

FACT SHEET



HARD WATER

In response to concerns regarding water quality issues, the City of Longview has asked a team of health science experts to review water quality data and determine whether some of the components of Longview's drinking water might have health impacts. This fact sheet was prepared by Intertox, Inc.* for City of Longview customers to address commonly asked questions.

What is hard water?

"Hard water" is water that has a high content of dissolved minerals. The minerals are mostly calcium and magnesium but other minerals (iron and manganese) can be dissolved in the water. These minerals are deposited in water as it moves through soil and rock and can eventually end up in the water supply.

How is water hardness measured?

Hardness is measured in milligrams of calcium per liter (mg/L). One mg/L is sometimes referred to as a part per million (ppm).

Water Hardness Classifications

CLASSIFICATION	MG/L OR PPM
Soft	<17
Slightly Hard	17-60
Moderately Hard	60-120
Hard	120-180
Very Hard	over 180

The water hardness in the State of Washington ranges from slightly hard to hard.

According to the U.S. Geological Survey, more than 85% of the U.S. has hard water.¹

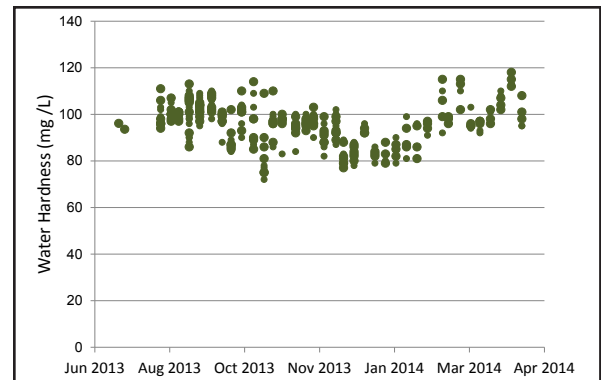
How small is one part per million?

One part per million is equal to:

- One minute in 2 years
- One quarter teaspoon in six 55-gallon drums

What is the hardness of drinking water in Longview?

Data from water sampling from July 2013 to April 2014 at 23 locations in Longview show an average hardness of 96 mg/L (moderately hard). Water hardness values ranged from 72 to 118 mg/L.



What does the government say about how much hardness is acceptable in drinking water?

The U.S. EPA establishes Primary Drinking Water Standards based on health considerations and Secondary Drinking Water Standards based on aesthetics such as taste, odor, color, or corrosivity. U.S. EPA has no Primary or Secondary Standard for water hardness, or for calcium or magnesium.

How much calcium and magnesium am I exposed to?

Calcium and magnesium are essential minerals and beneficial to human health. They are found in milk, vegetables, and grains.

Typical recommended dietary intakes (RDIs) are about 1000 mg of calcium per day and 200-400 mg of magnesium per day for adults.²

Average Amount of Calcium or Magnesium in Milligrams (mg) per Serving^{3,4}

FOOD OR BEVERAGE (SERVING)	CALCIUM MG PER SERVING	FOOD OR BEVERAGE (SERVING)	MAGNESIUM MG PER SERVING
Milk (8 ounces)	300	Bran cereal (1/2 cup)	112
Tofu (1/2 cup)	258	Brown rice (1 cup)	86
Kale (1/2 cup)	61	Spinach (1/2 cup)	78
Pinto beans (1/2 cup)	45	Almonds (1 ounce)	77
Broccoli (1/2 cup)	35	Milk (8 ounces)	34

A person drinking 2 liters (about 8 ½ cups) of water a day containing the highest level of hardness measured by the City of Longview would receive at most 236 mg of calcium per day from drinking water, an amount that is less than drinking one 8-ounce glass of milk.

What can I do about hard water?

While hard water does not pose any health risks, it can be a nuisance for customers. Hard water minerals may result in the appearance of white calcium deposits on cooking utensils, baby bottles, coffee pots and glassware. Hard water produces soap scum or film on glass shower doors, shower walls, bathtubs, sinks, and faucets.

Here are some helpful hints for dealing with hard water:

- Leave a squeegee in the shower to clean the walls and shower door after each use.
- Remove hard water deposits from glass and plumbing fixtures using distilled vinegar and a soft cloth.
- For plugged shower heads, fill a plastic bag with vinegar and attach it to the shower head with a rubber band and let it sit overnight.
- Use distilled water in steam irons and automobile batteries to extend their life.
- Consult manufacturer recommendations for dishwashers, clothes washers and coffee makers for use with moderately hard water.
- For bathroom cleaning, laundry, or kitchen applications, use detergents that include a phrase like “works in hard water” on the label.
- Remove soap scum more easily using new or used dryer sheets.

What happens to calcium and magnesium when they enter the body?

Calcium in drinking water is absorbed in the digestive tract and is used to build bones and teeth. Magnesium in drinking water is also absorbed through the stomach, and helps form proteins and in the maintenance of blood pressure and metabolism. Excess calcium and magnesium are excreted by the kidneys.

Calcium and magnesium are essential nutrients. Studies have demonstrated that adequate calcium intake can protect against osteoporosis, kidney stones, and hypertension. Adequate magnesium intake has been shown in some studies to protect against hypertension, heart disease, and type 2 diabetes.²

What type of health effects can be caused by exposure to hard water?

Drinking water with very high concentrations of both magnesium and sulfate (above 250 mg/L each) can cause temporary gastrointestinal effects (diarrhea).² The highest concentration of magnesium measured in Longview’s drinking water was 7.0 mg/L and the highest concentration of sulfate was 0.76 mg/L, well below concentrations that cause this effect.

Exposure to hard water at concentrations above 150 mg/L has been suggested to play a role in aggravating existing eczema.² This is above the highest levels found in Longview’s water.

Are any health effects expected from the hardness of Longview’s water?

Based on the data analyzed for Longview’s water, no adverse health effects are expected from water hardness, even at the maximum concentration measured.

An infant (up to 12 months of age) would have to drink about (7) 8-ounce glasses of water a day containing the highest level of hardness measured by the City of Longview to meet the adequate daily adequate intake for calcium of 200 mg for an infant. The number of glasses is greater for adults (35) and children (25) due to their substantially greater size.



Where can I get more information?

The U.S. EPA has a searchable website for Frequently Asked Questions regarding water quality at <http://safewater.supportportal.com/ics/support/KBSplash.asp>

The USGS has a web page about water hardness at <https://water.usgs.gov/owq/hardness-alkalinity.html>

References

1. Water Quality Association, 2014. Hard Water, from <http://www.wqa.org/sitelogic.cfm?ID=477>
2. World Health Organization, 2011. Hardness in Drinking Water, from http://www.who.int/water_sanitation_health/dwq/chemicals/hardness.pdf
3. Linus Pauling Institute, 2001. Micronutrient Information Center: Calcium, from <http://lpi.oregonstate.edu/infocenter/minerals/calcium/>
4. Linus Pauling Institute, 2003. Micronutrient Information Center: Magnesium, from <http://lpi.oregonstate.edu/infocenter/minerals/magnesium/>

* Intertox is a health science research firm headquartered in Seattle, Washington. Intertox consists of a multidisciplinary team of experts in the medical and environmental sciences who work with clients to evaluate risks posed by chemicals and biological agents affecting human health.