The interest in reducing environmental lead exposure is evident with the recent revision by the U.S. Environmental Protection Agency (EPA) for the nation's Air Quality Standards, which were lowered from 1.5 to 0.15 ug of lead per cubic meter of air. "With these stronger standards, a new generation of Americans is protected from harmful lead emissions, especially children," said EPA Administrator Stephen L. Johnson. The same goal was desired for the drinking water lead standard, which the EPA lowered in 1998 from 50 to 15 µg of lead per liter of water.

By Ivars Jaunakais

CAUTION: lead in water

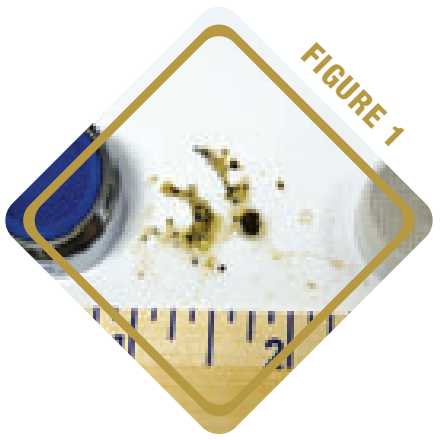

FIGURE 1

Elevated levels of lead in drinking water occur despite government action

Focus has primarily been on dissolved lead found in residential drinking water, which is why faucets should be turned on for a minute first thing in the morning in order to flush out standing water in plumbing fixtures and pipes. This should also be done before drinking the water.

Lead & Laws

Even though most drinking water lead problems continue to occur in isolated homes, large-scale incidents of elevated levels in drinking water occur in spite of the many steps taken by governmental agencies. A few years ago, Washington, D.C., dealt with issues associated with elevated lead levels when the drinking water treatment process was changed.

The U.S. government accepted the dangers of lead as evident in the new laws and regulations that restrict exposure. A 1986 law restricts the amount of lead in plumbing fixtures and pipes to levels of 8% or less. California thought this law was too lenient and adopted Proposition 65, which requires all water fixtures sold in the state to meet the NSF/ANSI Standard 61 Lead-Free Standard.

The encouraging news is that the average blood-lead level in U.S. citizens has decreased over the last 30 years; however, most of this reduction has been attributed to the removal of lead in gasoline and paint. The bad news is that current research has not been able to identify the threshold below which lead will not have a detrimental effect on us, especially small children.

Even at low levels, the following effects have been associated with lead:

- Lower IQ levels;
- Elevated blood pressure;
- Altered kidney function;
- Measurable cognitive decline;
- Increased violent behavior; and
- On rare occasion, death from high exposure.

Detecting Lead

Because lead is present in most metal plumbing and some solder (the law allows up to 8% lead), it will continue to be a concern in our water. Lead is only slightly soluble in water at or below 0.1 gram per liter (100,000 ppb), but problems continue. Below a pH level of 6, Pb2+ is the major dissolved lead species. Above pH 7, the dissolved polymeric hydroxocomplexes Pb4 (OH)4 4+, Pb6 (OH)8 4+ and Pb6 (OH)8 4+ predominate.

All forms of dissolved lead can be detected with a LeadQuick test kit, which takes five minutes to complete, uses four reagents and the Hach LeadTrak Colorimeter II. The four reagents involve minimum chemical hazard because only five drops of the 0.5 molar nitric acid (1ST reagent) is used. The porphyrin 5-,10-,15- and 20-terakis (1-methylpyridinium-4-yl) porphine (TMPYP) is used as an indicator in the test, which delivers optimum accuracy and sensitivity using minimum manipulation. The test is done on unpreserved, freshly drawn water samples.

I tested for lead levels as I traveled this past year. At different hotels, I found the dissolved lead levels to be below 3 ppb. It has been reported that tap water averages about 1 ppb dissolved lead. At the same hotels, lead was detected in varying amounts in the solid particles trapped in the faucet aerator filters. One hotel had visible lead particles trapped in the faucet aerator (Figure 1). Table 1 shows the level of lead that was found in the particles after a five-minute exposure of the particle to a dilute concentration of nitric acid (0.02N).

This random study only involves samples that I encountered, but the message is clear that undissolved particles in tap water have a high likelihood of containing lead. Point-of-use filtration devices work to remove dissolved lead from drinking water and should contain third-party-certified charcoal and a filter screen that removes particles. *wqp*

TABLE 1

Faucet Location	Extracted Lead in Particles (µg)
Business Men's Bathroom	1.9
Business Women's Bathroom	0.2
Business Lunch Bathroom	0.5
Banff, Canada - Hotel Bathroom	0.3
Edmonton, Canada - Hotel Bathroom	0.6
Barcelona, Spain - Hotel Bathroom No. 1	0.1
Barcelona, Spain - Hotel Bathroom No. 2	1
Amsterdam - Hotel Bathroom	0.3
Colorado Springs, CO - Hotel Bathroom	0.1
Denver, CO - Hotel Bathroom	0.9
Chicago, IL - Hotel Bathroom	0.3

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For more information on this subject write in 1012 on the reader service card.

WEB RESOURCES

Related search terms from www.waterinfolink.com: testing, contaminants, POE filtration, POU filtration

For more information related to this article, visit www.wqpmag.com/lm.cfm/wq010902