Water Testing: What to Test For

Reviewed and adapted for Missouri by Wanda Eubank, Jerry D. Carpenter and Beverly A. Maltsberger, University of Missouri-Columbia, and Nix Anderson, Missouri Department of Health, from Water Testing by Karen Mancl, Water Quality Specialist, The Ohio State University.

Some people depend on their own well, pond, spring or cistern for drinking water. Individual water supplies of this sort are private. Water testing or water treatment is usually not required by law. The exceptions are bacteria tests for existing or new construction that is being evaluated for loans (FHA, VA, FmHA and conventional). Dairy water supplies must be tested for bacteria and meet dairy industry standards.

Water testing and treatment can be expensive and time-consuming, but they are the only ways a homeowner can ensure a safe and reliable water supply. Individuals using public water supplies pay for water testing and treatment as a part of their water bill. Individuals operating a private water system do not have this benefit and are responsible for the testing and treatment of their water.

Choosing water tests

Testing water for every contaminant is possible but very expensive, impractical and not necessary. It is more important to test on a regular basis for a few indicators of contamination and to maintain a record of water quality. This helps to identify changes in the supply, contamination of the water source or deterioration of the water system. Good records of water quality are also important, should you need to prove that your water has been contaminated by some outside activity such as mining or waste disposal.

Routine testing

Standard laboratory procedures identify the amounts of specific bacteria, chemical compounds and other components that affect water quality. Routine annual water tests are most important, even if no obvious water problems exist.

For household water supplies, test for:

- total coliform bacteria,
- nitrate,
- pH (acid or alkaline level), and
- total dissolved solids.
Testing nuisance waters

Other tests identify particular problems and help in selecting water treatment equipment. Nuisance water may present no health hazard, but may not be satisfactory for all uses. Common complaints include staining of fixtures and fabrics, off-color appearance, unusual taste or odor, and deposits and pitting of metals. See Table 1 for a list of useful laboratory tests for nuisance water.

Table 1. Laboratory tests for nuisance water.

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Appearance</th>
<th>Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stained fixtures and clothes</td>
<td>red or brown</td>
<td>iron</td>
</tr>
<tr>
<td></td>
<td>reddish-brown slime</td>
<td>iron bacteria</td>
</tr>
<tr>
<td></td>
<td>black stain, greasy feel</td>
<td>manganese</td>
</tr>
<tr>
<td></td>
<td>green or blue</td>
<td>copper</td>
</tr>
<tr>
<td>Off-color</td>
<td>cloudy</td>
<td>turbidity</td>
</tr>
<tr>
<td></td>
<td>black</td>
<td>hydrogen sulfide, manganese</td>
</tr>
<tr>
<td></td>
<td>brown or yellow</td>
<td>iron, tannic acid</td>
</tr>
<tr>
<td>Unusual taste and odor</td>
<td>rotten egg</td>
<td>hydrogen sulfide</td>
</tr>
<tr>
<td></td>
<td>metallic</td>
<td>pH, corrosive index, iron, zinc, copper, lead</td>
</tr>
<tr>
<td></td>
<td>salty</td>
<td>total dissolved solids, chloride</td>
</tr>
<tr>
<td></td>
<td>septic, musty, earthy</td>
<td>total coliform bacteria, methane</td>
</tr>
<tr>
<td></td>
<td>alkali</td>
<td>pH, total dissolved solids</td>
</tr>
<tr>
<td></td>
<td>gasoline or oil</td>
<td>hydrocarbon scan</td>
</tr>
<tr>
<td></td>
<td>soapy</td>
<td>surfactants</td>
</tr>
<tr>
<td>Corrosive water</td>
<td>deposits, pitting</td>
<td>corrosion index, pH, copper, lead</td>
</tr>
</tbody>
</table>

*Home Water Treatment Systems*, for suggested treatment.
Laboratory tests for suspected contamination

Water tests are especially important if the supply is threatened by nearby activities. Good records, prior to contamination, will be needed to prove that the supply was damaged. Listed in Table 2 are activities that may affect a water supply and useful laboratory tests.

**Table 2. Activities that may affect a water supply and useful laboratory tests.**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Suggested tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leaking fuel tank</td>
<td>hydrocarbon scan</td>
</tr>
<tr>
<td>Coal mining</td>
<td>total dissolved solids, iron, sulfates, acidity, pH, corrosion index, manganese, aluminum</td>
</tr>
<tr>
<td>Gas and oil drilling</td>
<td>total dissolved solids, chlorides, sodium, barium, lead, pH, corrosion index, strontium</td>
</tr>
<tr>
<td>Road salt</td>
<td>total dissolved solids, chloride, sodium</td>
</tr>
<tr>
<td>Landfills</td>
<td>total dissolved solids, pH, chemical oxygen demand (COD), volatile organic scan</td>
</tr>
<tr>
<td>Sludge utilization</td>
<td>bacteria, nitrate, metals (lead, cadmium)</td>
</tr>
<tr>
<td>Septic systems</td>
<td>fecal coliform bacteria, fecal streptococcus, nitrate, surfactants</td>
</tr>
<tr>
<td>Intensive agricultural use</td>
<td>total coliform bacteria, nitrate, pesticide scan, pH, total dissolved solids</td>
</tr>
</tbody>
</table>

Collecting water samples

Proper collection and handling of a water sample is critical for a meaningful water test. **Read all directions fully before attempting to collect your sample.** If the water is being treated, it may be necessary to sample both before and after the water goes through the treatment equipment.

**Bacteria sampling**

Water samples for bacteria tests must always be collected in a sterile container. Take the sample from an inside faucet with the aerator removed. Sterilize by flaming the end of the tap with a disposable butane lighter. Run the water for two minutes to clear water lines and bring in fresh water. Do not touch or contaminate the inside of the bottle or cap. Carefully open the sample container and hold the outside of the cap. Fill the container to the line to allow mixing and replace the top. Refrigerate the sample and transport it to the testing laboratory within 36 hours (preferably in an ice chest). Many labs, including the state Health Department, will not accept bacteria samples on Friday or before a holiday, so check to find out the lab’s schedule.
Iron bacteria forms a very obvious slime on the inside of pipes and fixtures. A water test is not needed to identify it. Check for a reddish-brown slime inside a toilet tank or where water stands for several days.

**Chemical sampling**

Sample bottles used to collect water for chemical analysis often contain a fixing compound to prevent loss or breakdown of specific chemicals. Always obtain these sample bottles and instructions from the testing laboratory. Run water at an inside tap for five minutes to clear the lines and bring in fresh water. Follow instructions for filling sample bottles and transport samples to the testing laboratory as quickly as possible, via personal delivery or overnight mail service. Check the list of labs below.

**Hydrogen sulfide sampling**

Hydrogen sulfide is a gas with a distinctive odor (rotten eggs). The gas escapes from water very quickly, so if needed, measurements of hydrogen sulfide concentrations must be made immediately, on site. In most cases, this will not be necessary. If the odor is present, hydrogen sulfide is present.

**Corrosion sampling**

When sampling for evidence of corrosion, allow the water to stand in the water lines overnight or longer. **Do not let the water run before collecting a sample**, because water held in the pipes will have corrosion products. Take the sample from an inside faucet with a laboratory container. Deliver the samples to the laboratory in person, or use an overnight mail service.

**Organic chemical sampling**

Many organic contaminants are volatile and will escape from solution when aerated. Take extra care when collecting these samples. Remove the faucet aerator and let water run for five minutes to clear the pipes and bring in fresh water. Partially close the faucet until a slow, steady, non-aerated stream of water flows. Hold the laboratory sample bottle at an angle to reduce aeration when filling. Fill the bottle completely and replace the cover. Invert the bottle and check for air bubbles. If bubbles are present, empty and take another sample. Take the sample to the laboratory in person if possible or use an overnight mail service.
Sampling for court cases

Sometimes water samples are taken for evidence in a court case to show pollution or damage to a water supply. These samples should always be collected by a health department sanitarian trained in proper sample collection, who can testify as to how the sample was handled. Notify the sanitarian that this sample is being used in court and that the chain-of-custody must be adhered to. Use a state-approved lab for all water testing.

Your record of routine sampling provides evidence about your water supply before pollution or damage.

Test results

The laboratory sends out water test results anywhere from a few days to a few weeks after receipt of samples. Water test results often list the drinking water standards to aid in interpreting the results. Contact your local University Extension specialist or your county health department for assistance in interpreting test results and determining corrective action.

File your water test report in a safe place for future reference.

Water testing laboratories

As of January 1, 1993, the following labs are approved by the Missouri Department of Health:

**Missouri certified laboratories for the bacteriological examination of water**

**Commercial labs**

Biological Technology Lab, Inc., 10126 Woodfield Lane, St. Louis, MO 63123 Tamara Schwartz (314) 432-5030

Cargill Analytical Services, 4301 Doniphan Drive, Neosho, MO 64850 Marty Burroughs (417) 451-5973

Engineering Surveys and Services, 1113 Fay Street, Columbia, MO 65201 Chris Segafredo (573) 449-2646

Environmental Analysis South, 1810 Plaza Way East, Cape Girardeau, MO 63702 David Warren (573) 334-8817

Franklin County Lab, P.O. Box 122, Highway 47, St. Clair, MO 63077 Donna Guehne (314) 629-7288
General Testing Laboratories, Inc., 1517 Walnut, Kansas City, MO 64108 Richard Howard (816) 471-1205

Helms Environmental Services, 312 Lafayette, Jefferson City, MO 65101 Garah Helms (573) 634-2699

Lawson Laboratories, Rt. 2, Box 215, Rogersville, MO 65065 Ron Lawson (417) 883-8258

Mid America Environmental Labs, 802 Cass Ave., West Plains, MO 65775 Tim Cozort (417) 256-0887

St. Louis Testing Lab, 2810 Clark Ave., St. Louis, MO 63103 Frederick Weise (314) 531-8080

Utility Consultants, Inc., 1621 Grant Street, Unionville, MO 63565 Carol Irelan (816) 947-3011

Water Analysis, Inc., 111 West 17th Street, Joplin, MO 64804 Bobby Graves (417) 623-2626

Water Lab Co./Wastewater Service, Rt. 1, Box 30, Osage Beach, MO 65065 Bill Mitchell (573) 348-5412

Water Technology of Springfield, Hwy. 160, P.O. Box 1080, Nixa, MO 65714 Hollis H. Brower Jr. (417) 725-4141

**Government labs**

**State**

Missouri Department of Health, Public Health Laboratory (Missouri's Primacy Lab), 307 West McCarty, Jefferson City, MO 65101
James Clifford 1-800-735-2466, ask for (573) 751-7243

Missouri Department of Health, Southeast Branch Laboratory, 1812 South Broadway, Poplar Bluff, MO 63901
Robert Dickerson (573) 785-9633

Missouri Department of Health, Southwest Branch Laboratory, 1154 E. Latoka, Springfield, MO 65807
Stanton Farmer (417) 883-1527

Missouri Department of Agriculture, Veterinary Diagnostic Laboratory, 1922 North Broadway, Springfield, MO 65803
Joann Robertson (417) 865-2261
County and City

Clay County Health Department, 1940-152 Highway, Liberty, MO 64068 Richard Janulewicz (816) 781-1600

Columbia-Boone County Health Department, P.O. Box N, Columbia, MO 65205 Linda Hancik (573) 874-7355

Jefferson County Health Department, P.O. Box 337, Hillsboro, MO 63051 James Martin (314) 789-3372 or 296-1844

Kansas City Health Department, 2301 Locust, Todd Hall, Kansas City, MO 64108 Lucien Watkins (816) 474-4901

St. Louis City Public Health Lab, 634 North Grand, St. Louis, MO 63103 Dr. Valgard Johnson (314) 658-1100

St. Louis County Department of Comm. Health and Medical Care, 111 South Meramec, Clayton, MO 63105
Dr. Wayne Black (314) 854-6830

Springfield City Health Department, 227 East Chestnut Expressway, Springfield, MO 65802
Larry Lambeth (417) 864-1671

Water plants

Chillicothe Municipal Utilities, Box 807, Chillicothe, MO 64601 Gene Bennett (816) 646-0562

Clarence Cannon Services, Inc. (pending), Rt. 1, Box 42, Stoutsville, MO 65283 Scott Allen (573) 672-3237

Columbia Water Treatment Plant, P.O. Box N, Columbia, MO 65201
Don Sisson (573) 874-7310

Ft. Leonard Wood Water Plant, Bldg. 1601 DEH, Ft. Leonard Wood, MO 65473
Rodney Vogel (573) 368-1419

Gladstone Water Plant, 7010 North Holmes, Gladstone, MO 64118 Ed Wegner (816) 454-2770

Hannibal Water Works, Board of Public Works, No. 3 Industrial Loop Road, Hannibal, MO 63401
Delbert Thomas (573) 221-0341

Macon Municipal Utilities, 326 Vine St., Macon, MO 63552 Jim LeDeay (816) 385-3849

Marshall Municipal Utilities, 75 East Morgan, Marshall, MO 65340 Kim Countryman (816) 886-6966
City of Maryville, Water Treatment Plant, 415 North Market, Maryville, MO 64468
Barry Collins (816) 562-8017

Missouri American Water Co., Joplin District, 21st and Murphy Streets, Joplin, MO 64801
Harold Denham (417) 624-3361

Monett Pollution Control Department, Eisenhower Facility, 217 5th Street, Monett, MO 65708
David Sims (417) 235-7455

City of Nevada, Water Treatment Plant, Corner of Cherry and Tower, Nevada, MO 64774
Larry Warner, Sr. (417) 725-4144

City of Independence Water Department, 11610 Truman Road, Independence, MO 64051
Daniel Montgomery (816) 252-0555

Capital City Water Company, 906 West High, Jefferson City, MO 65101 Randy Brown (573) 636-8616

Kansas City, Missouri, Water & Pollution Control Department, Laboratory Services Division, 1 NW Briarcliff Road, Kansas City, MO 64116
Dale McMurtrey (816) 454-7600

Kirkwood Water Department, 2020 Marshall Road, Kirkwood, MO 63122
Tim Rajchart (314) 822-5846
Plant (314) 822-5824

US Water/Lexington, Missouri, Inc., 1023 Franklin, P.O. Box 56, Lexington, MO 64067
Robert Long (816) 259-2912

St. Louis County Water Company, 901 Hog Hollow Road, Chesterfield, MO 63017 Ronald Twillman (314) 469-6050

Liberty Water Treatment Plant, Box 159, Liberty, MO 64068
Michael Schwed (816) 781-7100, ext. 410

Missouri American Water Company, St. Joseph District, 2707 Pembroke Lane, St. Joseph, MO 64506
David Hines (816) 233-8844

St. Jude Industrial Park, P.O. Box 67, New Madrid, MO 63869 Fred Turner (573) 643-2784, or (573) 643-2734

St. Louis City Water Division, Howard Bend Plant, 14769 Olive Blvd., Chesterfield, MO 63017
Frank Fields (314) 469-1901
Sedalia Water Department, 111 West 4th Street, Sedalia, MO 65301 Herb Taylor (816) 826-1234
Plant (816) 826-1236

Sikeston Water Plant, P.O. Box 370, Sikeston, MO 63801 Sam Mathews (573) 471-0518

Springfield City Utilities, 301 East Central, Springfield, MO 65802 John Witherspoon (417) 887-2691

For more information

These MU publications provide more information about private water supplies:

- WQ0101, Understanding Your Water Test Report
- WQ0102, Understanding Your Water Test Report
- WQ0103, Nitrate in Drinking Water
- WQ0104, Understanding Home Water Treatment Systems