



Water Quality Series **Drinking Water Testing**

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The taste, odor, and appearance of your drinking water can give you an indication of its quality, but do you know if your water is really safe? A glass of water may contain dissolved minerals, organic compounds, or even live organisms. Some of these materials, if present in very small amounts, are no problem for drinking water. Other materials, however, may be serious health risks.

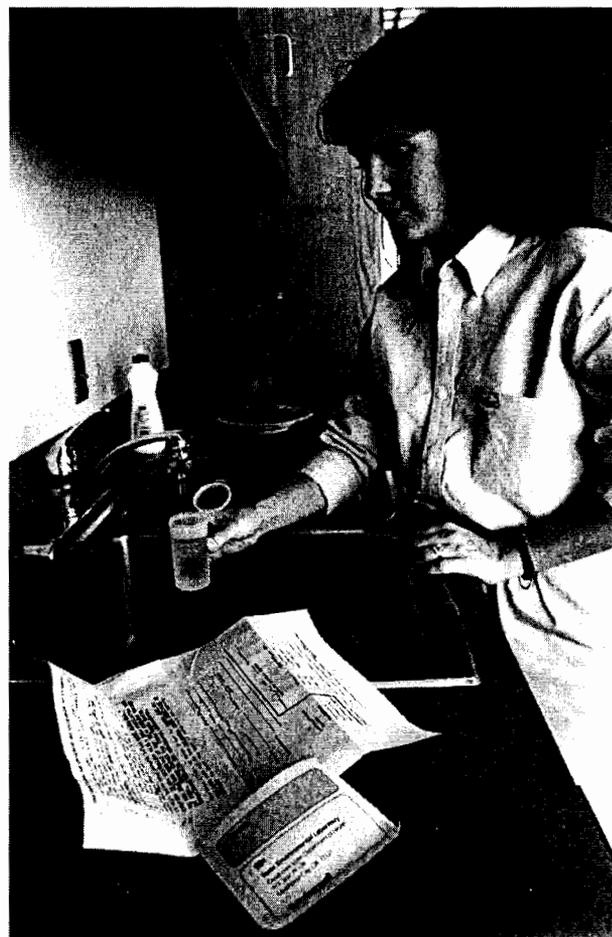
Public water supplies present few concerns because they are routinely disinfected and tested for a long list of potential contaminants according to rules and regulations set by the U.S. Environmental Protection Agency (EPA) under the Safe Drinking Water Act (SDWA). The Oklahoma Department of Environmental Quality (DEQ) is responsible for assuring that public water supplies satisfy SDWA standards. The SDWA requires that water treatment plants notify customers if any of these standards are violated. In 1996, Congress amended the SDWA requiring water suppliers to put annual drinking water quality reports into the hands of their customers beginning in 1999. The report is referred to as Consumer Confidence Report (CCR).

It is possible for water to meet SDWA standards when it leaves the public water treatment plant, but not meet those standards by the time it reaches your kitchen or bathroom sink. For example, water can extract lead from lead solder. Therefore, if you live in a home with plumbing that pre-dates the 1987 plumbing codes, or if you have a very old home in which there are lead pipes, you may wish to have your water tested for lead. Few other problems require testing by public water supply users.

If you get your water from a private well, it is your own responsibility to monitor its quality. Aside from your health concerns, most lending institutions require a water test before they will approve a loan for purchase or construction of your home. Much of Oklahoma's groundwater meets SDWA standards without any treatment. In some areas, however, there are health concerns, such as nitrate, fluoride, or arsenic concentrations above the drinking water standard. The more common problems, like hardness or high concentrations of iron, sulfate, or chloride are not health concerns.

Private well users may experience health-related water quality problems from chemical use or waste disposal near their wells, poor well construction and maintenance, the

Oklahoma Cooperative Extension Fact Sheets
are also available on our website at:
<http://osufacts.okstate.edu>



Water testing labs will give you instructions on collecting a sample of your water. For routine drinking water tests done by the State Department of Health, your local health department can provide a sample bottle, instructions, and a label and box for mailing the sample.

proximity of septic systems, chemical use or water disposal on adjacent land areas, or drastic weather events, such as severe drought or flooding. The only way to be certain your water supply is safe is to test it regularly for the most likely

contaminants and conduct additional tests if you suspect a particular contaminant.

The Oklahoma Department of Environmental Quality (DEQ) is responsible for assuring that public water supplies in Oklahoma meet Safe Drinking Water Standards. Public water supply systems are required to collect water samples on a regular basis (frequency of sampling depends on the size of the population served by the system) and submit the samples for analysis by an approved laboratory. DEQ enforces standards for inorganic chemicals, organic chemicals, volatile organic chemicals, turbidity, radionuclide contaminants and microbiological contaminants. If the maximum allowable level of any contaminant is violated, the public water system is required to issue public notices in a local newspaper and on monthly water bills to customers until the violation is corrected. Consumers will receive an annual water quality report from the public water supplier.

What Should I Test For?

A number of tests can be performed to check for specific water contaminants. To test for all possible pollutants, however, would be prohibitively expensive. Instead, tests should be conducted for the most common problems or for suspected problems. Table 1 provides a summary of typical problems observed in drinking water, the possible contaminants, and the recommended tests. Table 2 presents reasons to suspect contamination and the recommended tests. Use this information as a guide to determine which water tests you need.

In general, water analyses can be classified as bacteriological, inorganic, and organic tests. The bacteriological tests check for indicator species of bacteria (for example, coliforms or *E. coli*). Inorganic tests measure the concentration of dissolved minerals and the pH, or acidity. If other contaminants are suspected, the water may be tested for organic chemicals (including volatile organic compounds, pesticides, and petroleum products), radiological contaminants (such as uranium, radium, and radon), or heavy metals (such as arsenic, mercury, lead, or cadmium).

Table 1. Water Quality Problems and Recommended Tests.

| <i>PROBLEM:</i> | <i>IF YOU EXPERIENCE:</i> | <i>TEST FOR:</i> |
|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Appearance of Water | Brown or yellow Frothy or foamy Cloudy Organism brown precipitate Black flakes | Iron, tannin Detergents Turbidity Iron, pH Manganese, pH |
| Staining of fixtures or clothing | Red or brown Yellow Black Green or blue | Iron, pH Iron, hydrogen sulfide, hardness, pH Manganese, hydrogen sulfide, pH Copper, pH |
| Odor or taste of water | Bitter Rotten egg Soapy Metallic Salty Septic, musty, earthy Gasoline, oil, kerosene | Nitrate, sulfate Hydrogen sulfide Detergents, surfactants pH, iron, zinc, copper, lead Total dissolved solids, chloride, sodium, electrical conductivity Total coliform bacteria, iron, pH Hydrocarbons, organic compounds |
| Other | Tarnished silverware Stomach ache, diarrhea Discoloration or mottling of children's teeth White deposits on pots and fixtures or soap scum Corrosion of plumbing | Hydrogen sulfide, pH Total conform bacteria, nitrate, sulfate, manganese Fluoride Hardness, alkalinity, sulfate, total dissolved solids Electrical conductivity, pH, lead, iron, manganese, copper, sulfate, chloride |

Table 2. Reasons to Suspect Water Contamination and Recommended Tests.

| <i>Reason for Concern:</i> | <i>Consider Testing for:</i> |
|---------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| Water supply for infant less than 6 months | Nitrate |
| Lead pipe or lead solder in plumbing (older home) | Lead, copper, zinc, pH, alkalinity |
| Close to old fuel storage tanks | Hydrocarbons, volatile organic compounds |
| Close to gas and oil drilling | Chloride, total dissolved solids, sodium, barium, lead, pH, electrical conductivity, volatile organic compounds |
| Close to confined livestock area | Nitrate, total coliform bacteria |
| Close to a chemical/pesticide spill or sprayer loading/rinsing area | Specific chemical or pesticide |
| Close to a landfill or dump site | Volatile organic compounds, heavy metals, synthetic organic compounds |

Bacteriological Tests

The standard bacteriological test screens for coliform bacteria. These bacteria do not necessarily cause disease themselves, but their presence indicates contamination and the possible presence of disease-causing organisms such as pathogenic bacteria, viruses, or intestinal parasites. The presence of coliform bacteria means contamination from surface water sources, as these are not found in ground water. The Oklahoma Department of Environmental Quality recommends private wells be tested for coliform bacteria every one to two years. This is especially important if the well is shallow, old, or of substandard construction. Frequent testing is also recommended if it is located close to a source of human or animal waste, such as a septic tank drainfield, barnyard, or animal feeding operation. If a well appears to be substandard, DEQ can provide guidance for inspecting and upgrading it.

Other Tests

Inorganic chemical tests screen for specific minerals and salts, such as calcium carbonate, nitrate, chloride, and sulfate. Homes constructed prior to 1987 should also test for lead. Although some of the inorganic chemicals found in drinking water may not present a health hazard, they may be a nuisance. For a private well, inorganic chemical tests are recommended every three to five years; more frequently if you suspect contamination.

Organic chemical tests are used to check for synthetic and volatile organic compounds, petroleum products, pesticides and other organic chemicals. These tests are relatively expensive. Interpretation of the test results requires knowledge of the maximum contaminant levels (MCLs) established under the SDWA (Table 3). However, MCLs have not been established for many organic chemicals, and the health effects of long term exposure to small quantities of these chemicals are generally not known.

In general, testing for pesticides is recommended if the well is close to cropland where pesticides are used extensively, if the well is particularly shallow (50 ft or less), or if there is evidence of surface contamination by a pesticide.

Table 3. EPA Standards for Drinking Water.

| <i>Analyte</i> | <i>Limit</i> |
|----------------|--------------|
| Nitrate* | 10 ppm |
| Chloride | 150 ppm |
| Sulfate | 250 ppm |
| TSS | 500 ppm |
| pH | 6.5-8.5 |

* Only Nitrate is a primary drinking water standard.

Radiological contaminants generally occur naturally because of geological characteristics. Radiological tests may focus on specific contaminants, such as radon, or they may measure total alpha or beta emission. Knowing the geology in your area well will help you determine whether such a radiological test is needed.

Heavy metals may occur naturally in ground water because of underlying rocks and soils. However, mining, construction, and industrial activities may release these metals into the groundwater. Examples of heavy metals are arsenic, mercury, cadmium, chromium, selenium, and lead.

Where to Get Water Testing Done

The Oklahoma DEQ conducts routine bacteriological and inorganic chemical tests of water. Contact your local DEQ office for information on how to take the water sample, how to get it to the laboratory, and the cost. In addition, if you suspect contamination of your drinking water by any type of contaminant (requiring a routine or nonroutine test), contact your local DEQ office. They will work with you to determine whether contamination has occurred, to find the source of the contamination, and, if necessary, to find an alternative source for drinking water. DEQ also maintains a statewide hotline for reports or questions concerning possible environmental contamination: 1-800-522-0206.

The Soil, Water, and Forages Analytical Laboratory at Oklahoma State University can provide routine inorganic chemical

testing for household water. A nominal fee is charged. Contact your County Oklahoma Cooperative Extension office for DEQ sample bottles and details on drawing the water sample and getting it to the laboratory.

Shop carefully for private laboratory services. For most labs, testing private drinking water samples is a very small part of their overall workload, so ask about turnaround time. Also ask what information will be provided with the test results. A good lab should help you interpret the results. If you have questions about the report, call and ask. You can also contact your local Oklahoma Cooperative Extension Office if you have questions about whether contaminants detected in your water exceed safe levels.

DEQ not only provides drinking water test services but also certifies other laboratories to provide drinking water testing in Oklahoma. To be certified, a laboratory must satisfy specific criteria to assure the quality of their procedures and results. You may acquire a list of laboratories certified by DEQ from:

Oklahoma Department Of Environmental Quality
State Environmental Laboratory
707 N. Robinson
Oklahoma City, OK 73102
405-702-1000

DEQ also posts the information about currently certified laboratories on the internet at: <http://www.deq.state.ok.us/certcov.htm> . Certification is normally good for one year, therefore, some laboratories may lose certification and other labs may become certified. Contact the lab before you submit samples.

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