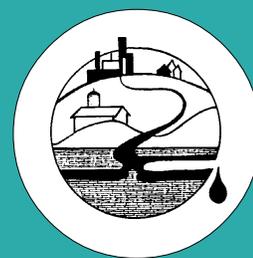


Water Quality



Knowledge to Go
Purdue Extension



Why & How to Test Home Water Supplies

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Why Test?

When you pour a glass of water, you expect it to be pure and safe. However, absolutely pure water rarely exists in nature. Water absorbs minerals, organic materials, and organisms as it moves through the air and soil into surface and ground water supplies. So, while most water appears clean and problem-free at the tap, it may not be safe for drinking or acceptable for household activities. Taste and odor are not always indicators of water quality. Contaminated water can taste and smell fine, while unpleasant-tasting or -smelling water can be safe to drink or use.

Overall, Indiana has a good supply of safe drinking water. Public water systems regularly test for over 80 contaminants, according to the rules and regulations set by the Environmental Protection Agency (EPA) under the Safe Drinking Water Act. Occasionally, problems such as spills, floods, or treatment malfunctions do occur at a public water supply and prevent the local water supply from meeting water quality standards. Consumers are notified immediately of violations and told how to take corrective actions (such as boiling water). Test

results from public water suppliers are public information and are available upon request. In 1999, public water suppliers began distributing annual quality reports to their customers.

You may wish to test your water if you sus-

pect a problem in your home's plumbing, connections, or treatment system. And if you are one of the 1.7 million private well owners in Indiana, you should know that *you* are responsible for monitoring the quality of your water. This bulletin will help you identify the tests needed for your water supply. Testing will help confirm if a problem exists. If necessary, appropriate treatment can be recommended. There is no general test for water quality. Water must be tested for specific substances, but testing for every possible contaminant is unnecessary and expensive.

Which Tests?

Your first concern is to provide your family with a safe source of water. Table 1 lists tests to conduct for possible health risks. Private well owners should test annually for total coliform bacteria and nitrate. Although they are not the only potential problems, the presence or absence of bacteria or nitrate often indicates the general safety of your water supply. These contaminants can only be identified through testing because both are typically invisible, odorless, and tasteless.

Table 1. Tests for Potential Health Concerns

Problem or concern	Test
Family or guests become ill	total coliform bacteria,* nitrate*
Water supply used by an infant less than six months old	nitrate
Water supply used by young children	lead

* Coliform bacteria and nitrate serve as indicator tests for possible contamination.

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1. *Bacteria*

The most commonly found contaminant in private wells is coliform bacteria, according to the Indiana State Department of Health. Coliform bacteria are found in the digestive tract of all birds and mammals. Most coliform bacteria are not harmful themselves, but point to an unsanitary condition and possible presence of disease-causing organisms. In some cases the bacteria are found in the plumbing or in the well and not in the water supply itself. Coliform bacteria serve as indicators of pathogens that are difficult to identify and measure. Pathogens commonly found in water cause acute intestinal infections.

Drinking water from private wells should be tested for the presence of bacteria at least once a year or when work has been done to the water supply system or any time there is any change in the water. The drinking water quality standard for coliform bacteria is set at less than one coliform organism per 100 ml of water. For more information about bacteria in drinking water, refer to the Purdue Extension publication "Bacterial Contamination of Household Water" (WQ-15).

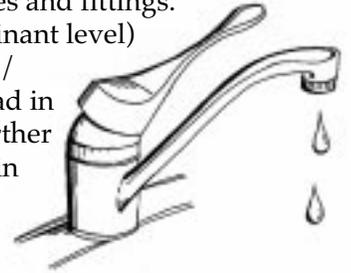
2. *Nitrate*

High levels of nitrate in the water supply can cause methemoglobinemia (blue baby syndrome), which is a serious health threat for infants less than six months old. Researchers don't know of any chronic, long-term risks of nitrate consumption at this time. Potential sources of nitrate in ground water include septic systems, fertilizers, and livestock manure.

A regular nitrate test is recommended for all wells and is essential for wells serving infants less than six months of age. If nitrate levels are less than 5 mg/l, retesting every few years should be adequate. If the results are between 5 and 10 mg/l, annual testing is recommended. If the well is located *near* a source of nitrate, such as manure storage or septic or sewer systems, consider retesting for nitrate. The Purdue Extension publication "Nitrate and Indiana's Ground Water" (WQ-27) provides information on nitrate in drinking water supplies.

3. *Lead*

High concentrations of lead are a hazard to young children, infants, and fetuses. Lead rarely occurs naturally in drinking water supplies, but results from corrosion of welding in older plumbing. Lead-based solders and pipes were widely used in plumbing before 1986. Acidic water leaches lead into drinking water from pipes and fittings. The MCL (maximum contaminant level) for lead is 15 ppb or 0.015 mg/liter. Purdue Extension's "Lead in Drinking Water" (WQ-26) further explains the problem of lead in drinking water.



4. *Pesticides*

If you are in an agricultural area, and especially if the soil and geology make your ground water more vulnerable than most, you may be concerned about pesticides in ground water. Pesticides applied to fields at the recommended rate pose a minimal risk to ground water. When ground water becomes contaminated, it is usually from pesticide spills occurring near the wellhead. Poorly constructed or deteriorating well casings also allow pesticides to directly enter well water. To better understand the fate of pesticides in the environment, read Purdue Extension publication "Pesticides and the Environment" (WQ-19).

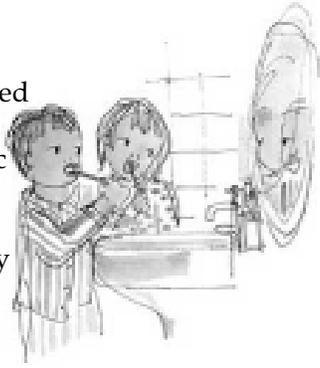
Although testing for specific pesticides is expensive, new screening methods make testing more affordable. Water-testing programs organized in some counties offer screening for two widely used pesticide groups. Home testing kits for triazines are also available. As with all tests other than those performed by a certified laboratory, if any test results raise concerns, the water should be retested at a certified lab.

5. *Fuel, Solvents, & Other Volatile Organic Compounds*

Test your water if a petroleum product or volatile organic compound spill occurs on your property, or if your water tastes or smells like gasoline. Also test your water if you have or suspect a leaking underground storage tank on your property. Above-ground storage tanks located within 50 feet of the wellhead can pose a risk to drinking water supplies if not protected from spills or leaks.

6. Fluoride

Fluoride is generally believed to prevent dental cavities and is added to most public water supplies to bring fluoride levels to between 0.7 ppm and 1.2 ppm. Many dentists recommend fluoride supplements for children who drink from private wells, where fluoride is not added to water. Test your water for fluoride before giving children supplements. If the fluoride level is found to be under 0.6 ppm, you might consider giving supplements to children over three years old. Do not use supplements if the level is over 0.6 ppm. Too much fluoride can cause dental fluorosis (mottling or staining of teeth) in children and may cause bone disease. Consult your dentist or pediatrician for their recommendations.



7. Taste, Odor, & Nuisance Concerns

A major concern for Indiana homeowners is the nuisance contaminants often present in water. Nuisance contaminants can stain fixtures and clothing, and cause odors, off-tastes, and cloudy appearances. Nuisance problems generally do not present a health risk, but they are a real concern for many households. Table 2 lists the tests for common nuisance contaminants.

The most common nuisance problems in Indiana are objectionable taste, odor, color, and hardness. Two common nuisance contaminants, iron and manganese, cause water to stain fixtures or clothing and give water a dark appearance or an off-taste. Hydrogen sulfide in water causes the rotten egg smell with which many homeowners contend.

Treatment for nuisance contaminants depends on the particular contaminant(s) present and the level of contamination. In cases where more than one contaminant is present in the water supply, a number of treatment procedures may be necessary to satisfactorily handle all the nuisance problems.

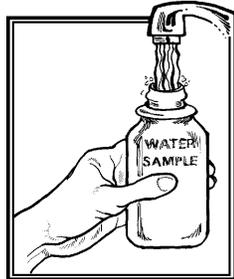
Table 2. Tests for Nuisance Problems

Problem or concern	Recommended test
Appearance black flakes brown or yellow water	manganese iron
Stains on fixtures or clothing red or brown black green or blue	iron manganese copper
Odor or taste rotten egg metallic salty septic, musty, earthy gasoline or oil	hydrogen sulfide pH, iron, zinc, copper total dissolved solids, chloride, sodium total coliform bacteria, iron hydrocarbon scan, volatile organic chemicals
White deposits on pots and fixtures, hard-to-lather soap	hardness
Corrosion of plumbing	corrosivity, pH, lead, iron, zinc, manganese, copper, sulfates, chloride

When to Test?

Table 3 serves as a general guide for when to test your water. If you have an old (over 30 years) or shallow well (less than 50 feet), it is especially important to test your water regularly. Older methods of well construction, breakdown in well seals, changes in nearby land use, and the well's location in relation to septic systems, livestock facilities, or previous underground storage tanks make older and shallow wells more prone to contamination.

Test your water for other contaminants if you have reason to suspect them. Following a chemical spill or leak within 500 feet of your well, test your water for that possible contaminant. Also test your water supply if your neighbors have found contamination.



How to Test?

Certified Laboratories

The Indiana Department of Health, under the Safe Drinking Water Act, certifies laboratories that test water samples. The two categories are laboratories that test for chemicals and those that test for microbials. The accuracy of certified laboratories' testing procedures is regularly assessed. You can obtain the current list of certified laboratories from the Indiana State Department of Health by calling 317/233-8074. Purdue Extension publication "Water Testing Laboratories" (WQ-1) lists certified laboratories.

After contacting the lab, your next step will be to take the sample. Follow the instructions from the lab closely. Also refer to "How to Take a Water Sample" (WQ-3).

The Indiana State Department of Health Laboratory will test private well water samples for total coliform bacteria and *E. coli*, sodium, fluoride, nitrite, and nitrate for \$8 per test. The form required for submitting a sample can be obtained from your county Health Department or the State Health Department Water Testing Laboratory. The form is also included in WQ-1, cited above. Some county health departments have laboratories that test water samples.

Home Tests

Testing kits for certain parameters such as hardness, iron, nitrate, and lead are currently available in stores. Some test kits provide containers and a mailing label for sending samples to a laboratory. If the laboratory is certified and you follow all instructions, the results are generally reliable. (You can find out if a laboratory is certified by contacting them or contacting the agency responsible for drinking water testing in that state.)

Other products are "do-it-yourself" water test kits. Keep in mind these tests are a simplified version of the tests conducted by a lab. These screening tests serve as useful tools for indicating if further testing is needed. If the results are positive, you should follow up with a test from a certified laboratory.

Table 3. Frequency of Common Water Tests

Test	Recommended frequency
Total Coliform Bacteria	Test before purchasing a house and once a year after that. Test more often if changes made in your plumbing or water treatment system could introduce a contaminant, or if the wellhead becomes flooded or submerged.
Nitrate	Test annually if nitrate levels are above 5 mg/l or an infant is expected. If nitrate levels are below 5 mg/l, test every few years.
Lead	If you have a home constructed before 1985 test annually, particularly if young children drink the water.

Test results from commercial water treatment vendors should be considered no more reliable than home test kits. Water treatment vendors are in the business of water treatment, not water testing.

If you are concerned about declines in water quality, you should document all results by using only a certified laboratory. Results from home test kits are not likely to be admissible as evidence for any sort of legal action. When legal actions are being considered, a third party should also collect the sample and be responsible for shipping it to the laboratory.

How Can I Protect My Water Supply?

Your everyday activities affect water quality—either positively or negatively. Careful attention to what you do, particularly near your well, can protect the quality of both ground and surface waters.

- Slope the area around the well to drain surface runoff away from the well.
- Keep accurate records of well maintenance and water analysis.
- Regularly check exposed parts of the well for cracked, corroded, or damaged well-casing, a broken or missing well cap, or settling and cracking of surface seals. (See Figure 1.)

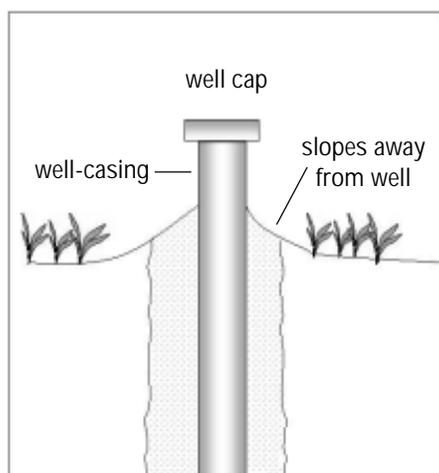


Figure 1. A well cap and undamaged well-casing protect ground water from surface contamination.

- Avoid mixing or using pesticides, fertilizers, degreasers, fuel, and other potential pollutants near the well.
- Properly dispose of used motor oil, leftover paint, antifreeze, and other hazardous compounds. Do not pour these compounds on the ground or down the drain.
- Seal abandoned wells using recommended methods.
- Do not cut off the well-casing below the ground surface.
- Make certain set-back distances between the septic system and well are adequate.

For More Information

Purdue Extension Information

For further information on water testing in your area, contact your local health department or county Purdue Extension office.

The following Purdue Extension publications may be helpful. You can order them through your local office of Purdue Extension or by calling 1-888-EXT-INFO.

WQ-1 "Water Testing Laboratories"

WQ-3 "How to Take a Water Sample"

WQ-5 "Interpreting Water Test Reports"

WQ-6 "Buying Home Water Treatment Equipment"

WQ-11 "Sulfur Water Control"

WQ-15 "Bacterial Contamination of Household Water"

WQ-21 "Plugging Abandoned Wells"

WQ-22 "Indiana Farmstead Assessment"

WQ-25 "Home*A*Syst" (\$5.00)

WQ-26 "Lead in Drinking Water"

WQ-27 "Nitrate in Indiana's Ground Water"

MWPS-14 "Private Water Systems Handbook, Midwest Plan Service"

You can also find many Purdue Extension publications on the Web at: <http://www.agcom.purdue.edu/AgCom/Pubs/menu.htm>.

Other Sources of Information

The EPA's Safe Drinking Water Hotline (800/426-4791) answers questions related to water testing, treatment, health concerns and other topics related to drinking water.

Indiana Department of Environmental Management (IDEM) Ground Water section, Indianapolis, Indiana, (317/240-6216) provides information on what to do if you suspect contamination of ground water.

References

American Dental Association (fluoride information). Chicago, IL. 312/440-2500. <<http://www.ada.org/>>.

EPA Office of Ground Water & Drinking Water. <<http://www.epa.gov/safewater>>.

Indiana State Department of Health. 2 N. Meridian Street, Indianapolis, IN. 317/233-1325.

Liukkonen, Barbara. "Getting Your Water Tested." Minnesota Sea Grant Program and the Minnesota Extension Service.

Mancl, Karen M. 1986. "Water Testing." AEX-314. Ohio Cooperative Extension Service. The Ohio State University, Columbus, Ohio.

Powell, G. Morgan. 1989. "Suggested Water Tests for Private Systems." Cooperative Extension Service, Kansas State University, Manhattan, Kansas.

The original publication, "Why Test Your Water?" (WQ-4), was written by David Mengel and Cheri Janssen, Department of Agronomy, 1990.

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