



## Make sure drinking water is safe

Safe drinking water is essential to good health. Contaminated water supplies can carry disease; cause diarrhea, nausea, headaches, or other ailments; and may lead to more serious problems such as increased risk of cancer or birth defects.

To help ensure safe water supplies, operators of public water systems constantly watch for defects that could allow contaminants to enter the system. Water samples are analyzed frequently to ensure that federal drinking water standards for public water systems are met. Privately owned water supplies are not monitored by professional operators, so it is up to the user of these supplies to periodically inspect the system and test for contaminants to ensure safety.

Well water quality has been a concern in Iowa in recent years. The University Hygienic Laboratory (UHL) at the University of Iowa reports that 35-45 percent of the 12,000 private water samples tested every year have unacceptable levels of coliform bacteria. At least 15-20 percent contain concentrations of nitrate that are unsafe for infants.

The only way to be sure well water is safe is to periodically test samples for contaminants. Regular inspection of the well system also will help identify potential problems. This publication presents only the basics about water contaminants and how to test for them. See the information section on the back for more details.

### Water contaminants

The two most common contaminants of privately owned wells are coliform bacteria and nitrate. Tests for these two contaminants provide a general indication of drinking water quality. **Both tests are recommended at least once a year, preferably in late spring or early summer during frequent rainfall.**

**Coliform bacteria:** Coliforms are naturally occurring bacteria commonly found in topsoil, surface water, sewage, and animal wastes. They cause no observable odor, taste, or color changes in water, and testing is the only way to determine if they are present. Although coliform bacteria by themselves generally do not cause disease, their presence indicates an increased risk that disease-carrying organisms can enter your water supply.

**Nitrate:** Nitrate is formed by decay of naturally occurring organic matter in soil, livestock manure, and human wastes. Excessive use of nitrogen fertilizers also causes elevated nitrate levels. Rainfall percolating through the soil dissolves the nitrate and transports it deeper into the ground. Shallow aquifers and wells are more likely to be contaminated with nitrate than deeper ones.

Nitrate causes no observable odor, taste, or color changes in water, and testing is the only way to determine if high levels of nitrate are present. When consumed by infants less than six months old, nitrate can cause a serious blood disorder known as infant methemoglobinemia, or “blue baby” syndrome.

**Man-made chemicals:** Chemicals such as insecticides, herbicides, solvents, and petroleum products also can get into the water supply. Improper storage or disposal, chemical spills, and excessive use or misapplication of chemicals increases the risks of finding unsafe levels in a water supply. Health effects vary widely with the type of chemical and its concentration.

Although some chemicals (particularly petroleum products) cause a noticeable odor or color in water, testing is the only reliable way to determine if most man-made chemicals

## Farmstead safety

### How much do you know?

1. The two most common contaminants of private well water supplies are coliform bacteria and nitrate. True or false?
2. The best time to test water quality is
  - a) late spring or early summer when water levels are high.
  - b) during dry weather.
  - c) during winter when the ground is frozen.
3. Coliform bacteria leaves a distinctive “rotten egg” odor in water. True or false?
4. Water quality can be affected by:
  - a) loose, missing well caps.
  - b) spill or overapplication of pesticides near well.
  - c) a poorly maintained septic system.
  - d) nearby feedlot runoff or other concentrated sources of nitrogen.
  - e) all of the above.

See answers on back.

are present in drinking water. Costs of testing for man-made chemicals can be high, so professional consultation is recommended before ordering tests.

## Inspecting your well

Typical well defects that can lead to water contamination include:

- missing or damaged well cap;
- cracks, corrosion holes, or other openings in the upper 20 feet of the well casing;
- seepage of contaminated water along the outside of the well casing; and
- unusually low water pressure (less than 20 pounds per square inch when two fixtures are running).

A nearby abandoned well that is not properly plugged also can route contaminants directly into the water supply, as can a septic system that is poorly maintained or located too close to a well. Wells less than 20 feet deep also are likely to be unsafe because groundwater at such shallow depths is vulnerable to contamination.

For assistance in identifying and repairing well defects, contact a county health sanitarian or state-certified well contractor.

## Testing your water

**What to test for:** There are many potential water contaminants. It would be very costly, and in most cases, unnecessary, to test for all of them. Unless a specific problem is suspected, private well owners often rely on tests for coliform bacteria and nitrate as general indicators of drinking water safety. Every private well should be tested for these two contaminants at least once a year. A commercial lab, county sanitarian, the University Hygienic Laboratory, or the Iowa Department of Public Health can advise about other possible tests. To help ensure accurate test results, be sure to work with a laboratory that has been certified by the Iowa Department of Natural Resources for analysis of public water supplies.

**When to test:** The best time to test your drinking water is during late spring or early summer when bacteria or nitrate are most likely to be present. During those times, excess runoff and soil moisture can flush contaminants into defects in your well. If present, pesticides used on the lawn, garden, or farm fields are most likely to be detected in high concentrations soon after application.

The worst time to test for water quality would be during extremely dry weather or when the ground is frozen. Acceptable test results in the winter or a very dry season doesn't guarantee that contaminants won't be present during wet weather.

**Where to sample:** The best place to collect a sample is at the tap you drink from most frequently. If this test shows unsafe levels, inspect the well and plumbing system for defects and repair them. Then test again. If problems persist, collect additional samples at other locations to determine if the impurities are entering at the well or through the plumbing or water treatment systems.

Avoid drawing samples at extremely dirty locations where bacteria-laden dust could enter the container. Clean indoor locations are best. If an outdoor location must be used, avoid drawing bacterial samples from frost-proof hydrants. The buried valve that allows them to drain and avoid freezing can also allow bacterially contaminated water to be drawn into the water hydrant.

Always use a container from the laboratory and carefully follow sampling instructions. Tests for coliform bacteria require the sample to be in a sterile container and received by the lab within 48 hours after it has been collected.

## For more information

- Publications from ISU Extension county offices or <https://store.extension.iastate.edu/>:
  - Repairing Bacterially Contaminated Wells, AEN-155;
  - Coping with Contaminated Wells, Pm-1329;
  - Good Wells for Safe Water, Pm-840;
  - Sampling Your Drinking Water, Pm-1335, and
  - Shock-Chlorinating Small Water Systems, Pm-899.
- Videotapes to check out from county offices:
  - Hard Water (75702);
  - Red Water (75703);
  - Coliform Bacteria (75704);
  - Nitrate (75705);
  - Man-made Chemicals (75706);
  - Sulfur (75707); and
  - Well Reconstruction and Repair (75765).
- For a consumer guide:
  - Residential Water Treatment Systems, Iowa Dept. of Public Health.
- For water tests:
  - University Hygienic Laboratory at the University of Iowa, (319) 335-4500.
- For local geology:
  - Geological Survey Bureau of the Iowa Dept. of Natural Resources, (319) 335-1575.

Answers to quiz: 1-True; 2-a; 3-False; 4-e

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Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Cathann A. Kress, director, Cooperative Extension Service, Iowa State University of Science and Technology, Ames, Iowa.



Safe Farm is an Iowa State University Extension and Outreach project helping to make Iowa farms a safer place to work and live.

For more safety information, check the web at: [www.abe.iastate.edu](http://www.abe.iastate.edu).