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FULL-SERVICE ENVIRONMENTAL CONSULTING:

Hazardous materials investigation—**asbestos, lead, radon, PCBs**

Abatement planning, design, and project monitoring

Indoor air quality—**sampling, testing, and monitoring**

Industrial hygiene investigations

OSHA compliance audits and monitoring

Water testing, monitoring, and remediation

Microbiologicals consulting—**mold, bacteria**

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LEAD AWARENESS—Part II

Lead can occur ... IN THE SOIL

Background concentrations of lead that occur naturally in **surface agricultural soils** in the United States average 10 parts per million (ppm) with a range of 7 to 20 ppm. Soils with lead levels above this range are primarily the result of lead contamination.

Soil lead content in **urban and suburban backyards** can reach levels nearly nine times higher than those of rural backyards—275 ppm compared to 25 ppm. Studies conducted in urban areas have shown that soil lead levels are highest around building foundations and within a few feet of busy streets. Once lead has been deposited, as from prior emissions of leaded gas or the deterioration of consumer lead-based paint, it moves very little through the soil and can persist for a long time. Therefore, lead contamination of soil continues to be a concern in our cities even though the sale of leaded gas and lead-based paint is now banned.

Since plants do not take up large quantities of soil lead, the levels considered safe for growing plants will be much higher than soil lead levels where eating soil is of concern. **Inadvertent ingestion** is more likely to result from lead-contaminated soil or dust deposits on the plants than from uptake of lead by the plant. If you are concerned about the state of the soil in your garden, always remove outer leaves of leafy crops, peel all root crops, and thoroughly wash the remaining produce in water containing vinegar (1 percent) or soap (0.5 percent).

Lead in soil can be a hazard when children play in bare soil or when people bring contaminated soil indoors on their shoes. Because of the possibility of lead exposure to children through **hand-to-mouth activity**, areas with high lead levels in the soil should not be used as recreational areas such as playgrounds, campgrounds, gardens or trails unless they have been remediated. If you suspect high levels of lead in your soil, it is desirable to have the soil tested by an EPA-certified lead risk assessor, who will ensure that accurate sampling is done and who will have your tests conducted by a laboratory specifically accredited for lead testing.

Currently, the best way of dealing with high-lead soil is elimination of the lead by physically removing the soil. This should only be done by trained professionals and according to EPA guidelines. Bioremediation, or the growing, harvesting, and removal of contaminant-accumulating plants in these soils, has shown promise for cleaning up soils contaminated with cadmium, zinc, and copper, but at the present time this technique is of limited value for lead.

... ON SURFACES OR IN MATERIALS



Lead may leach into **foods or liquids** that have been stored in ceramics, pottery, china or crystal with lead in them, especially if the contents are acidic, like wine. Lead-glazed dishes usually come from other countries, and lead solder can still be found on cans made outside the U.S. Legally imported foods, and their containers and wrappers, may have lead in them, and some folk medicines (e.g. greta, azarcon), ayurvedics, and cosmetics (e.g. kohl) contain lead. Some children's items, like inexpensive jewelry and vending machine toys, may contain lead.

Through their **work or hobbies**, certain people come into regular contact with lead, and they may bring lead home on their clothes, shoes, hair, or skin. Jobs that expose people to lead include the construction trades, painting and refinishing, car or radiator repair, plumbing, welding and cutting, electronics, municipal waste

incineration, battery manufacturing, lead compound manufacturing, rubber products and plastics manufacturing, lead smelting and refining, working in brass or bronze foundries, demolition, and working with scrap metal. Some hobbies that use lead-containing materials include pottery making, stained glass, hunting, fishing, and furniture refinishing. Safe work practices and hygiene are paramount for these activities. Wear your personal protection equipment (PPE), wash up frequently, shower before you return home if possible, and launder work/hobby clothes separately from your family's clothes.



People may be at risk from handling objects painted in lead-based paint, e.g. old toys or furniture, or from **lead chips and dust** on surfaces and objects that they touch.



Though the federal government banned lead-based paint in 1978, and some states stopped its use even earlier, many buildings today still contain significant amounts of LBP. In most cases, LBP in good condition is not a hazard, except in places where painted surfaces rub against each other and create dust, e.g. when a window is opened, producing friction between sash and sill. Peeling, chipping, chalking, or cracking lead-based paint is a hazard and needs immediate attention. LBP may also be a hazard when found on surfaces that children can chew or that get a lot of wear-and-tear, such as porches, fences, door frames, stairs, railings, and banisters. Paint should be sampled by an **EPA-certified lead inspector** and analyzed with XRF (x-ray fluorescence) and/or tested at an accredited lab to accurately determine the presence of lead. Home test kits available to the consumer cannot detect small amounts of lead under some conditions and should not be relied upon to maintain your building.

... IN LIVING ORGANISMS



Lead enters the human body either by **ingestion or inhalation**. The effects are the same whether lead is breathed in or swallowed. The human body cannot tell the difference between lead and calcium, which is a mineral that strengthens the

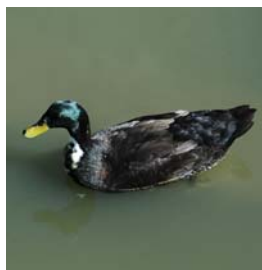
bones. Like calcium, lead remains in the bloodstream and organs (e.g. muscle or brain) for a few months. What is not excreted is absorbed into the bones, where it can collect for a lifetime.

Research suggests that the primary sources of **lead exposure for children** are deteriorating lead-based paint, lead-contaminated dust, and lead-contaminated residential soil. Children 6 years and younger are at particular risk for lead exposure because they have frequent hand-to-mouth activity, so are more likely to ingest lead, and their fast-growing bodies absorb lead more easily than those of adults. Children's nervous systems are still undergoing development and are therefore more susceptible to the effects of toxic agents. Lead is also harmful to the developing fetuses of pregnant women.

Lead in the human body can be measured in blood, urine, bones, teeth, or hair. The most frequent test for lead poisoning is to measure the **blood lead level (BLL)**, which shows the amount of lead circulating in the blood stream, reported in micrograms per deciliter ($\mu\text{g}/\text{dL}$). But BLL does not show the amount of lead stored in the body or its cumulative effects. Lead can affect almost every organ and system in your body. The most sensitive is the central nervous system and brain. Lead exposure can cause high blood pressure, heart disease, and anemia. Lead also damages kidneys and the reproductive system.

Even small amounts of lead in the body can cause **harmful effects**. Low levels of lead in blood (those below $10 \mu\text{g}/\text{dL}$) have been associated with reduced IQ and attention span, learning disabilities, poor classroom performance, hyperactivity, behavioral problems, impaired growth, and hearing loss. Very high blood lead levels ($70 \mu\text{g}/\text{dL}$ or greater) can cause severe neurological problems such as coma, convulsions, or even death.

The **degree of harm** from lead exposure depends on a number of factors, including the frequency, duration, and dose of the exposure(s), and individual susceptibility factors (e.g., age, previous exposure history, nutrition, and overall health). In addition, the degree of harm depends on one's total exposure to lead from all sources in the environment—air, soil, dust, food, and water.



Lead poisoning in **wildlife** has been documented in sport fish and waterfowl, though contamination in urban wildlife has received little attention.

Animals take up lead into their tissues through diet and inadvertent soil consumption. Each year waterfowl ingest thousands of tons of spent shot containing lead, and millions of birds die off. American robins can have high levels of lead in their blood due to foraging on earthworms that live in contaminated soil. As long as lead remains in the air, the soil, hunting ammunition, and fishing sinkers, our wildlife are at risk of exposure along with our children and ourselves.

More Information

More information is available through the **National Service Center for Environmental Publications (NSCEP)** (formerly NCEPI), a central repository of more than 7,000 EPA documents in paper and/or electronic format available for free distribution. Visit www.epa.gov/ncepihom or call 1 (800) 490-9198.

Some suggested reading/viewing available from the NSCEP includes:

- 3T's Toolkits for Reducing Lead in Drinking Water - Training, Testing, and Telling* - a suite of targeted guidance documents for schools, child care facilities, and community partners.
- What Your School or Child Care Facility Should Know About Lead in Drinking Water* (DVD)
- Lead in Drinking Water in Schools and Non-Residential Buildings*
A manual for officials responsible for facilities maintenance and/or safety, demonstrating how drinking water can be tested for lead and how contamination problems can be corrected if found.
- Sampling for Lead in Drinking Water in Nursery Schools and Day Care Facilities*
A companion document to "Lead in Drinking Water in Schools and Non-Residential Buildings"
- Lead Contamination Control Act (LCCA)*
An overview to the provisions of the LCCA
- Lead and Copper Rule: A Quick Reference Guide for Schools and Child Care Facilities that Are Regulated Under the Safe Drinking Water Act*
- The Lead-Based Paint Pre-Renovation Education Rule: A Handbook for Contractors, Property Managers, and Maintenance Personnel*
- Lead-Based Paint: Operations and Maintenance Work Practices Manual for Home and Buildings*
- Lead Safety for Property Owners, Developers, and Managers*

Answers to our Lead Awareness Quiz:

1. True, 2. True, 3. False, 4. False, 5. False, 6. False, 7. False, 8. False, 9. True, 10. True, 11. False