

FACT SHEET

IRON

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 iron?

Iron is the second most abundant metal in the Earth's crust.¹ Rainwater dissolves iron as it filters through the soil and underlying geologic formations, causing it to seep into aquifers that serve as sources of groundwater for wells. Iron is most commonly found in nature in the form of compounds of iron and oxygen, known as iron oxides, such as rust.¹

How is iron measured?

Iron is mainly present in water in two forms: either the soluble form (as ferrous iron or Fe²⁺) or the insoluble form (as ferric iron or Fe³⁺). It is measured in milligrams (mg) of iron (either soluble or total) per liter (L) of water, or mg/L. One mg/L is sometimes referred to as a part per million (ppm).

Concentrations of iron in drinking water are normally less than 0.3 mg/L but may be higher where cast iron, steel, and galvanized iron pipes are used for water distribution.¹

In groundwater where iron is in the soluble form, concentrations will usually be 0.5–10 mg/L, but concentrations up to 50 mg/L can sometimes be found.¹

How small is one part per million?

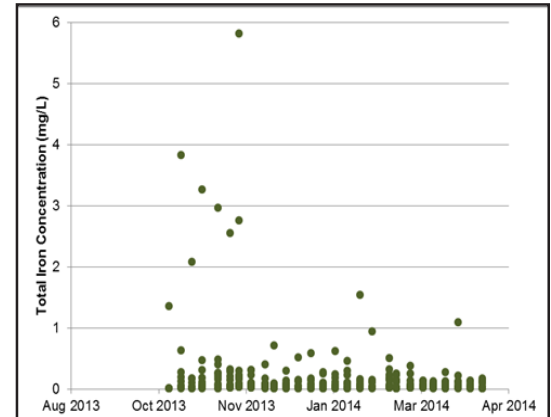
One part per million is equal to:

- One penny in \$10,000
- One hour in 120 years

What is the iron concentration in drinking water in Longview?

Data from water sampling conducted from October 2013 to April 2014 at 23 locations in Longview show a mid-level (median) total iron concentration of 0.05 mg/L and a mid-level soluble iron concentration of 0.01 mg/L. Total iron concentrations ranged up to 5.8 mg/L. Soluble iron concentrations ranged up to 1 mg/L. The highest concentrations were measured during re-

equilibration of the distribution system and have dropped as the system has stabilized.



What does the government say about how much iron 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 Standard for iron. The Secondary Maximum Contaminant Level (SMCL) for iron is 0.3 mg/L due to rusty color, sediment, metallic taste, and reddish or orange staining.²

How much iron am I exposed to?

Iron is an essential mineral, and is beneficial to human health. It is found in many foods, including meat, seafood, raisins, and prunes. Recommended dietary allowances (RDAs) for iron range from about 11-18 mg/day for children and non-pregnant adults, and 27 mg/day for pregnant females.³ The tolerable upper intake level (UL) for iron is set by the U.S. Institute of Medicine at 40 mg/day for infants and children, and 45 mg/day for adults.³

Average Amount of Iron in Milligrams (mg) per Serving³

FOOD OR BEVERAGE	MG PER SERVING
Raisin bran cereal (1 cup)	6-18
Beef (3 ounces)	2
Prune juice (6 ounces)	2
Kidney beans (1/2 cup)	2
Cashew nuts (1 ounce)	2

A person drinking 2 liters (about 8 ½ cups) of water a day containing the highest level of total iron from the sampling done by the City of Longview would receive at most 12 mg of iron per day from drinking water, less than the amount in one serving of some brands of raisin bran.

What can I do about iron?

While iron does not pose any health risks at the levels found in drinking water, it can be a nuisance for customers. Iron may result in the appearance of red or orange stains on sinks, toilets, and faucets. Here are some helpful hints for dealing with iron:

- Use a pumice stick or lemon juice and salt to remove mineral stains on toilets, tubs, and sinks.
- For bathroom or kitchen cleaning, use detergents that include phrases like “removes mineral stains” on the label.
- Cleaners containing oxalic acid or hydrochloric acid (muriatic acid) are effective at removing mineral stains. However, these products are not recommended for septic systems. Read and follow directions for these products carefully.

What happens to iron when it enters the body?

Iron present in drinking water is absorbed in the digestive tract.¹ Little iron is absorbed through the skin.

The amount of absorption in the digestive tract depends on how much iron a person has in their body due to typical daily intake and is controlled so that excessive amounts of iron are not stored in the body.¹

Iron is an essential component of hundreds of proteins and enzymes and supports normal red blood cell formation. Iron deficiency can result in anemia.³

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

Iron supplements can cause gastrointestinal irritation, nausea, vomiting, diarrhea, or constipation in some people.³

Are any health effects expected from the iron in Longview’s water?

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

An infant (up to 12 months of age) or child would have to drink about (28) 8-ounce glasses of water a day containing the highest level of iron measured by the City of Longview to ingest an amount equal to the maximum tolerable daily intake for iron of 40 mg/day for an infant or child. The number of glasses is greater for adults (32) due to their 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>

References

1. World Health Organization, 2003. Iron in Drinking Water, from http://www.who.int/water_sanitation_health/dwq/chemicals/iron.pdf
2. U.S. EPA, 2013. Drinking Water Contaminants, from <http://water.epa.gov/drink/contaminants/index.cfm>
3. Linus Pauling Institute, 2001. Micronutrient Information Center: Iron, from <http://lpi.oregonstate.edu/infocenter/minerals/iron/>

* 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.