



## Virginia Household Water Quality Program – Drinking Water Clinic Interpretation Sheet



**Contaminant Levels:** The Environmental Protection Agency (EPA) sets either a Maximum Contaminant Level (**MCL**) or Secondary Maximum Contaminant Level (**SMCL**) for each contaminant. Maximum Contaminant Levels are set to protect the public health from contaminants in water. These legally enforceable national standards apply to public drinking water systems, but serve as a good guide for private systems. Secondary Maximum Contaminant Levels are concentration limits for nuisance contaminants. **No regulations are enforced for private systems such as wells and springs; these standards are useful guidelines for individual water supplies.**

**Units:** Contaminants in your water test are reported in milligrams per liter (mg/l). One mg/l is equal to 1 part per million (ppm). To visualize this, about 4 drops of ink in a 55 gallon barrel of water results in an “ink concentration” of 1 ppm or 1 mg/l.

Parameter (EPA standard)	Information
<b>Coliform Bacteria</b>  (MCL=absent)	The total coliform bacteria analysis is the EPA standard test for microbiological contamination of a water supply. Coliform bacteria, found in decaying vegetation and the digestive systems of animals, do not cause disease, but they are indicators of the possible presence of disease bacteria. Their presence in drinking water points to the need for additional testing. Total coliform levels on water test results are represented by either “presence” or “absence”. If test results show that coliform bacteria are present, a homeowner should consider shock chlorination and retest the water two weeks later to determine if coliform persists. A homeowner should examine their water source for potential pathways of contamination, such as a cracked well cap, pooling water around the top of the well, or a leaking spring box. If a disinfection system is already in use, it should be inspected to ensure it is functioning properly. If coliform bacteria are present, test for E. coli to determine if human or animal waste is entering the water supply.
<b>E. Coli Bacteria</b>  (MCL=absent)	A positive E. coli result is much more serious than coliform bacteria alone because it indicates that human or animal waste is entering the water supply. Most strains of E. coli are harmless, but a few strains can cause severe illness. If E. coli is present in your water supply, take immediate steps to address the problem, even if your family has not suffered ill effects thus far. Consider using an alternate source of water, or boil water to be used for drinking and cooking for at least 1 full minute. Examine the water source for potential pathways of contamination, such as a cracked well cap, pooling water around the top of the well, or a leaking spring box. Shock chlorination can be used and should be followed with additional testing. Continuous disinfection, such as an ultraviolet light, continuous chlorination, or ozonation may be required if bacteria persists.
<b>Nitrate</b>  (MCL=10 mg/L)	Nitrate comes from animal manure, septic systems, and fertilizer. High levels of nitrate may cause methemoglobinemia or “blue-baby” disease in infants. EPA has set a Maximum Contaminant Level for nitrate-nitrogen of 10 mg/l for public water systems, and suggests that water with greater than 1 mg/l not be used for feeding infants. Levels of higher than 3 mg/l may indicate excessive contamination by fertilizers or organic wastes. Never boil nitrate contaminated water. Use reverse osmosis or distillation units to treat.
<b>Manganese</b> (SMCL=0.05 mg/L)	Manganese in groundwater usually originates from certain rock formations, and does not present a health risk in drinking water. If present in amounts greater than 0.05 mg/l, it may give water a bitter taste and produce black stains on laundry, cooking utensils, or plumbing fixtures.

<p><b>Iron</b> (SMCL= 0.3 mg/L)</p>	<p>Iron in groundwater usually originates from certain rock formations, and does not usually present a health risk. It can, however, be objectionable if present in amounts greater than 0.3 mg/l. Excessive iron levels can leave red-orange-brown stains on plumbing fixtures and laundry. It may give water and beverages a bitter, metallic taste and discolor beverages. Iron bacteria, which are harmless to human health, may be present in water with iron, and create a reddish-brown slime by-product anywhere water stands (e.g. toilet tanks).</p>
<p><b>Hardness</b> (N/A)</p>	<p>Hardness is a measure of calcium and magnesium in water. Hard water does not present a health risk, but does keep soap from lathering, decrease cleaning action of soaps and detergents, and may leave scale deposits on water pipes and hot water heaters. Softening treatment is highly recommended for very hard water (above 180 mg/l), and may be considered for hardness levels ranging from 60 to 180 mg/L. In most hard water situations, softening only the hot water will solve the problem.</p>
<p><b>Sulfate</b> (SMCL=250 mg/L)</p>	<p>High sulfate concentrations may result in adverse taste, and may have a laxative effect on those who are unaccustomed to drinking the water. The SMCL for sulfate is 250 mg/l. Sulfate may be linked to other sulfur-related problems, such as hydrogen sulfide gas, which gives water a “rotten-egg” odor or taste. Hydrogen sulfide gas occurs naturally as a byproduct of sulfur-reducing bacteria. These bacteria feed on small amounts of sulfur in water and thrive in low oxygen environments common in groundwater wells. These bacteria may cause an unpleasant taste or odor, but they do not present a health threat to humans. While it is difficult to test for hydrogen sulfide gas in water, it is easily detected by smell, especially in hot water. Water containing this gas may corrode metals in the water system and stain plumbing and cooking utensils.</p>
<p><b>pH</b> (SMCL=6.5 to 8.5)</p>	<p>The pH of water indicates whether it is acidic (below 7.0) or alkaline (above 7.0). Acidic water can cause corrosion of pipes, which may lead to leaching of toxic metals, such as copper or lead, from plumbing systems. The life of plumbing systems may be shortened due to corrosion, requiring expensive repair or replacement. The use of plastic pipes approved by the National Sanitation Foundation (NSF) throughout the water distribution system lessens the concern of metal leaching. Water with a pH below 6.5 is acidic enough to require treatment. Alkaline water with a pH above 8.5 is rarely found naturally, and may indicate contamination by alkaline industrial wastes.</p>
<p><b>Copper</b> (MCL=1.3 mg/L; SMCL=1.0 mg/L)</p>	<p>The EPA drinking water standard (MCL) for copper is 1.3 mg/l, based on concerns of acute gastrointestinal illness. Since dissolved copper leaves blue-green stains on plumbing fixtures, there is a SMCL of 1.0 mg/l. If copper is present in your water sample, addressing the corrosiveness (acidity) of your water by installing an acid neutralizing filter may help the problem by reducing the deterioration of metals from household pipes. If the issue is from corroding pipes, the highest concentration of metals is leached from plumbing after water sits in the pipes for at least 6-8 hours. Flushing the pipes by running the water for at least 5 minutes may alleviate the problem. Compare the “first draw” and “flushed” sample results. Copper in the groundwater may indicate industrial waste or landfill contamination.</p>
<p><b>Total Dissolved Solids/TDS</b> (SMCL=500 mg/L)</p>	<p>Total dissolved solids (TDS) is a measure of all the dissolved substances in water, including salts and other ions. High concentrations of dissolved solids may cause adverse taste effects. TDS levels may be affected by sodium and hardness levels. The EPA SMCL is 500 mg/l for total dissolved solids.</p>

<p><b>Lead</b></p> <p>(MCL=0 mg/L; HAL=0.015 mg/L)</p>	<p>Lead rarely occurs naturally in water; it usually is leached into household water from plumbing or pipe materials. Lead can cause irreversible damage to the brain, kidneys, nervous system, and blood cells. It is a cumulative poison, meaning that it will accumulate in the body until it reaches toxic levels. Young children are most susceptible: mental and physical development can be irreversibly stunted by lead poisoning. Lead may be found in household drinking water in homes built prior to 1930 with lead pipes, prior to 1986 with lead solder, or in new homes with “lead-free” brass components, which may contain up to 8% lead. There is no safe level of exposure to lead. The MCL goal is 0 mg/L, and the Health Action Level (HAL) is 0.015 mg/L. If lead is present above 0.015 mg/L in your drinking water, addressing the corrosiveness (acidity) of your water by installing an acid neutralizing filter may help the problem. Alternatively, consider installing an activated carbon filtration or reverse osmosis unit designed to remove lead at the faucet where drinking water is obtained. Another option is to flush pipes for at least 5 minutes to remove water with higher lead concentrations before drinking.</p>
<p><b>Fluoride</b></p> <p>(MCL=4 mg/L SMCL=2mg/L)</p>	<p>Small concentrations of fluoride are considered to be beneficial in preventing tooth decay, while moderate amounts can cause brownish discoloration of teeth, and high fluoride concentrations can lead to tooth and bone damage. For these reasons, the EPA has set a Secondary Maximum Contaminant Level of 2 mg/L and a Maximum Contaminant Level of 4 mg/l.</p>
<p><b>Sodium</b></p> <p>(MCL=20 mg/L)</p>	<p>Moderate quantities of sodium in drinking water are not considered harmful as long as they are factored into the recommended daily sodium intake from food (1,500-2,000 mg per day). Excessive sodium has been linked to high blood pressure, heart and kidney diseases. For those on low-sodium diets, both the American Heart Association and EPA suggest 20 mg/l as a maximum level for sodium in drinking water. Contact your physician with questions. Water softening by ion exchange increases sodium levels in water. Reduce sodium in drinking water by softening only the hot water or bypassing drinking water lines.</p>
<p><b>Arsenic</b></p> <p>(MCLG=0.010 mg/L)</p>	<p>Arsenic is an odorless, tasteless, semi-metal that occurs naturally in some rocks or can be a by-product of agriculture or industrial practices. It is used in wood preservatives, paints, dyes, drugs, and certain fertilizers and herbicides. Naturally occurring arsenic often the source of contamination in groundwater supplies. Arsenic has been linked to many types of cancer, including cancer of the bladder, lungs, skin, and kidneys. It is also associated with stomach pain, nausea, numbness of hands and feet, blindness, and partial paralysis. The EPA standard for arsenic in public drinking water supplies is 0.010 mg/L.</p>

For more information, please visit [www.wellwater.bse.vt.edu](http://www.wellwater.bse.vt.edu), email [wellwater@vt.edu](mailto:wellwater@vt.edu), or call 540-231-9058.



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