



Welcome to Lead's Urban Legacy.

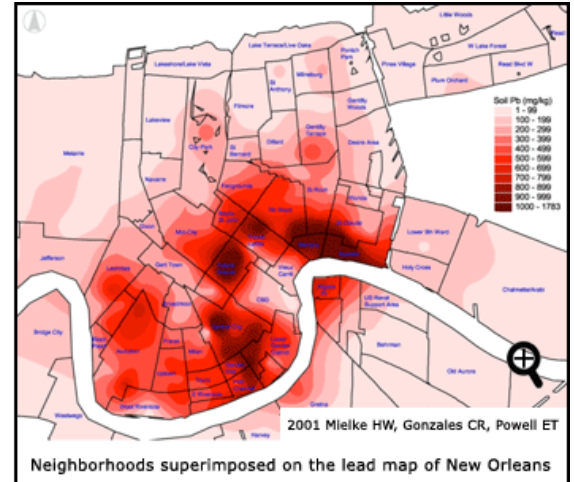
Much of our landscape, especially inner city areas, is contaminated with lead. Lead paint and dust in homes. Lead-contaminated soil in yards and playgrounds. Lead in children's bodies and bones. The major use of lead is in batteries which are recycled, however the urban legacy is the result of a century of adding **millions of tons** of the heavy metal to paint, gasoline and other everyday products that accumulate in the environment.

Today, old paint, dust and soil, drinking water and even some health care supplies are the major sources of lead exposure. Warnings about lead paint abound.

Lesser known and possibly more important, **are the threats** from lead-contaminated soil and dust in homes and yards (see link to [Hidden Poison](#)). Merely touching lead dust then licking or sucking fingers can raise the amount of lead in a child's body to dangerous levels. Too much lead in our bodies results in lead poisoning. This entirely preventable disease still presents a major health threat in the U.S. Even though children of all races and ethnic backgrounds are at risk, those most at risk are city dwellers, the poor and minority populations who live and work in the highest lead-contaminated environments. Unborn babies, **infants** and young children are especially vulnerable to lead.

How can you protect yourself and those you love? The only way is to lower or avoid contact with the element. Learn where lead is found; have your water, soil and children's blood tested; and keep your house free of dust and peeling paint. Visit our [Lead Protection](#) and [Help/More Info](#) sections for guidance and counsel.

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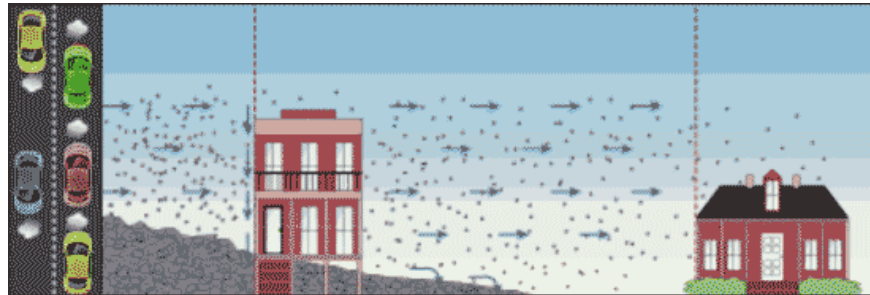




Lead Poisoning

What is Lead Poisoning	"Safe" Blood-Lead Levels	Lead in the Body	Lead Affects Health
References			

Lead is a metal that occurs naturally in the earth's crust. There are high concentrations of lead in some rock formations and these mineral sources are mined and the lead is concentrated by smelting. Lead contamination of surface soils occurs at mining and smelting sites and many people live nearby these sites. The lead from smelters is used to make many types of products and thus people have spread it through the environment in many ways. Currently the major consumer product is lead acid batteries. Lead used to be in paint and gasoline. In the U.S. major restrictions in the lead content of paint occurred in 1978.



Its use in gasoline for highway travel was first restricted with the introduction of cars requiring catalytic converters that needed lead-free gasoline, followed by the rapid phasedown on January 1, 1984, and finally a total ban on January 1, 1995. Lead additives are still used in aviation fuel. The lead from mining, smelting, lead-based paints, and gasoline contaminated household dust and outdoor soil.

Lead used to make pipes and solder contaminates drinking water. Other sources of lead include lead-glazed pottery, some metal jewelry and even cosmetics. Breathing air, drinking water, eating food or ingesting dust or soil that is contaminated with lead can cause many health problems. In adults, lead increases blood pressure and causes infertility, nerve disorders, muscle and joint pain. It can also make a person irritable and affect their ability to concentrate and remember. Lead is especially dangerous for children. Their vulnerability is related to their need for minerals to support development plus their common hand-to-mouth behavior, especially during infancy. Children swallowing even small amounts of lead may develop anemia, severe stomachache, muscle weakness and brain damage. Exposure to tiny amounts of lead are linked to lower IQ scores.

Advisory Committee on Childhood Lead Poisoning Prevention.

[Low level lead exposure harms children: a renewed call for primary prevention.](#)

US Department of Health and Human Services, CDC, Advisory Committee on Childhood Lead Poisoning Prevention; 2012.

Centers for Disease Control and Prevention.

[Response to Advisory Committee on Childhood Lead Poisoning Prevention recommendations in Low level lead exposure harms children: a renewed call for primary prevention.](#)

US Department of Health and Human Services; 2012, MMWR 61(20):383.

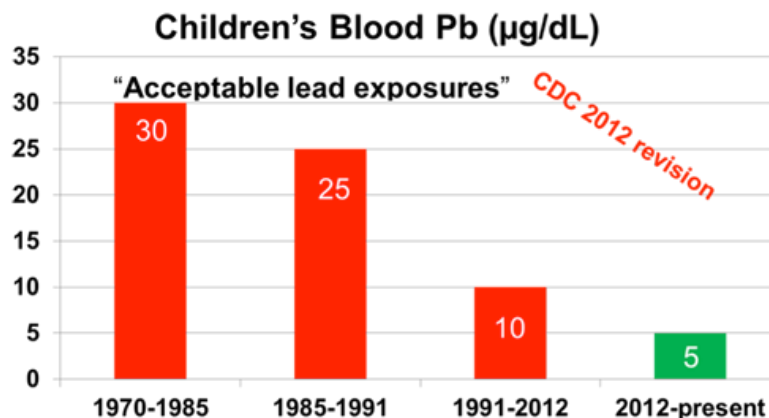


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The most common way for diagnosing human exposure is by measuring the amount of lead in the blood. The test requires collecting a small amount of blood. The site of collecting is either by finger prick or withdrawing a small amount of blood from a vein in the arm. Because the finger surface may be contaminated with lead the venous sample is generally the most reliable measure of blood lead. The blood sample is then analyzed by an instrument to measure the amount of lead. The results are reported as micrograms per deciliter ($\mu\text{g}/\text{dl}$) of blood. A microgram equals a millionth of a gram and a gram is three-hundreds of an ounce; a deciliter is about one-tenth of a quart.

Analytical capability for measuring lead has played a critical role in understanding the hazards of exposure to lead. As analytical skills improved, new findings about the health hazards of different levels of exposure became evident. The health outcomes associated with various blood lead levels triggered actions to prevent exposure. Over the decades the evolution of CDC blood lead guidelines closely tracks the analytical capability for measuring blood lead. Thus during the 1960's reliable measurements of blood lead were extremely high at 60 $\mu\text{g}/\text{dl}$. With major improvements in analytical capabilities, in 1970 the "acceptable lead exposure" declined to 30 $\mu\text{g}/\text{dl}$ etcetera.



The research community has observed that blood lead levels of 2 $\mu\text{g}/\text{dl}$ and even lower are associated with various chronic diseases, learning and behavioral issues. In 2012, CDC supported the research community by making two critical changes. First it recognized that there is no known minimum level of lead exposure which can be defined as safe. And secondly CDC guideline language about children's "acceptable lead exposure" was revised to "reference value". The revision is feasible because it is now possible to reliably measure blood lead levels at 1 $\mu\text{g}/\text{dl}$ and even lower. The reference value is connected to the findings of the 97.5th percentile of the National Health and Nutrition Evaluation Survey (NHANES) results for children's blood lead in the U.S. Currently the top 2.5% of the children in the U.S. have a blood lead level of 5 $\mu\text{g}/\text{dl}$ or higher. The NHANES is repeated every few years and because blood lead is declining the future blood lead reference value should also decline.

Blood-lead Levels Declining

Overall, blood-lead levels are falling in the United States and this is a remarkable achievement brought about by improved engineering and chemical changes in both paints and gasoline. Looking back, we see that between 1976 and 1980, 9 out of every 10 one- to five-year-olds had lead levels greater than 10 $\mu\text{g}/\text{dl}$. Between 1988 and 1991, the same blood lead levels were detected in only one out of every 11 children. All-in-all, the average blood-lead levels for all age groups dropped over 90% since the late 1970s.

The decreases are credited to the government mandated removal of lead from gasoline, paint, food and drinking containers, eliminate lead from plumbing systems as well as increased education and awareness about lead. The most effective steps involved changes in technology that removed lead from products and the environment.

Even though blood-lead levels in U.S. children dropped between 1976 and 2012, many children, especially minority, low-income and urban youth, still face lead poisoning because of hazardous lead contamination of their environment. The main hazards are associated

with the legacy of the massive use of lead by our society during the twentieth century, and this legacy plays out in communities surrounding former lead smelters and in cities such as Atlanta, Baltimore, Boston, Chicago, Detroit, Philadelphia, and New Orleans.

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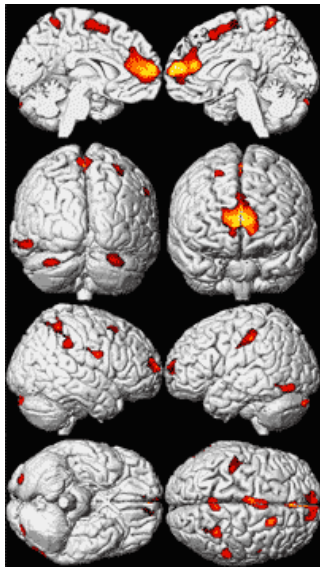


Lead Poisoning

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Lead accumulates in the body during a lifetime. Once stored, the heavy metal is released very slowly and is a continuous source of lead exposure.

In the body, lead enters the bloodstream (99 percent is associated with red blood cells and 1 percent is in the plasma) where it is carried throughout the body. Lead meets one of two fates: 1) It can be excreted through the kidneys or intestines; or 2) It can be stored in soft tissue and bones and teeth where it is slowly released over decades.



More than 95 percent of total lead in the adult body is in bones and teeth. Throughout a lifetime, lead is mobilized back into the bloodstream in times of stress, chronic disease or pregnancy/lactation (a hazardous exposure source for unborn fetuses).

Even though single exposures are hazardous, it is chronic exposure that poses the biggest threat. Constant, long-term exposure from both the external environment and total body burden (all lead circulating or stored in a body) can cause adverse health effects. For instance, even if a person is removed from a lead source and blood-lead levels return to normal, the stored lead can be mobilized for decades, representing a continuous lead source that could cause lead poisoning.

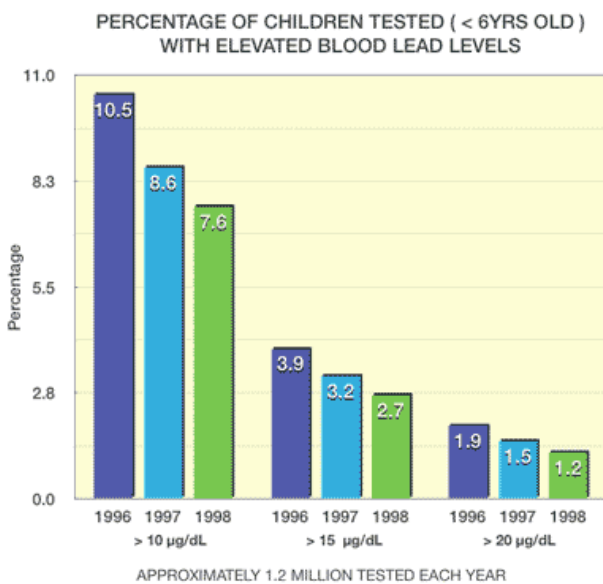
Figure 1. Regional Brain Volume Loss for the Cincinnati Lead Study Participants show more A composite representation of regions with significant volume loss for male and female CLS participants (n = 157) associated with mean childhood blood lead concentrations is shown with red and yellow clusters overlaid upon a standard brain template (seen at multiple angles; the first row presents views from the midline of the left and right hemispheres, respectively; the second row demonstrates views from the back and front of the cerebrum, respectively; the third row shows the lateral right and left hemispheres; and the fourth row shows views from below and above the cerebrum.

[Brain template source reference \[51\]. doi:10.1371/journal.pmed.0050112.g001.](#)



Lead Poisoning

What is Lead Poisoning	"Safe" Blood-Lead Levels	Lead in the Body	Lead Affects Health
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Lead affects almost every bodily system, but susceptibility varies with age, gender and nutritional status. The element affects the nervous system and kidneys, inhibits hemoglobin production, interferes with vitamin D's duties in cell maturation and skeletal growth, affects fetal development and may cause renal cancer.

Most vulnerable are unborn babies and young children. The heavy metal can damage growing brains and nervous systems that have not yet formed their natural protection systems. Unborn babies are exposed through their mother's blood. Through hand-to-mouth action, children from nine months to 6 years-years-old inadvertently eat lead in paint, dust or soil. They can absorb and retain up to 50% of the swallowed element.

Once in the body, children's health effects vary. With severe lead poisoning, problems range from permanent mental retardation to death.

Figure 1. Blood Lead Levels in Young Children (USA & Selected States, 1996--1999). [Centers for Disease Control and Prevention \(CDC\), MMWR.](#)

Lower blood-lead levels also create a range of problems including a drop in IQ. One study found blood-lead levels of 10 µg/dl lowered IQ by 3 to 5 points. Additionally, constant exposure to low lead levels causes attention deficit, hearing loss, slowed growth, headaches and hyperactivity.

Some of these illnesses go unnoticed until a child first attends school. By that time, the irreversible brain damage may be enough to interfere with life-long learning. Adults who live or work with high amounts of lead also suffer. Related health problems include difficulties during pregnancy, reproductive problems, muscle and joint pain, digestive problems, memory and concentration problems, nerve disorders and high blood pressure.

Centers for Disease Control and Prevention 2014 MMWR: [Lead Screening and Prevalence of Blood Lead Levels in Children Aged 1–2 Years — Child Blood Lead Surveillance System, United States, 2002–2010 and National Health and Nutrition Examination Survey, United States, 1999–2010](#)



Lead Poisoning

[What is Lead Poisoning](#)["Safe" Blood-Lead Levels](#)[Lead in the Body](#)[Lead Affects Health](#)[References](#)

1. Update: blood-lead levels - United States, 1991-1994. 1997. *Morbidity and Mortality Weekly Report*. Department of Health and Human Services, Centers for Disease Control and Prevention. 46(February 21):141-146.
2. **Lead Toxicity: Case Studies in Environmental Medicine**. 1992. Agency for Toxic Substances and disease Registry, U.S. Department of Health and Human Services. Publication 099-3380. 30 pp.
3. Blood levels keep dropping - New guidelines proposed for those most vulnerable. Department of Health and Human Services, Centers for Disease Control and Prevention, National Centers for Environmental Health, Childhood Lead Poisoning Prevention. (February 21, 1997 press release).
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5. Meadows, R. 1996. **Growing pains**. *Environmental Health Perspectives*. 104(February):146-149.
6. From a speech at Earth Day 1997 at the Center for Bioenvironmental Research at Tulane and Xavier Universities in New Orleans, Louisiana.
7. **Cleanup and lawsuits proceed in an old Idaho mining valley**. *Washington Post*. May 5, 1997: A1,A13.



Lead Sources

How Lead Got into the Environment	Major Sources of Lead	Other Sources of Lead	References
<p>During the last 100 years, lead was added to many U.S. products including paint, gasoline, water pipes and health care supplies. About 330 million tons of lead were mined for these purposes. Even though lead's use is now restricted and regulated because of known health risks, the heavy metal is still mined and added to products.</p> <p>Because it does not break down, most of the lead ever produced remains in soil, dust and other environs. The odorless, colorless, tasteless metal so widely present in homes, yards and workplaces can only be detected through chemical analysis.</p> <p>In most U.S. communities, the major sources of lead are old, peeling lead-based paint, contaminated soil and dust, drinking water, and household products.</p> <p>The two biggest contributors of lead to the environment are leaded paint and gasoline. Leaded paint use peaked in the 1920s and gradually fell off until its ban in 1978. At its zenith in the 1970s and before its use was restricted in 1986, leaded gasoline spewed up to 250,000 tons of lead per year into the environment.</p>			



Lead Sources

How Lead Got into the Environment	Major Sources of Lead	Other Sources of Lead	References
<ul style="list-style-type: none">Paint<p>Between 1920 and 1950 paint contained lead. Although most manufacturers had phased lead out of their products by the 1950s, mandatory paint lead bans were not enacted until 1978. Today, many who live in older homes are still exposed to lead inside the house when walls crack, paint peels or renovations are done and outside by soil and dust near the foundation that is contaminated with leaded paint chips.</p><p>Protection Tips</p>Gasoline<p>Leaded gasoline was used in the U.S. from 1923 to 1986. A rapid government phase out ended the use of this anti-knock additive and ushered in the era of unleaded gasoline. (see the online article <i>Bad decisions again and again</i> for a brief look at lead in the environment and a history of lead in gasoline). Environmental lead contamination from gas peaked in the 1970s when more than 205,000 tons of lead per year were put into the atmosphere. By 1990, lead released from gas fell to 520 tons^{1,2,3}. Today, most of this lead is concentrated in soil and dirt near major freeways and busy intersections in most U.S. cities. Eating soil and breathing the dust puts many, especially children who play and live in these areas, at risk for lead poisoning each year.</p><p>Protection Tips</p>Food and drink cans<p>Between 1976 and 1991, one of the top three major sources of lead exposure in the general population was from soldered cans¹. Lead leached from the lead solder, used to hold the can together, into the food and was consumed by anyone who ate the product. In 1980, 47% of food and soft drink cans were lead soldered, while in 1990 only 0.85% of cans were lead soldered. Since November 1991, lead soldered cans are no longer made in the U.S., but exposure can still occur with food imported from other countries with less strict standards.</p><p>Protection Tips</p>Lead pipes<p>Lead leaches into drinking water supplies from lead water pipes and lead solder used on the pipes. Incentive programs in the 1980s reduced the use of lead pipes and products that carry drinking water. Treating water to reduce pipe corrosion in existing lines also reduced lead content in drinking water.</p><p>Protection Tips</p>Consumer products<p>Many cosmetics and other nonfood consumer goods still contain large amounts of lead. In a recent study⁴, Howard Mielke of Tulane University, reported that several types of lead-based hair coloring products contained lead acetate levels between 2,300 and 6,000 micrograms of lead per gram. After its use, hands, faucets, combs and other articles were coated with dangerous amounts of lead that could be transferred from surfaces and ingested by anyone who comes into contact with it.</p><p>Protection Tips</p>			



Lead Sources

How Lead Got into the Environment	Major Sources of Lead	Other Sources of Lead	References
<ul style="list-style-type: none">• Contaminated cooking utensils• Ethnic medicines• Lead batteries• Primary batteries, wet and dry• Valve and pipe fittings• Pottery• Automobile parts and accessories• Hobby sources of lead:<ul style="list-style-type: none">◦ firing ranges, casting ammunition or making fishing weights◦ making stained glass◦ refinishing furniture◦ artists paints that contain lead◦ lead solder for electronics• Occupational sources such as factories, industry and repair:<ul style="list-style-type: none">◦ secondary metal smelters◦ brass or copper foundries◦ automobile repair shops◦ industrial machinery and equipment◦ remodeling or renovating old homes◦ chemical and chemical preparations◦ bridge, tunnel and highway construction			



Lead Sources

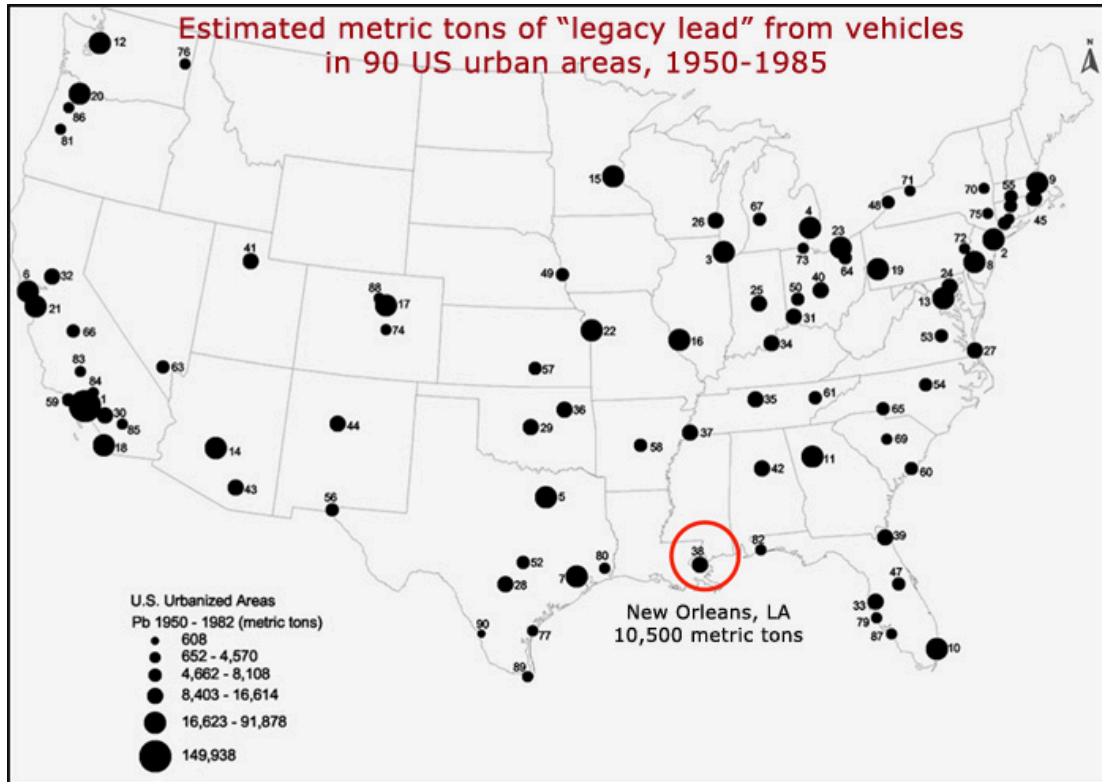
How Lead Got into the Environment	Major Sources of Lead	Other Sources of Lead	References
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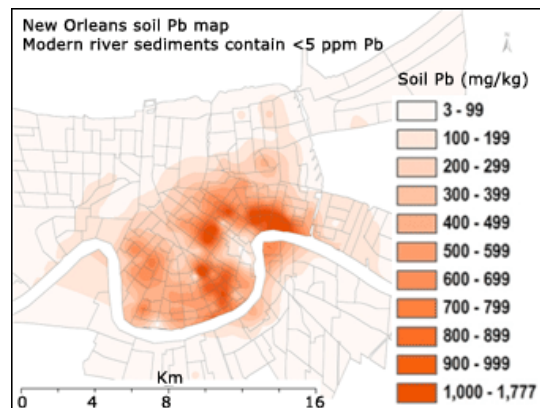
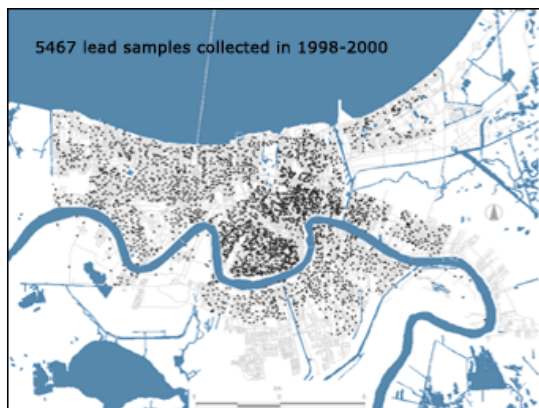
Lead in Soil

The Problem	Lead Dust Patterns	References
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Leaded paint and gasoline, long since retired from use in the United States, have left behind a reminder that they were once common. Their legacy is lead, a natural metal element mined from the Earth for use in many consumer products. Because it does not breakdown, most of the millions of tons of lead added to products during this century is still in the environment, contaminating soil, water, air and our bodies.



Lead-contaminated soil, found almost everywhere, can have severe health risks. Children and adults inadvertently touch, breath and eat lead-soil from inside and outside sources. Its accessibility makes it a bigger lead-health threat than leaded paint and a major, if not the greatest, source of childhood lead poisoning in the United States¹.



Risk of lead poisoning varies and depends on several factors. Boys are at higher risk than girls. Poor children, who may lack proper nutrition and live near bare soils, are at higher risk than middle-class and wealthy children. Minorities face more risk than whites. Inner-city dwellers, especially the poorest and youngest, face the highest risks because of multiple exposures from lead paint, soil, air and improper nutrition.

Contaminated soil and the associated health problems became well-known after an expressway in San Francisco collapsed during an earthquake. Children playing in the soil next to the broken structure were lead poisoned. The soil, in this case, tainted from decades of leaded gasoline use, contained many parts per billion (ppb) of lead. Just 10 ppb in blood is considered dangerous to children's health according to guidelines from the Centers for Disease Control.

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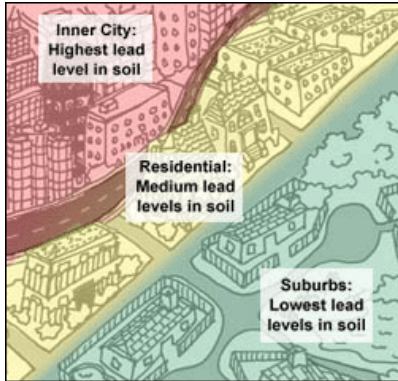


Lead in Soil

The Problem

Lead Dust Patterns

References



Not all areas bear the same contamination. Lead-soil content varies between and within cities because of historical traffic congestion, city size, age of the city, industry and the type of soil. Of these, traffic, and its associated past use of leaded gasoline, plays the most important role in determining where lead is found in city and rural soils.

In general, [city size](#), an [area's location](#) relative to the urban center and the [soil's location](#) relative to buildings and the street determine lead-soil content, according to Howard Mielke, Associate Professor of Environmental Toxicology at Xavier University of Louisiana. His insights come from 25 years of research characterizing lead dust patterns in urban areas and deciphering how home lead exposure occurs.

City size

Older, larger cities usually have more leaded soil than older, smaller cities.

Urban areas, especially the inner city corridors, experience more traffic and congestion than smaller cities and rural areas. Hence, areas with historically high traffic volume are more polluted with lead dust from leaded gasoline that settled out into the soil or clung to buildings and was washed into the surrounding soil.

City	Average Daily Traffic Volume	Tons of Lead in Soil
Thibodaux	10,000	.45
New Orleans	95,000	5.15

Comparing New Orleans, a large, old city, with the smaller, older city of Thibodaux, Louisiana, illustrates this. About 10,000 cars stream through Thibodaux's busiest intersections per day. In the past, they deposited about a half a ton of lead per year into the environment. New Orleans' intersections see about 95,000 cars a day, which historically deposited more than five tons of lead per year². New Orleans' 10-fold car traffic left about 10 times the lead in the soil. Rural towns often have lower soil-lead levels, too. The median soil sample for inner city communities in New Orleans was greater than 840 parts per million (ppm) lead whereas the median soil lead for the small town of Natchitoches, Louisiana, was less than 50 ppm lead³. Since children's average blood lead levels follow the same patterns as soil-lead levels, city dwellers are at a higher risk for lead poisoning than those in smaller cities or rural areas. One study confirmed this when it found that children in rural areas had 13.9 micrograms of lead per deciliter of blood ($\mu\text{g}/\text{dl}$), those in cities with populations less than one million had 16.5 $\mu\text{g}/\text{dl}$, those in cities larger than one million had 18 $\mu\text{g}/\text{dl}$ and those in inner cities had 20 $\mu\text{g}/\text{dl}$ ⁴.

Location relative to city center

Inner city areas are more contaminated with lead than residential areas or suburbs.

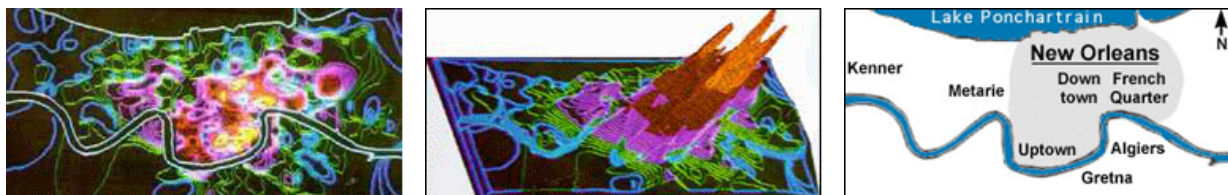
Studies of New Orleans, Boston, Baltimore, Minneapolis, St. Paul, and London, England, show that inner city areas have more lead pollution than outlying areas. Streetside samples in New Orleans' inner city areas range from 600 to 1,200 micrograms of lead per gram of soil ($\mu\text{g}/\text{g}$) while soils in suburban areas contain less than 75 $\mu\text{g}/\text{g}$ ⁵ (see illustration below). Soil lead levels in city areas of Minneapolis and St. Paul ranged from 100 $\mu\text{g}/\text{g}$ to more than 1,200 $\mu\text{g}/\text{g}$ while outer lying suburbs ranged from 30 to 100 $\mu\text{g}/\text{g}$, a 100-fold change between the two areas^{5,6}. Why the differences? In general, inner cities:

- have historically high traffic flow and congestion,
- may have more bare or exposed soil,
- contain more leaded paint on houses and buildings, and

- concentrate and retain hot air and pollutants.

These higher inner-city soil-lead levels mean that city children face a greater health threat than their suburban counterparts. Many of these children may be getting more than the maximum daily lead intake of 150 µg. In Minneapolis, where 78 percent of homes had soil-lead levels higher than 500 µg/g, a child eating just a half a gram of soil would ingest 250 µg of lead, almost twice the suggested maximum daily intake. Soil control measures and education are important deterrents. Some Public Housing complexes in inner city New Orleans have surprisingly low lead levels in surface soil because sand is routinely spread on the property to raise ground levels. Other simpler soil and dust control measures - keeping soil dust low, covering bare soil, keeping hands and toys clean - also significantly reduce lead exposure and blood lead levels.

Computer images of lead soil in the New Orleans metro area.



Soil lead levels are highest near the inner city (yellow contours) and decrease (red, pink, green, blue) with increasing distance from the city center. The 3,074 surface soil samples representing all 283 census tracts were collected from residential properties one meter from buildings and streets and in midyard areas but not near busy traffic streets and corners. Map colors designate the amount of lead from soil residents may be exposed to on a daily basis.

Color	Soil lead, Parts per million (ppm)
Yellow	600 - 1,200
Red	300 - 600
Pink	150 - 300
Green	75-150
Blue	less than 75

Soil's location relative to buildings and the street

Soil near building foundations and next to the street have higher lead content than soils in the middle of yards or playgrounds.

Median lead soil content (ug/g) New Orleans metro area			
	Houseside	Midyard	Streetside
Inner city	840	212	342
Midcity	110	40	110
Suburbs	86	28	50

The amount of lead in streetside, midyard and houseside soil generally follows these trends:

1. **The highest soil-lead levels are found near buildings in inner-city neighborhoods. Two factors are responsible for this trend:**
 - small, airborne lead-dust particles from leaded gasoline and industry that collected on buildings and were washed into surrounding soils (especially in high traffic areas) and
 - lead-paint chips, dust and debris from buildings that settled out into houseside soil.

Median soil content near buildings in Minnesota's Twin Cities range from 100 ppm in outlying areas to 800 ppm in the inner city areas. The highest levels were next to inner city houses near historically congested trafficways⁷. Leaded paint also contributes to the problem as soil next to painted buildings had twice the soil-lead content as soil next to brick, stucco and

stone buildings. Even so, soil near the mostly unpainted brick structures of Baltimore's inner city had similarly high lead-soil levels suggesting that lead from exhaust plays as large a role in soil-lead levels next to buildings as leaded paint⁸.

2. Houseside and streetside lead-soil levels are higher in the inner city than in outlying areas, are highest near heavy traffic areas and are higher than midyard areas:

The numbers tell the story. The median lead-soil level of 840 ppm (ranges from 400 to 2,500 ppm) near buildings in New Orleans' inner city are almost eight times higher than the midcity lead-soil medians of 110 and almost 10 times higher than 86 ppm found near buildings in the suburbs⁵. Streetside soil of the inner-city are also more contaminated than those in midcity and the suburbs. Even more so than houseside soils, lead in soil near streets is directly related to the amount of past daily traffic. The more historic traffic, the more lead that, most likely, settled out into the soil from leaded gasoline. In all locations, midyard soil contains the lowest amount of lead.

3. The lowest soil-lead levels are found near buildings in the suburbs:

Unleaded paint usually covers these younger buildings minimizing leaded paint residue in soils. Auto emissions probably contribute the lion's share of soil lead since suburban streetside soil is more contaminated than the soil next to suburban houses. City size also influences the amount of lead found in different parts of the yard. Like the suburbs, streetside samples in small towns were more contaminated than houseside samples. Median soil-lead levels in Minnesota's small cities had slightly higher soil-lead levels near the street than near foundations while large cities had three times the amount of lead in soil near buildings than streetside.



Lead in Soil

The Problem	Lead Dust Patterns	References
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Lead Protection

The best way to protect yourself and your family from lead poisoning is to learn how to identify sources of lead, detect lead poisoning symptoms and reduce or prevent exposure. Common sense, not expensive or inconvenient tests and gadgets, is the most effective approach to reducing and eliminating lead in your environment.

The following guidelines and suggestions are easily accomplished in any home or work place. Education, recognition and prevention are key to keeping this preventable illness at bay.

Keep house soil and dust low

- minimize dust and soil brought into the house
- take off your shoes before entering your house
- if you work with lead or in a lead-contaminated environment, change out of your work clothes before entering the house
- do a thorough house cleanup - use a High-Efficiency Particulate Air (HEPA) vacuum cleaner then use a high phosphate detergent with a wet mop, sponge or rag to wipe floors, baseboards and window sills
- thoroughly rinse mops, sponges and rags after cleaning
- keep play areas and toys clean
- have your home and yard tested for lead levels

Keep yard soil covered and in place

- cover exposed soil with sod or wood chips, plant grass and other plants or build a deck
- do not let children play in lead-contaminated soil (the highest lead levels are found next to houses where lead-paint debris accumulates and wind-blown contaminated dust settles)
- add a sandbox to provide a clean play area

Don't disturb lead-based paint

- maintain intact painted areas to prevent peeling and cracking
- test for lead-based paint in any house built before 1978 before buying or remodeling
- do not sand, burn, scrape or remove lead-based paint in or on homes, boats or cars
- if lead paint is crumbling, peeling or you're remodeling, have a professional inspect and remove the paint following proper safety procedures
- keep furniture and children (especially cribs and playpens) away from damaged paint
- have your landlord fix peeling or chipping paint surfaces

Test your drinking water for lead

- most well or city water supplies do not contain lead but water picks up lead inside your home if plumbing is made with lead materials
- water contains more lead if it has sat in pipes for a long time, is hot or is acidic.
- if you have high lead amounts in your water, do not drink, cook or make baby formula with hot tap water; if cold water has not been used for two hours, run the cold water for 30 to 60 seconds before drinking or cooking with it; and buy a filter certified for lead removal

Eat right and avoid consumer products with lead

- eat a balanced diet rich in calcium and iron
- do not serve, prepare or store food in older or handmade dishes that contain lead
- teach children to wash their hands often, not to lick their fingers or bite their nails
- avoid home remedies or cosmetics that contain lead (Azarcon, Greta, Pay-loo-ah, Alkohl or Kohl and hair coloring products)
- buy food packaged in cans that are not made with lead solder

Know and be able to detect lead poisoning symptoms

- common severe lead poisoning symptoms include: fatigue, memory loss, balance problems, weakness in the fingers, chronic bowel troubles and visual difficulties; less visible symptoms may include: tantrums, short attention span, learning disabilities or irritability.
- a simple blood test can detect high lead levels
 - if you suspect lead poisoning, take action immediately, call the [National Lead Information Center](#) at **1-800-424-LEAD [5323]** for general information and for testing and treatment programs (which may include diet changes, medication or hospitalization) in your area

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- [U.S. Environmental Protection Agency \(EPA\)](#) -- National Lead Information Center (NLIC) at 1 (800) 424-LEAD [5323].
- [U.S. Environmental Protection Agency \(EPA\)](#) -- Safe Drinking Water Hotline at 1 (800) 426-4791.
- [U.S. National Library of Medicine, MedlinePlus, National Institutes of Health \(NIH\)](#) -- Lead Poisoning.
- [U.S. Department of Labor, Occupational Safety and Health Administration \(OSHA\)](#) -- Lead Safety and Health.
- [U.S. Department of Housing & Urban Development \(HUD\)](#) -- Healthy Homes and Lead Hazard Control (OHHLHC).
- [Centers for Disease Control & Prevention \(CDC\)](#) -- Prevention Tips, Policy Resources, Tools & Training, Publications, Data & Surveillance.
- [Centers for Disease Control & Prevention \(CDC\)](#) -- Childhood Lead Poisoning Prevention Program.
- [U.S. Department of Health and Human Services, Public Health Service Agency for Toxic Substances and Disease Registry](#) -- Lead.
- [Louisiana Department of Health & Hospitals](#) -- Childhood Lead Poisoning Prevention Program.

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Selected Papers

[PubMed Publications](#)



- Howard W. Mielke, Christopher R. Gonzales, Eric T. Powell, Aila Shah, Kenneth J. Berry, Daniel D. Richter, [Spatial-temporal association of soil Pb and children's blood Pb in the Detroit Tri-County Area of Michigan \(USA\)](#), *Environmental Research*, Volume 191, August 27, 2020
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- [Help Make New Orleans Lead-Safe for Children](#) -- Howard W. Mielke, Department of Pharmacology, Tulane University School of Medicine, New Orleans.
- [There is no known safe level of lead exposure and children under 3 are at especially high risk --](#) Mielke HW, Gonzales CR, Powell ET. Department of Pharmacology, Tulane University School of Medicine, New Orleans.
- [Urban Gardening: Managing the Risks of Contaminated Soil](#) -- "Interest in urban agriculture has grown as residents seek to revitalize cities and improve access to fresh produce. Investigators are figuring out how to maximize the benefits of gardening while minimizing the risks of contaminated urban soils", Environmental Health Perspectives.

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Report: Using Google Earth to Visualize and Interact with the New Orleans soil legacy Pb and blood Pb data before and after Hurricane Katrina

The New Orleans soil legacy Pb and blood Pb data collections and studies were conducted before Katrina and repeated 15-19 years after Katrina by **Howard Mielke, Chris Gonzales, and Eric Powell** at **Tulane University** in cooperation with **Trina Evans** and **Ngoc Huynh** of the **Louisiana Department of Health Healthy Homes and Childhood Lead Poisoning Prevention Program**. All data for the Pre-K and post-K surveys have been packaged into a Google Earth kmz (keyhole markup language zipped) file. It is part of our responsibility to share this report with the citizens of New Orleans.

Follow these instructions to view the project:

1. Download [Google Earth Pro](#)
2. Install Google Earth Pro and launch.
3. *Important:* If you are not familiar with Google Earth, read the introductory users guide found at: https://serc.carleton.edu/introgeo/google_earth/UserGuide.html
4. Download KMZ file: [New Orleans Pb surveys soil & children](#)
5. Locate downloaded kmz file and double click on it.
 1. The file will open in Google Earth. Please note that this file contains a lot of data and it may take some time to load on slower computers.
 2. The kmz file will appear as new item called "Temporary Places" in the layers pane on the left side of Google Earth.
 3. In that pane, uncheck the box called [New Orleans Pb surveys soil & children](#). The file has six items which correspond to layers on the map. To view the layers, expand by clicking the little black arrow to the left of the box.
6. Check the boxes for the following layers:
 1. Pre-Katrina Pb kriged.
 2. Post-Katrina Pb kriged.
 3. Soil Pb kriged (legend).
 4. Toggling between the two maps can be accomplished by turning on and off the Post-Katrina Pb kriged subheading. The legend applies to both sets of soil samples.
7. Check the box for the Census Tract Soil and Blood Pb layer. Move your mouse to a blue-bordered Census Tract and click. The pop-up window lists information about median Soil Pb & Blood Pb for both surveys. If you move your mouse into a blue-bordered census tract and see a hand cursor, keep moving your mouse within that area until you see an actual arrow cursor. Then you can click and see the information.

Example: Census Tract 274 information below describes the information for each layer.

CTract 274.00 (Census tract number -1990 tract numbers)
 Pre-K SPb 82 (median soil Pb, Pre-K survey)
 Post-K SPb 25 (median soil Pb, Post-K survey)
 SPb Units mg/kg (units also referred to as ppm)
 Pre-K N BPb 217 (number of children tested, Pre-K)
 Post-K N BPb 63 (number of children tested, Post-K)
 Pre-K BPb 3.7 (median blood Pb Pre-K)
 Post-K BPb 1.2 (median blood Pb, Post-K)
 BPb Units µg/dL (micrograms of Pb per deciliter of blood)

8. Look up individual sample results for Pre-Katrina (green) and/or for Post-Katrina survey (blue) sample collection sites. The individual samples are listed as Foundation (FND), residential street (STR), busy street (BST), open space (OPS).

Brief Discussion: The environmental Pb chemistry of the city plays an important role in multiple health issues which are associated with socioeconomic disparities in New Orleans. Soil legacy Pb is invisible. This kmz file contains novel information about the decades-long

continuing decline of environmental Pb and children's Pb exposure. Knowledge about the dynamic Pb chemistry of the urban environment and its spatiotemporal distribution provides a tool for primary prevention of children's Pb exposure.

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About Us...

Lead's Urban Legacy deals with lead, a pervasive environmental pollutant that alters the biological signals in the human nervous system. The adverse effects of lead on brain health and function have been known since the Roman Empire.



Howard Mielke, Research Professor Emeritus, Department of Pharmacology, Tulane University School of Medicine is an expert on this topic. Dr. Mielke has been studying lead and its effects on health for over 40 years resulting in [numerous publications](#).

Dr. Mielke's work has been covered in several public media (including "[Hidden Poison](#)" broadcast by ABC Primetime, USA Today's "[Ghost Factories](#)", WBRZ's "[Lead in Playgrounds](#)", WVUE's "[Toxic Beads](#)", NOLA.com "[Lead is still in the city](#)", Detroit Free Press' "[Hazards lurking in soil as children play](#)", Mother Jones' "[America's Real Criminal Element: Lead](#)"), The Atlantic's "[The Poisoned Generation](#)", and KFF's "[Poison at Play: Unsafe Levels of Lead Found in Half of New Orleans Playgrounds](#)".

Dr. Howard Mielke is the creator of the **Lead Lab project**, a not for profit initiative dedicated to helping communities with lead contamination in children's play areas. He is currently a faculty member in Tulane School of Medicine's Pharmacology Department and part of the Environmental Signaling Laboratory research effort.

Dr. Mielke most recently participated and facilitated the New Orleans Museum of Art's [Family Day: NOMA Unleaded](#) event, which involved several activities themed around awareness of lead in the environment.

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This site is also part of the **Environmental Signaling Network (ESN)** project, which includes e.hormone.tulane.edu and is hosted by Tulane University. ESN was funded by a grant from the National Science Foundation on *Enhancing Diversity in Environmental Biology*, and the generous support of the Weatherhead Foundation. Legacy funding for ESN includes an originating grant by the W. Alton Jones Foundation, a Research Coordination Network Grant from NSF, and grants from the Office of Naval Research, USDA and EPA to [John A. McLachlan](#) as PI.

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