cancer. The International Agency for Research on Cancer, the U.S. Environmental Protection Agency, and the National Toxicology Program, have all identified lead as a cancer causing chemical.

Lead also reduces our ability to have healthy children. Two recent studies, one from the Taiwan Institute of Occupational Safety and Health and the other from Brown Medical School, showed that women with higher lead exposures were more likely to have infertility problems. A third study, led by a researcher from the Harvard School of Public Health, found that mothers with higher lead exposure during the first part of their pregnancies were more likely to have babies with slower mental development.

Other important diseases are also linked to lead exposure. Researchers from Tulane University and Johns Hopkins University recently showed that low level lead exposures are linked to a greater risk of heart attacks and strokes. Other recent studies showed that low or normal lead exposures accelerate kidney failure in patients with chronic kidney disease and are linked to an increased risk of Lou Gehrig's disease.

Not Good for Animals or Plants Either

Scientists have known for decades that lead is toxic to animals and plants. In 1988, a review by the U.S. Fish and Wildlife Service stated that lead “is neither essential nor beneficial to living organisms, and that all measured effects are adverse.” The report summarized evidence that lead reduces survival, growth, reproduction, development, behavior, and learning in a variety of wildlife species.

Lead is toxic to all kinds of aquatic animals, including fish and waterfowl. Some animals are impacted by lead concentrations as low as 1 part per billion. In fish lead can cause anemia, reduced ability to swim, and abnormal sex organs.

Lead is also toxic to plants, reducing growth and photosynthesis. (Photosynthesis is the process by which plants use sunlight, water, and carbon dioxide to produce sugar.)

In some animals, scientists have measured the same effects seen in lead-exposed children: hyperactivity and learning difficulties.

What You Can Do

When you have tires balanced, ask your tire retailer to use lead-free wheel weights.

Encourage local businesses and government agencies to use lead-free wheel weights.

During the past decade, the Center for Environmental Health has successfully negotiated agreements with manufacturers of other products that contain toxic chemicals. These agreements reduced the amount of toxic chemicals in children's medicines, wood play equipment, lunchboxes, jewelry, and candy. We used California's Safe Drinking Water and Toxic Enforcement Act of 1986, commonly known as Proposition 65, to initiate these actions. We are taking the same action with wheel weights.

References

Introduction

U.S. Department of Health and Human Services. Public Health Service. Agency for Toxic Substances and Disease Registry. 2005. Draft toxicological profile for lead. <http://www.atsdr.cdc.gov/toxprofiles/tp13.html>. Pp. 9-30.

Facts about Wheel Weights

D.I. Bleiwas. 2006. Stocks and flows of lead-based wheel weights in the United States. U.S. Geological Survey Open-File Report 2006-1111.

R.A. Root. 2000. Lead loading of urban streets by motor vehicle wheel weights. *Environ. Health Perspect.* 108:937-940.

Lead in California Rivers and Streams

J. L. Domagalski. 2000. Water Quality in the Sacramento River Basin, California, 1994–98. U.S. Geological Survey Circular 1215. <http://water.usgs.gov/nawqa/>.

K. Belitz. 2004. Water Quality in the Santa Ana Basin, California, 1999–2001. U.S. Geological Survey Circular 1238. <http://water.usgs.gov/nawqa/>.

Not Good For Kids

U.S. Department of Health and Human Services. Public Health Service. Agency for Toxic Substances and Disease Registry. 2005. Draft toxicological profile for lead. <http://www.atsdr.cdc.gov/toxprofiles/tp13.html>. p.23.

M.L. Miranda et al. 2007. The relationship between early childhood blood lead levels and performance on end-of-grade tests. *Environ. Health Perspect.* 115:1242–1247.

Joe M. Braun et al. 2006. Exposures to environmental toxicants and Attention Deficit Hyperactivity Disorder in U.S. children. *Environ. Health Perspect.* 114:1904–1909.

Weihong Yuan, et al. 2006. The impact of early childhood lead exposure on brain organization: A functional magnetic resonance imaging study of language function. *Pediatrics* 118:971-977.

Not Good For Adults

U.S. Department of Health and Human Services. Public Health Service. Agency for Toxic Substances and Disease Registry. 2005. Draft toxicological profile for lead. <http://www.atsdr.cdc.gov/toxprofiles/tp13.html>. Pp. 378-380.

Shu-Hao Chang et al. 2006. Low blood lead concentration in association with infertility in women. *Environmental Research* 101: 380–386.

Tali Silberstein et al. 2006. Lead concentrates in ovarian follicle compromises pregnancy. *Journal of Trace Elements in Medicine and Biology* 20: 205–207.

Howard Hu et al. 2006. Fetal lead exposure at each stage of pregnancy as a predictor of infant mental development. *Environ. Health Perspect.* 114:1730–1735

Andy Menke et al. 2006. Blood lead below 0.48 $\mu\text{mol/L}$ (10 $\mu\text{g/dL}$) and mortality among US adults. *Circulation* 114: 1388-1394.

Ja-Liang Lin et al. 2006. Low-level environmental exposure to lead and progressive chronic kidney diseases. *The American Journal of Medicine* 119: 707e1-707.e9.

F. Kamel et al. 2005. Lead Exposure as a risk factor for amyotrophic lateral sclerosis. *Neurodegenerative Dis.* 2:195–201.

Not Good for Animals and Plants Either

R. Eisler. 1988. Lead hazards to fish, wildlife, and invertebrates: A synoptic review. Patuxent Wildlife Research Center. Contaminant Hazard Reviews Report No. 14. http://www.pwrc.usgs.gov/infobase/eisler/CHR_14_Lead.pdf