
ENVIRONMENTAL Fact Sheet



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Water Corrosivity, Lead and Copper

INTRODUCTION AND OCCURRENCE

Most surface waters and many well waters in New Hampshire are corrosive, which means they can cause the leaching of lead, copper and other metals from home plumbing and fixtures. Water corrosivity is caused by a combination of low pH and alkalinity, and generally high conductivity or dissolved solids, among other physical and chemical conditions. In addition to the very serious toxicity from potential ingestion of lead in drinking water, corrosive water can cause pinhole leaks and damage hot water heaters and home appliances.

Lead and copper metals are ubiquitous in our current plumbing. Until January 2014, drinking water fixtures in the U.S. contained up to 8% lead alloy. From the 1950s to 1986, we applied 50% lead solder for copper piping installation. Homes built prior to 1978 have lead-based paint. Last, municipal water utilities throughout the U.S. installed residential lead service lines and lead goosenecks connectors between the water main and our homes, from the early 1900s to the late-1930s, with millions of lead service lines still in service today.

HEALTH EFFECTS

Lead is absorbed by the body when ingested or inhaled. There is no significant absorption through the skin. Children are most at risk, as their bodies absorb up to 50% of an oral dose (NHDES 2012). Lead replaces the calcium in a child's brain, bones and other organs of the body, causing impairment of a child's learning, behavior and decision-making ability, with irreversible life-long consequences for the child and all of society. Once ingested, lead is stored in our bones and is passed down instead of calcium to the fetus during pregnancy (Cecil K. et al. 2008). Any detectable lead in water as well as any speck of lead paint dust can poison a child.

Copper health effects can occur at higher doses and may include stomach cramps, nausea or diarrhea. Intentionally high intakes of copper can cause liver damage and kidney disease (ATSDR 2004).

HEALTH STANDARDS

The federal Lead and Copper Rule promulgated in 1991 established a Maximum Contaminant Level goal for lead of ZERO, and a treatment "action level" for corrosion control practices in public water systems, as follows:

Lead MCL Goal	0 ppb
Lead Action Level for treatment	15 ppb
Copper Action Level for treatment	1.3 mg/L

TESTING

All homeowners should test their home drinking water tap for lead and copper whether on town water or a private well. If your home was built prior to 1978, you should also test for lead paint. Water testing should include the kitchen tap, refrigerator water and ice dispensers, and any other taps used for water consumption.

Two water samples are recommended: A first flush or “stagnant” sample obtained first thing in the morning or after the water has sat unused for at least 6 hours. This sample is intended to capture the worst-case levels as it takes time for the metals to leach into the water. The second sample is “flushed” water taken once the tap is allowed to run until the water turns cold, generally by 1 to 3 minutes. This sample should confirm no detectable metals as long as the tap is flushed.

Obtain water sample bottles by contacting an accredited laboratory from the list provided at des.nh.gov, or a web search for “NHDES Private Wells.” NHDES recommends testing for the Standard Analysis suite of parameters which includes both stagnant and flushed lead and copper, in addition to other important water quality parameters such as pH, alkalinity, bacteria, arsenic and uranium.

MITIGATION AND TREATMENT

Flush your Tap Daily – The most important practice to reduce your exposure is to flush your tap every day or after extended periods of non-use, until the water runs cold or about 1 min. Do not drink stale water that has sat overnight or an extended period of time, as leached metals accumulate in the stagnant water.

Use Cold Water – Do not use hot water for cooking or hot beverages. Use the flushed cold water tap and heat it. Hot water accelerates metals leaching from your plumbing.

WATER TREATMENT TO REDUCE CORROSIVITY

The most common residential treatment technologies to correct water pH and alkalinity are a Calcite Neutralizer and Aeration. Additional corrosion control technologies used by public water systems include Sodium or Potassium Carbonate (Soda Ash/Potash), Sodium Hydroxide (Caustic Soda) and Orthophosphate chemical feed systems. This fact sheet addresses residential treatment only.

Calcite Neutralizer – Calcite is a naturally occurring calcium carbonate or limestone sacrificial filter media. Food-grade calcium carbonate is packed in a standard fiberglass filter vessel either alone or mixed with magnesium oxide to saturate the water as it flows through the bed. They are typically used in upflow mode to reduce bed compaction. An advantage of this treatment is that it is completely passive and self-limiting, so there is no danger of overfeed or over correction. As the calcite is consumed, it must be replenished every 6 months or so to maintain adequate contact time through the filter. Approximate cost for a whole-house neutralizer is about \$1,500.

Aeration – Residential aerators are more expensive to install and operate (due to the electricity use), but they remove drinking water **Radon** in addition to reducing corrosivity. Typical cost is \$3,000 to \$6,000 installed. Current equipment designs include an air blower and a booster pump, as the water must be repressurized following contact through the aeration trays. Equipment maintenance should be performed annually.

REFERENCES

Agency of Toxic Substances and Disease Registry (2004), Toxicological Profile for Copper
<https://www.atsdr.cdc.gov/phs/phs.asp?id=204&tid=37>

Cecil K.M., Brubaker C.J., Adler C.M., Dietrich K.N., et al. (2008). Decreased brain volume in adults with childhood lead exposure. PLoS Medicine, 5m 741-750.

FOR MORE INFORMATION

Contact the Drinking Water and Groundwater Bureau at (603) 271-2513 or dwgbinfo@des.nh.gov, or visit us at des.nh.gov. You may also input your water test results to the [NHDES Be Well Informed](#) water treatment application (available via a web search) to interpret your results and identify appropriate treatment options.

Note: This fact sheet is accurate as of June 2019. Statutory or regulatory changes or the availability of additional information after this date may render this information inaccurate or incomplete.