Almost everyone knows that lead-based paint caused serious health problems (especially in children) before it was banned. But not everyone is aware that people can ingest lead from other sources such as contaminated food and drinking water. Imported foods in lead-soldered cans and foods served in lead-glazed ceramics or leaded crystal may contain lead. If your water comes from a public water system there is little cause for concern, because the law requires that public systems eliminate any sources of lead contamination. But if your water comes from a private well, it might contain enough lead to warrant action.

How does lead affect health?
Lead can be absorbed through the digestive tract, the lungs and the skin. It accumulates in the body and can cause lead poisoning. Even at low concentrations, when there are no outward symptoms, lead can damage the brain, kidneys, nervous system and red blood cells. Some effects of lead poisoning may diminish if the source of exposure is removed, but some damage is permanent.

Symptoms of lead poisoning include tiredness, a short attention span, restlessness, poor appetite, constipation, headaches, sudden behavior change, vomiting and hearing loss. Adults with lead poisoning may be irritable and disoriented.

Interestingly, most children with lead poisoning do not show any visible symptoms, even though young children, infants and fetuses absorb lead more quickly than adults and are vulnerable to even small amounts of it. Lead poisoning can cause a child’s mental and physical development to be irreversibly stunted.

Lead in drinking water is not a main source of lead poisoning, but it can increase the amount of lead people are exposed to. This is particularly risky for infants who drink baby formulas and juices that are mixed with water containing lead. On average, about 10 to 20 percent of a child’s lead exposure might come from drinking water; however, infants who are fed formula could get 40 to 60 percent of their lead intake from water.

The only way to detect lead poisoning is with a blood test. The Centers for Disease Control and Prevention recommend that all children be tested. Your doctor can give you more information.

How does lead enter drinking water?
Though lead rarely occurs naturally in water, lead mining and smelting operations may be a source of contamination. According to the U.S. Environmental Protection Agency (EPA), Texas is among the top ten states in the amount of lead released into the environment. Most lead contamination takes place at some point in the water delivery system as water corrodes service connections, pipes, solder and brass fixtures that contain lead. Some waters are more corrosive than others. Factors that cause water to be corrosive are acidity, high temperature, low dissolved solids content, and high amounts of dissolved oxygen or carbon diox-
How do I test water for lead?

There are no laws requiring that private water supplies be tested for contamination but it is a good idea to do so, especially if a problem is suspected or there are young children or pregnant/nursing women who use the water. To determine if drinking water contains lead, the water must be tested by a laboratory certified to do these tests. Home test kits are hard to use and may not be accurate. Contact your county Extension office, local water utility or health department for information about water testing laboratories in your area. Carefully follow all directions the laboratory gives you regarding the kind of container to use and how to collect and submit water samples.

It’s important to collect two samples.

Sample #1: Do not use the plumbing system for 6 hours or more, so that water sits motionless in the pipes. Then turn on the water and collect a sample immediately. This is called a first-draw or first-flush sample. Because lead continuously dissolves into water over time, water collected after the system has not been used for awhile will contain the highest concentration of lead.

Sample #2: Collect a second sample of water after the tap has run for at least 5 minutes. This is called a purged-line or flushed sample. It will show the lead content of water that has not been in contact with the plumbing system for a long time.

What do the test results mean?

Interpreting a water test involves not just determining how much lead is in the water, but also comparing the amounts of lead in the two samples. The EPA has established Maximum Contaminant Level Goals (MCLG) for various chemicals that may be found in water. The MCLG is the highest level of contamination that can exist without causing health concerns. The MCLG for lead in drinking water is set at zero. In other words, the EPA considers any amount of lead to be undesirable. However, the EPA has set the maximum contaminant level or action level at 15 ppb. This is the lead concentration the EPA enforces with public water supplies. When the concentration is greater than this action level the water supplier must eliminate the problem. Users of private water supplies also should set 15 ppb as an action level. If your water contains more lead than this, stop using it immediately and find an alternate source of water until the problem can be resolved.
If the first-draw sample contains more lead than the purged-line sample, lead is leaching from the household plumbing system. If both samples contain nearly equal amounts of lead, the water is being contaminated by a source other than the household plumbing system.

**How do I eliminate lead from drinking water?**

If tests indicate that lead is leaching from the household plumbing system, try to find and eliminate the source. Sometimes this is neither possible nor cost-effective, in which case "point of use" treatments can be installed (discussed below).

If the source of lead is beyond the household plumbing, the first step is to try to locate and eliminate the source. If your household is served by a public water system, contact the water supplier and ask what steps will be taken to remove the contamination. If the source is a private well, check both the well and the pump for sources of lead. A licensed water well contractor may be able to help you determine whether any of the well components are sources of lead. If they are, eliminate them if at all possible.

In searching for sources of contamination, determine whether any electrical equipment (including telephones) has been grounded to water pipes. Electric current traveling through the ground wire accelerates corrosion in pipes. A qualified electrician will be needed to correct this problem.

When it is not possible to eliminate sources of lead contamination, the only option is to use an alternate source of drinking water (such as bottled water) or install a treatment system on one faucet in the home and draw water for drinking and cooking from that faucet only. This is called a "point of use" treatment system. There are several types of treatment systems, including reverse osmosis, distillation and carbon filter systems. Reverse osmosis units remove about 85 percent of the lead from water. Distillation removes about 99 percent. A water softener can be used with both a reverse osmosis and a distillation unit. Carbon filters that remove lead must have low flow rates, generally not more than 1/2 gallon per minute.

**Summary**

Water from private wells can be contaminated by lead leaching from pumps, pipes and other system components. To safeguard health, it is important to have water tested and, if there is a problem, eliminate sources of lead contamination. If it is not possible to eliminate the lead entirely, there are treatment systems that can make water safe for drinking and cooking.

This publication was adapted from NebGuide G1333, "Drinking Water: Lead," published by Nebraska Cooperative Extension Service, 1997.

**For more information:**

- "Lead Contamination in Water Wells," L-5096 [Texas Cooperative Extension].

**Acknowledgments**

Guidance and assistance was provided by the Texas Groundwater Protection Committee and the Texas Commission on Environmental Quality. The effort was partially funded by the U.S. Environmental Protection Agency.
This publication was funded by the Rio Grande Basin Initiative administered by the Texas Water Resources Institute of Texas Cooperative Extension, with funds provided through a grant from the Cooperative State Research, Education, and Extension Service, U.S. Department of Agriculture, under Agreement No. 2001-45049-01149.

Produced by Agricultural Communications, The Texas A&M University System

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