WQ1352 (Revised)

What's Wrong With My Water?
Choosing the Right Test

Who is Responsible?

Households using municipal or rural water supplies can depend on the utility to follow Environmental Protection Agency (EPA) guidelines for maximum levels of contaminants. An annual report is distributed to the users.

Private well owners are not monitored by government agencies. This means the owner must take responsibility for the condition of the system.

Routine testing establishes a water-quality record. If a contaminant problem develops, correlating the cause is easier if you keep a water-quality record.

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What's in Your Water?

Water is never just pure hydrogen and oxygen. Water naturally contains minerals and microorganisms from the rocks, soil and air in which it comes in contact. Human activities add many more substances to water. Some, such as bacteria, come from waste products of people and animals. Others, such as gasoline and industrial solvents, are synthetic chemicals, made and used for special purposes. Still other materials, such as nitrate and salt, occur naturally, but human activities can increase their concentrations in the environment. Which of the many potential drinking water contaminants should you be concerned about?

Reasons to Test Your Private Well

- Your well is new or recently serviced
- The area around the wellhead has been flooded or submerged
- Back-siphoning has occurred
- You have used, mixed or spilled pesticides near the well
- You have a heating oil tank or underground fuel tank near the well that has leaked
- You are pregnant, are planning a pregnancy or have an infant less than 6 months old
- Your or your neighbor's septic system absorption field is close to the well (within 100 feet)

Annual Baseline Testing

- Coliform (bacteria)
- Nitrate/Nitrite (forms of nitrogen)
- Total Dissolved Solids (salts)
- pH
- Any constituents that were at or near maximum safe drinking water limit standards in previous tests

Every Five Years

- The above tests
- A complete water chemistry analysis

Keep copies of ALL results so you can track changes in your water quality through time.

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Water Problem Identification

Problem or Concern	Symptoms	Water Test to Consider
Appearance	Frothy, foamy	Detergents
Appearance	Black flakes	Manganese
Appearance	Brown, yellow or reddish	Iron
Odor or taste	Rotten egg	Hydrogen sulfide
Odor or taste	Metallic	pH, iron, zinc, copper, lead
Odor or taste	Salty	Total dissolved solids, chloride, sodium, sulfates
Odor or taste	Septic, musty or earthy	Coliform bacteria, iron
Odor or taste	Soapy	Surfactants, detergents
Odor or taste	Gasoline or oil	Hydrocarbon scan, volatile organic chemicals (VOCs)
Stains on fixtures or clothing	Red or brown	Iron
Stains on fixtures or clothing	Black	Manganese
Stains on fixtures or clothing	Green or blue	Copper
Stains on fixtures or clothing	Reddish-brown slime	Iron bacteria
Stains on fixtures or clothing	White deposits, soap scum	Hardness (calcium and magnesium)
Discoloration of children's teeth		Fluoride
Gastrointestinal illness		Coliform bacteria, sulfates, Guardia
Deposits on sinks and plumbing pipes	Pitting of fixtures or corrosion	Corrosivity, pH, lead, zinc, manganese, copper, iron, sulfates, chloride
Leaking fuel tank		Hydrocarbon scan, VOCs
Road salt		Total dissolved solids, pH, VOCs, heavy metals
Sewage sludge applied to fields		Coliform bacteria, nitrate, metals (lead, cadmium)
Septic system problems (effluent coming to surface)		Coliform bacteria, nitrate, detergents, total dissolved solids, chloride, sodium, sulfates
Intensive agricultural nearby		Coliform bacteria, nitrate, pesticide scan, pH, total dissolved solids

Related Publications at:

www.ag.ndsu.edu/publications/environment-natural-resources/household-water-supply

WQ1029 Filtration: Sediment, Activated Carbon and Mixed Media

WQ1030 It's All in Your Water: Iron and Manganese Removal

WQ1031 Water Softening (Ion Exchange)

WQ1341 Drinking Water Quality: Testing and Interpreting Your Results

WQ1614 Baseline Water Quality in Areas of Oil Development

How Do I Test My Water?

Contact a certified lab for questions concerning sampling. A list of certified labs is available at *www.ndsu.edu/waterquality*

Bacterial analysis

Most labs will provide a sterile collection container with instructions. This container may contain a chlorine inhibitor, so do not rinse the container prior to use.

Remove the aerator from the faucet if it has one. Sterilize the end of the faucet with a flame or douse with alcohol. Remove the bottle cap, taking care not to touch the inside of the cap or container.

To remove stagnant water from the system, run the water for at least 30 seconds and then fill the bottle to the line indicated or near the top. Immediately replace the bottle cap and secure transportation as soon as possible because coliform samples should be analyzed within 36 hours of collection.

Chemical analysis

Well water

Pump the well for several minutes so the actual sample collected is from the groundwater source.

Tap water

Run the tap fully open for 30 seconds before collecting the sample.

Rinse the container two to three times with the water being collected unless preservative has been added to the container to maintain sample integrity (iron and manganese). Lead testing requires the water sample to be taken after the water has been sitting undisturbed in pipes. Do not run water prior to sampling.

Completely fill the container, leaving a small space for expansion of the liquid. Immediately replace the bottle cap.

Send the samples to the lab within 48 hours.

Common well head for a 4-inch diameter casing with submersible pump.

Good-quality (potable) drinking water is free from disease-causing organisms, harmful chemical substances and radioactive matter.

It tastes good, is aesthetically appealing and is free from objectionable color or odor.

Selecting the appropriate water treatment system

- **Point-of-entry** – Treats water as it enters the residence.
- **Point-of-use** – Treats water at a single tap. All filtration units can be fitted for whole-house application; however, expense may be a factor to consider.

Issue	Treatment and Comments
Tannins	Tea coloring formed during the decomposition of vegetation. pH more than 6.0 – **anion exchange.** pH less than 5.0 – **activated carbon filter**
Staining	**Water softener** (cationic ion exchange) or **iron/manganese filtration**
Odor: grassy or musty, chlorine, rotten egg or hydrogen sulfide – smell dissipates after 15 to 30 seconds.	**Activated carbon filtration** **Oxidizing filter** **Chlorination or aeration followed by filtration** **Manganese greensand, chlorination, aeration**
Odor: chemical	Stop chemical seepage, use **activated carbon.**
pH	High or low pH can affect the efficiency of water treatment systems. **Neutralizer filter**

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Issue	Treatment and Comments
Coliform	**Shock chlorination** followed by repeated testing should be done to determine if this is a one-time event from surface water contamination or if aquifers have been polluted. **Ultraviolet disinfection** may be used on a more permanent basis; however, sourcing the contamination needs to be a priority. Fecal coliform and E. coli, while not pathogens, are indicators of disease-causing microbes and water should not be used for drinking. **Boiling** water will kill coliform.
Turbidity	No health effects. Can be addressed by removing the following: soil erosion, waste discharge, urban runoff; eroding stream banks; large numbers of bottom feeders (such as carp), which stir up bottom sediments; and excessive algal growth. **Activated carbon filtration**
Chloride	Salty taste and with high levels, a laxative effect. **Reverse osmosis, distillation**
Fluoride	Added to municipal water. Children under 9 should not drink water that has more than 2 mg/L of fluoride. **Reverse osmosis, activated alumina or distillation**
Nitrate, Nitrites, Nitrate (as N)	High nitrate may cause methemoglobinema (blue baby) in infants who drink water or formula made from water with high levels. Health concerns with long-term use for adults. **Reverse osmosis, distillation**
Arsenic	A known carcinogen and associated with many health risks. Treatment is dependent on level of contamination. **Chlorinate to change from A3 to A5 form, remove with filtration, distillation, reverse osmosis (A3 removal), alumina, anion exchange**
Alkalinity	Generally associated with high pH values, hardness and excess dissolved solids. **Reverse osmosis or tank media**
Copper	Gastrointestinal distress to liver or kidney damage, depending on exposure time. Corrosion control including the addition of **Poly 4 in crystal form** to coat the pipes within your home. **Distillation, reverse osmosis**
Hardness	**Water softener** (cation exchange)
Iron Ferrous (clear and colorless when drawn) **Ferric** (ferrous water when exposed to air converts to reddish brown)	Metallic taste. Rust stains in toilets, plumbing fixtures, tableware and laundry. **Water softener or oxidizing filter system**
Iron bacteria (red, orange, yellow water)	Slime on well screens, pipes and plumbing fixtures. Smells of fuel oil, cucumber or sewage. **Shock chlorination**
Manganese (black)	Reddish-brown water, staining of plumbing fixtures and laundry. Off-taste and odor. **Reverse osmosis or chlorination followed by oxidizing filter**
Lead	The pipes in your home are the likely source of high lead levels. Use only thoroughly flushed water from the cold tap for consumption. **Reverse osmosis, distillation**
Sodium	Use potassium pellets instead of sodium softener pellets. Restrict drinking water from this source. **Reverse osmosis, distillation**
Sulfates	May have a laxative effect on people unaccustomed to the water. **Reverse osmosis, distillation, anion exchange**
Total Dissolved Salts (TDS)	Adverse taste. Deteriorates plumbing and appliances. **Reverse osmosis, distillation**

This publication was authored by Roxanne Johnson, former water quality associate

For more information on this and other topics, see www.ag.ndsu.edu

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