



HOUSEHOLD WATER QUALITY

## Household Water Testing

Blake Ross, Kathleen Parrott, and Janice Woodard,\*

Concerns about personal and family health may lead you to question the safety of the water used in your household. Perhaps you have been alarmed by recent publicity about water pollution problems and their effect on water used in the home for drinking, cooking, and many other purposes. You may be particularly uncertain about the quality of your household water if you rely on your own well or other private water supply. With the availability of modern water treatment equipment and the aggressive marketing of these devices, you may wonder about the need to install such equipment in your home.

### WHY TEST YOUR WATER

There is no such thing in nature as “pure” water. Nearly all water contains contaminants, even in the absence of pollution-causing activities. Many dissolved minerals, organic compounds, and microorganisms find their way into water supplies as water comes into contact with air and soil. When contaminant levels in water are excessive, they may affect certain household activities and/or be detrimental to human health.

Obvious problems, such as staining of plumbing fixtures and laundry, as well as many objectionable tastes and odors, may be evidence of excessive levels of contaminants in your water supply. Many of these impurities are naturally present and are considered a nuisance, presenting no hazard to human health. The presence of most harmful contaminants, however, is not always obvious and such contaminated water may not cause health-related symptoms for many years. As a result, the only way that you can ensure that your water supply is safe is to have a periodic laboratory analysis of your household water.

### *Public/municipal water systems*

If you rely on a public or municipal water system, this testing is currently being done, the cost of which is included in your water bill. Federal law requires water utilities to regularly monitor and test the water they sell to ensure a safe supply to their customers. The results of any testing are public information and available to you, as a public water user, upon request.

Testing and treatment for many nuisance contaminants is voluntary, however, and is not always conducted. You should also keep in mind that testing performed only applies to the water as it leaves the treatment facility and may not reflect the presence of contaminants that enter your water from your plumbing system, for example, from corrosion of household water pipes. It is also important to remember that violations by public water systems are known to occur. Many small communities cannot afford a modern water treatment facility, and only the minimum water treatment standards are met. In addition, some public water systems are old and have not been properly maintained.

### *Private/individual water supplies*

If you rely on a private water supply, such as an individual backyard well, you are solely responsible for the safety of that supply and any recommended testing. A laboratory analysis of your own water supply will provide you with the information needed to take immediate and long-term corrective measures, if necessary, to provide a suitable and safe water supply. A pattern of timely and regular testing will help you to examine the long-standing quality of your water supply and trends that may alert you to contamination-causing activities. Establishing a record of your household

\* Extension Specialist, Biological Systems Engineering; Extension Specialist, Housing, Retired Extension Specialist, Home Management and Equipment; respectively; Virginia Tech.

water quality may help you to prove damage and obtain compensation should your water supply become contaminated from some pollution incident.

## WHAT TO TEST FOR

The list of potential contaminants is very lengthy and impractical to test for in its entirety. Such water testing would be very expensive and unnecessary. In the event that you could have every potential contaminant tested for, relatively few have established standards, or recommended levels, to allow you to evaluate how serious the contamination may be. Knowing which contaminants are most likely to be a problem and being aware of the warning signs of certain contaminants can make such testing more meaningful and less costly. The following tables can be used to select the proper test(s) to confirm a perceived water quality problem and ultimately lead to a solution.

Several basic tests not only reveal the severity of specific impurities, but also indicate the likelihood of other contaminants being present. For example, low pH, a measure of the acidity of water, may lead to corrosion of plumbing materials, such as copper and lead, which may dissolve and reach unhealthy levels in drinking water. In addition, high nitrate levels indicate contamination by surface water or seepage which may convey other harmful contaminants, such as pesticides, into household water supplies. For this reason, it is a good idea to conduct routine testing, as often as annually, for the following:

total coliform bacteria  
nitrate  
pH  
total dissolved solids (TDS).

---

### *Laboratory Tests for Nuisance Problems*

While many of the following symptoms are not considered health hazards, nearly all will render water unsatisfactory for normal household use. Most of the tests for nuisance problems should be included in an initial assessment of a private water supply's quality, for example, when digging a new well or moving into a new home with an existing water system.

Symptom	Description	Recommended Tests
Stained plumbing fixtures, cooking utensils and/or laundry	red or brown reddish-brown slime black green or blue chalky white	iron iron bacteria manganese copper hardness
Off-color water	cloudy black brown or yellow	turbidity, suspended solids hydrogen sulfide, manganese iron, tannic acid
Unusual taste and odor	rotten egg metallic  salty  septic, musty, earthy alkali, bitter gasoline or oil soapy	hydrogen sulfide pH, corrosion index, iron, zinc, copper, lead total dissolved solids (TDS), chloride, sodium total coliform bacteria, methane pH, total dissolved solids (TDS) hydrocarbon scan surfactants (surface-active agents)
Corrosive water	deposits, pitting of plumbing fixtures	corrosion index, pH, copper, lead

---

---

### ***Tests for Specific Health Concerns***

The following health-related tests are recommended if any of the following situations are encountered:

---

<b>Situation</b>	<b>Recommended Tests</b>
Family members or guests have recurring incidents of gastrointestinal illness	coliform bacteria, nitrate, sulfate
Household plumbing contains lead pipes, fittings or solder joints	pH, corrosion index, lead, copper, cadmium, zinc
Household with pregnant resident or infant less than six months old	nitrate, coliform bacteria
Family member on recommended low salt/sodium diet (particularly if a water softener is currently installed)	sodium

---

### ***Testing for Suspected Contamination***

Water tests are especially important if the supply is threatened by nearby activities even if no apparent problems are noted. Listed below are activities that may affect the quality of a water supply and appropriate laboratory tests if warranted.

---

<b>If you suspect/observe</b>	<b>Recommended Tests</b>
Leaking fuel tank	hydrocarbon scan
Coal mining	total dissolved solids (TDS), iron, sulfate, pH, corrosion index, manganese, aluminum
Gas and oil drilling	total dissolved solids (TDS), chloride, sodium, barium, lead, pH, corrosion index, strontium
Road salt storage/application or near sea coast	total dissolved solids (TDS), chloride, sodium
Landfill	total dissolved solids (TDS), pH, chemical oxygen demand (COD), volatile organic scan, heavy metals
Land application of sludge	total coliform bacteria, nitrate, heavy metals
Septic system	fecal coliform or <i>E.coli</i> bacteria, fecal streptococcus, nitrate, surfactants (surface-active agents)
Intensive agricultural use	total coliform bacteria, nitrate, pesticide scan, pH, total dissolved solids (TDS)

---

Tests should be performed during spring or summer, and preferably after a rainy period. In addition, they should be repeated any time work is done on the water supply system, such as well improvements, installing a new pump, etc. When considering the purchase of a new home, at the very least, these tests should be performed on the existing water system. Banks and other lending agencies may require these and/or additional tests before approving a loan.

## HAVING YOUR WATER TESTED

Although many companies which sell water treatment equipment offer free tests for a few contaminants such as hardness and iron, this is primarily used as a marketing tool. Any results obtained should be viewed as being preliminary and should be confirmed by an independent water testing laboratory before purchasing any equipment that has been suggested. The choice of laboratories is ever increasing throughout Virginia as numerous private water testing firms are responding to increased demand for such services in recent years. Not all laboratories will be able to conduct all the tests you require and costs of analysis will vary widely.

Your local Health Department and Cooperative Extension Offices can provide you with information about water testing labs most accessible to you. The yellow pages of your phone book may also be helpful. Look under the following listings: *Laboratories-testing*, *Water analysis*, *Water purification*, and *Water treatment* to name a few. Be sure to ask any laboratory you contact for a certification number indicating that it has been approved at the state level. In Virginia, water testing laboratories are certified through the Virginia Division of Consolidated Laboratory Services.

Always contact the water testing laboratory beforehand to obtain proper sample containers and specific instructions on where and how to take the sample, as

well as how and when to deliver the sample to the laboratory. After receiving the test results, contact the laboratory if you have any problems interpreting the specifics of the report. Again, you can contact your local Health Department and Cooperative Extension Office for assistance in evaluating the significance of your results, and any actions you should take to solve identified problems.

Several water testing laboratories across the country promote the use of mail order analysis which may be more convenient for you. Out of state laboratories, while not always certified in Virginia, should be certified in their home state. Keep in mind that, if you choose this alternative, it may be necessary to send a water sample by express mail or overnight courier. The results of tests, such as coliform bacteria, can be significantly altered by a delay between the times of sampling and laboratory analysis.

Also becoming more readily available are water testing kits which you can purchase to conduct your own analysis. These will range from the more expensive, multi-test kits which can be used many times to relatively inexpensive, single, onetime tests. Your unique situation will determine what kind of kit you may be able to use. In most cases, your results will not be as accurate or exact as those obtained from a certified water testing laboratory. If you do use a water testing kit, be sure, as always, to obtain assistance in interpreting readings.

Obtaining a water analysis is a necessary first step toward understanding the nature and extent of water quality problems. Having your water tested may help you to avoid taking a costly, and possibly ineffective, remedy. At the very least, if your water supply is determined to be safe, you will have peace of mind in knowing that you and your family are not being exposed to dangerous levels of harmful contaminants.

For additional information and publications on water quality, contact your local Cooperative Extension office.