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)
- 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 lead in drinking water contributes between 10 and 20% of total lead exposure in young children. Food is the greatest single source of lead for the average adult.

How does lead get into my water supply?

Most Wisconsin drinking water systems use 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.

How can I be exposed?

Lead exposure in young children is particularly critical. It is known to cause permanent central nervous system damage, including decreased intelligence and developmental delays, hearing loss, language problems and behavioral disorders. 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, or
2. find out how much lead your water is dissolving from your plumbing system.

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

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

There are certain obvious advantages to having your water tested for lead, including knowing exactly how high your lead levels are. Flint and other areas of nonuse. Even if you live in an older home, it is possible to have no lead they consume. A child's mental and physical development can be irreversibly stunted by over-exposure to lead.

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

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Letting the water run for an extra 15 seconds after it cools 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.

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).

If you live in a former lead-cinn 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.

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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.

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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 Commerce. 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.

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.

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 wells 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.

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If you must do this for each drinking water faucet — taking a shower will not flush your kitchen tap. Showers, toilets and 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: with the limited data available, 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.