Lead in Drinking Water

This brochure tells of growing evidence that even moderate levels of lead can be harmful to human health, and particularly to the health of small children and developing fetuses. For this reason, Wisconsin residents are advised to:

1) **run your water in the morning** for two or three minutes, or until it gets as cold as it will get, before you drink it, and
2) find out how much lead your water is dissolving from your plumbing system by having your water tested for lead.

Whether your water comes from a community water system or your own private well, this brochure will discuss the lead issue in some detail, and will provide some specific recommendations for a variety of situations.

The Wisconsin Department of Natural Resources Bureau of Drinking Water & Groundwater would like to thank the Groundwater Coordinating Council (GCC) Education Sub-Committee for their part in the development and editing of this publication. For more information on the GCC, it's member organizations and programming, please visit **wisconsin.gov**. *Choose "Government," "State Agencies," followed by "List of Agencies" then select "Groundwater Coordinating Council."*

Wisconsin Department of Natural Resources
Bureau of Drinking Water & Groundwater

What is Lead? How can I be exposed?

Lead is a toxic metal which has been used in the construction of most household plumbing systems in Wisconsin. Water within the plumbing system will continuously dissolve the lead it contacts. The rate can vary greatly with variations in natural water quality and the age of the plumbing system. Most water in Wisconsin is corrosive enough to dissolve some amount of lead. When the water stands for extended periods of time, such as overnight, lead concentrations in the water can increase greatly.

Lead is widespread in the environment, and people absorb lead from a variety of sources every day. Although lead has been used in numerous consumer products, the most important sources of lead exposure to the general population are:

- Lead-based paint
- Food (which can be contaminated by lead in the air or in food containers, particularly lead-soldered food containers)
- Soil and dust (which has been contaminated by air, and includes dust both inside and outside the home)
- Outside air from vehicle emissions and other sources. These have been reduced significantly since placing federal controls on lead in gasoline
- Drinking water (from the corrosion of plumbing systems)

It is estimated that drinking water can make up 20% or more of a person's total exposure to lead. Food is the greatest single source of lead for the average adult.

How does lead get into my water supply?

Most Wisconsin drinking water sources, either wells or lake water intakes, have little or no measurable lead. The source of lead in drinking water is most likely lead pipe or solder in the house water supply plumbing, or lead service lines which join buildings to street water mains.

Under typical circumstances, lead will dissolve into the water. The concentration of lead in drinking water can vary greatly, depending on the corrosivity of the water, the type and age of the plumbing materials used in the house, and the length of time that the water stands in the pipes. The highest levels of lead occur when very corrosive water stands motionless in lead or lead-soldered copper pipe for long periods of time.

Corrosivity varies greatly with water quality, but hard water is generally less corrosive than soft water. Nevertheless, hard water alone does not always guarantee that there will be no elevated lead levels.

A greenish discoloration and unpleasant taste of tap water are indications that copper pipes are corroding, but significant corrosion can occur even if there are no visible indications.

The age of a house relates to the type of plumbing system that can be expected. Through the early 1900s, lead pipes were commonly used for interior plumbing in some areas. Until the 1940s, lead piping was often used for the service lines that join buildings to street water mains. Lead piping can be recognized as a dull-grey metal which is soft enough to be easily scratched with a key or screwdriver. Scratched lead will be shiny underneath.

In the 1930s, copper pipes or galvanized steel pipes replaced lead pipes in most residential plumbing. However, the use of 50/50 tin/lead solder and lead-containing fluxes to join copper piping continued in Wisconsin until a ban on the use of lead solder and fluxes became effective in1984. Homes constructed after that date should have "lead-free" water supply plumbing systems. Also, any repairs of existing plumbing systems must be made with "lead-free" materials, such as tin/antimony (95/5) solder.

Studies indicate that the levels of dissolved metals in drinking water will decrease as a building ages. This is because, as time passes, a mineral or oxidation coating forms on the inside of the pipes (if the water is not too corrosive). This coating can partially insulate the water from the lead materials, significantly reducing levels of dissolved lead.

The longer water stands in a pipe the more lead can be dissolved. Because lead will continuously dissolve into the water, the resulting lead concentrations will increase directly with time. This is why water which is drawn first thing in the morning, or after any extended period of nonuse, will contain the highest levels of lead.

Federal and state standards have established an action level of 15 parts per billion (ppb) for lead in drinking water. The standard is adjusted to account for average lead exposures from other environmental sources as well. Nevertheless, lead has no beneficial health effects, and it is advisable to reduce the lead in your tap water as much as possible. This is particularly true for pregnant women or young children who may drink the water.

How does lead affect my health?

Lead absorbed by the lungs and the digestive tract from all sources enters the bloodstream, where it distributes to all tissues of the body. Excessive levels of lead can damage the brain, kidneys, nervous system, red blood cells and reproductive system. The degree of harm is directly related to the level of lead in the blood (from all sources). Known effects of exposure to lead range from subtle changes in body chemistry and nervous system functions at low levels of exposure, to severe toxic effects or even death at very high levels associated with acute poisoning. Some harmful effects are reversible if exposure is reduced, while other harmful effects can be permanent.

Young children, infants and fetuses appear to be particularly vulnerable to harmful effects of lead. A dose of lead that would have little effect on an adult can have a big effect on a small child. Also, growing children will more rapidly absorb any lead they consume. A child's mental and physical development can be irreversibly stunted by over-exposure to lead. In infants, whose diet consists of liquids made with water — such as baby formula — lead in drinking water makes up an even greater proportion of total lead exposure (40 to 60%).

How can I find out if my water is safe to drink?

There are certain obvious advantages to having your water tested for lead, including knowing exactly how high your lead levels rise after periods of nonuse. Even if you live in an older home with no lead piping and are in a hard water area, a lead test can confirm that there is little or no lead in your "first-draw" sample. If testing shows lead in your first drawn water, a lead test before and after flushing can confirm if your flushing procedure is working.

If you decide to have your water tested, it is recommended that you use a state certified laboratory which can detect lead in drinking water at 5 parts per billion or less. There are a number of laboratories statewide that can provide drinking water sampling materials and instruction. A list of certified labs is available online at **dnr.wi.gov**, Search: certified labs. Persons served by a public water system should contact the system owner to determine whether there has already been testing of homes with plumbing materials and aninstallation date similar to yours.

Private Wells

In addition to plumbing corrosion concerns, there are several other potential sources of lead in private wells. If your well draws water from a sand and/or gravel formation, you should know that some well screens contain lead, and many have been installed with a "lead packing collar." If such a device is contributing lead to your water, flushing will probably take longer. It is recommended that you have your water tested for lead.

If you own a "driven-point" well, and if you have ever "shot" the well to clear the screen, you have another potential source of lead in your water. Some individuals have actually poured lead shot into a well

to keep out sand. Lead wool has also been placed in some wells. (None of these practices has ever been recommended.) In any of these cases, it is recommended that you have your water tested for lead.

If you live in a former lead-zinc mining region of extreme southwest Wisconsin or if you live near existing or former cherry orchards in Door County, you may have lead in your **groundwater**. It is recommended that you have your water tested for lead.

If you have lead in your groundwater, flushing will not be effective. Point-of-use treatment devices, such as reverse osmosis and distillation units can be effective in removing lead. However, they can be expensive, their effectiveness varies, and they must be properly maintained. All makes and models of treatment devices must be approved by the Wisconsin Department of Safety and Professional Services. Department of Natural Resources approval may be required, under certain conditions, for the installation of a point of use treatment device. Contact the Bureau of Drinking Water and Groundwater at (608) 266-0821 or one of the DNR offices listed at the end of this brochure for additional information.

If a treatment device is installed, set up an effective and practical maintenance and monitoring program to be sure the system is maintained as recommended by the manufacturer. This is the best way to be certain that it is doing the job intended.

Bring in water from a known safe supply.

A new house

If your house was constructed after September 26, 1984, state law requires that the soldered joints be "lead-free." To check on this, try to scratch the outside of the solder at a pipe joint with a key or screwdriver. If the solder is dull in appearance, scratches easily, and is shiny underneath, it may be illegally-installed 50/50 lead/tin solder. Tin/antimony (95/5) solder, the typical replacement for lead solder, remains bright in appearance, and there is often a slight gap or indentation in the solder where the pipe and fitting meet. Lead solder usually bridges this gap completely.

If you suspect that lead solder was used in the construction of your plumbing system, have a "first-draw" sample of your water tested for lead. If lead is found at levels over 10 ppb, contact your local plumbing inspector or the Wisconsin Department of Safety and Professional Services, Safety and Buildings Division at **dsps.wi.gov** for further advice. (Lead often occurs in other metallic alloys such as brass and bronze and small amounts can occur in copper pipe itself.)

How can I reduce my exposure to lead in drinking water?

If your house was constructed before October, 1984, the easiest and most effective method of reducing lead in drinking water is not to drink water that has been in contact with your house plumbing for more than 6 hours, such as overnight or during your work day. Before using water for drinking or cooking, flush the cold water faucet by allowing the water to run until the water has become as cold as it will get (usually 2-3 minutes).

You must do this for each drinking water faucet — taking a shower will not flush your kitchen tap. Shower, toilet, or cold water laundry use will, however, partially flush the plumbing, and will often reduce the time needed to flush drinking water faucets. Buildings constructed prior to the 1940s may have service lines made of lead. Letting the water run for an extra 15 seconds after it cools should also flush this service line.

Studies by the DNR have shown that such flushing can reduce lead levels from hundreds of parts per billion to less than 3 parts per billion (the current detection limit at the State Laboratory of Hygiene). Water flushed from the taps — usually one to two gallons — can be collected and used for nonconsumptive purposes such as washing; it needn't be wasted. (NOTE: The flushing procedures outlined above will usually be inadequate in large buildings such as apartment complexes.)

Another recommendation for reducing lead exposure is to **never cook with or drink water from the hot-water tap.** Hot water dissolves lead more quickly than cold water. So, do not use water taken from the hot tap for cooking or drinking and **especially not for making baby formula.**

Must every plumbing system be flushed in the morning? Not in all cases. Compliance samples collected show that, in areas with high water hardness, little or no detectable lead was found in homes which met **all** of the following conditions:

- Very hard, alkaline water (generally total hardness greater than 300 parts per million, reported "as calcium carbonate"),
- Water supply plumbing system more than five years old
- No lead piping
- No lead service line connecting to street water main

The individuals in these homes do not need to flush their house plumbing if water is used daily and many others with a similar situation will probably find few problems. You can contact your water utility or supplier for information on the level of water hardness in your area, as well as other information available on first-draw lead levels in the area.

A word of caution: it is not possible to **guarantee** that all homes with the above characteristics will have little or no detectable "first-draw" lead levels. If you do not have your water tested, flushing is a simple precaution.

The City of Princeton is checking to see if you have a lead service leading into your home.

We are not checking the plumbing within the home.

If your service line is found to be lead we will contact you once we get through the entire community with some options for replacement of the service line.

What is the State of Wisconsin doing about the problem of lead in drinking water?

- DNR rules establish a lead "action level" of 15 ug/L (micrograms per liter) in public water systems.
- All community and non-transient non-community water system owners are required under DNR rules to regularly test high-risk locations for lead. If more than ten percent of the locations exceed the action level the system owner must conduct a public education program and install system-wide treatment to reduce corrosion.
- DNR well and facility construction rules currently prohibit the use of lead in wells, pumps, and other water system components.
- Department of Safety and Professional Services rules currently restricts the use of lead in solder, fluxes and plumbing system piping.
- DNR will continue to work with community water systems to reduce the corrosivity of the water through central treatment. System-wide corrosion control can be designed to either reduce the actual corrosivity of the water, or to coat the piping with an additive which acts as a barrier between the pipe and the water.
- DNR will continue to provide updated information on the issue of lead in drinking water.

Contact Us

Customer Service Staff are here to assist you.

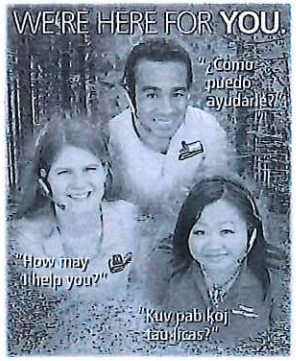
How may we help you?

Call Toll Free 1-888-WDNRINFO (1-888-936-7463)
Or, go to **dnr.wi.gov**, Search: Contact
Click on one of the following options:

Chat with customer service.

Call a representative.

Email your question.



Toll free hotlines
Violation Hotline:
1-800-TIP-WDNR or phone 1-800-847-9367
Confidentially report suspected wildlife, recreational and environmental violations.

Emergency Spill Hotline:
1-800-943-0003 phone

Bilingual Services are available
Drinking Water & Groundwater Program
101 S. Webster
P.O. Box 7921
Madison, WI 53707-7921
(608) 266-1054

For more information, go to **dnr.wi.gov**, Search: Drinking Water

The Wisconsin Department of Natural Resources provides equal opportunity in its employment, programs, services and functions under an Affirmative Action Plan. If you have any questions, please write to: Equal Opportunity Office, Department of the Interior, Washington, D.C. 20240.

This publication is available in alternative format (large print, Braille, audiotape, etc.) upon request. Please call (608) 266-0821 for more information.

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