



Solving Water Quality Problems in the Home

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Everyone needs high quality water for drinking and other domestic uses. If your water supply is public, the water utility company must test the water regularly to make sure it meets standards set by the Environmental Protection Agency. The two types of standards are Primary Standards (having to do with pollutants that affect health, including pathogens, radioactive elements and toxic chemicals) and Secondary Standards (having to do with properties such as taste, color, corrosivity, foaminess, and staining). The utility must treat the water, if necessary, to maintain its quality.

If your water supply comes from a private well, it is up to the well owner to test the water and make any treatments necessary. There are several reasons well water may be poor quality. Some water naturally contains elements or compounds for which it should be treated. In some cases, there may be a source of pollution that is affecting the well. Finally, the water may be reacting with the plumbing system to produce undesirable substances.

Follow the step-by-step procedure described below to determine whether you have a water quality problem and find an appropriate solution.

Step 1. Inspect Your Water

First you will need to inspect your water. Does it have an unusual taste, color or odor? Does it contain sediment? Does it stain clothes, dishes, fixtures or sidewalks? For example, water in some parts of

Texas contains a high level of dissolved iron that causes reddish brown stains on sinks, bathtubs and toilets. Table 1 is a guide to common water problems and their causes. If you notice any of these problems, your water should be tested to confirm the cause.

Step 2. Get Expert Information

If your water comes from a public source, contact the water utility and request a copy of the Municipal Drinking Water Contaminant Analysis Report (commonly referred to as a consumer confidence report). The utility is required by law to send this report to its customers annually. Because public water utilities must test water regularly, your water may not need to be tested unless someone in your family becomes ill or the taste, odor or color of your water changes. If you do have problems, the utility should help get the water tested.

If your water source is private, contact your county Extension agent or county health department to find out what contaminants are typical of well water in your locale. The health department can test your water for bacterial contamination. Both the Extension agent and the county health department can put you in touch with laboratories that test the quality of drinking water.

Table 1. Common problems.	
Problems and symptoms	Possible contaminants or confirmation tests
Stained fixtures and clothes: Red or brown Black Green or blue	Iron Manganese Copper
Reddish-brown slime	Iron bacteria
Off-color appearance: Cloudy Black Brown or yellow	Turbidity Hydrogen sulfide, manganese Iron, tannic acid
Unusual taste and odor: Rotten egg Metallic Septic, musty, earthy Alkali Gasoline or oil Soapy	Hydrogen sulfide pH, corrosive index, iron, zinc, copper, lead Total coliform bacteria, methane pH, total dissolved salts Hydrocarbon scan Surfactants
Corrosion of pipes or plumbing	pH, lead, iron, manganese, copper

Source: "Water Testing," publication AEX-314, Ohio Cooperative Extension Service.

Step 3. Have Your Water Tested

Contact the testing laboratory and ask for complete instructions, and any necessary equipment, for taking a water sample. Read the instructions very carefully and carry them out precisely. Proper sampling is the most important part of water testing. Use only the containers the lab sends or recommends. Note how much time the lab allows between the time the water is collected and the time it is analyzed. Make sure your samples arrive at the lab within the time limit.

Some laboratories can test for all known contaminants, but this is expensive and usually unnecessary. Private well water should be tested at least every 2 years for coliform bacteria and nitrates. Also test for lead if the house is old and contains iron or copper pipes, fittings, plumbing fixtures or solder. Other contaminants need to be measured only if there is reason to believe they are present at levels that cause problems.

The laboratory report should state whether there are any contaminants that do not meet Primary or Secondary Standards. Within the Primary Standards, each contaminant is assigned a Maximum Contaminant Level (MCL) based on its toxicity and

its effect on human health. Drinking water standards and related information can be found on the EPA Web site at www.epa.gov.

If you have questions about the lab report you receive, contact the lab and ask for an explanation. Your county Extension agent or county health department also can help you interpret laboratory results.

The do-it-yourself water testing kits available in home product stores are not as accurate as laboratory analyses and usually do not detect low levels of contaminants as readily. Also, they do not detect all kinds of contaminants. Organic pollutants, for example, must be analyzed in a laboratory with sophisticated equipment. Hydrogen sulfide (H₂S) also requires professional laboratory analysis. This is the contaminant that gives water a "rotten egg" smell. For more information on this substance, see L-5312, "Hydrogen Sulfide in Drinking Water," available at <http://tcebookstore.org>. Most home testing kits are not useful for analyzing anything more than basic water characteristics such as hardness, pH, iron, chlorine and sulfur.

Step 4. Choose Treatment Equipment

If you have taken time to find out all you can about your water, you will be able to select the appropriate treatment method. If your water has no objectionable physical properties and contains no contaminants above acceptable limits, it does not need treatment. Table 2 lists most major water problems and the treatment options you can use in your home. When you select equipment, remember to consider not just the initial cost but also the cost of maintaining the equipment (including back flushing, adding chemicals and replacing filters). Without proper maintenance your system will not operate effectively.

One source of consumer information about water treatment equipment is NSF International, an independent, nonprofit organization that develops equipment standards and evaluates products against those standards. NSF International certifies plumbing products, drinking water additives and drinking water treatment systems and devices. The organization is accredited by the American National Standards Institute. The circled NSF approval stamp means that a product conforms to specified standards. For a list of water treatment units certified by NSF International, write:

NSF International
3475 Plymouth Road
Ann Arbor, MI 48105
(317) 769-8010

Table 2. Index of water problems and water treatment equipment.

Filter equipment options					Other equipment options					
Problem pollutant	Activated carbon	Mechanical	Oxidizing	Activated alumina cartridge	Reverse osmosis	Distillation	Cation exchange	Anion exchange	Chemical feed (chlorinator)	UV light
Aluminum					X	X				
Arsenic				X	X	X				
Asbestos		X			X					
Barium					X	X	X			
Cadmium					X	X	X			
Chloride					X	X		X		
Chlorine ^a	X				X					
Chromium					X	X				
Coliform bacteria						X			X	X
Color	X	X			X				X	
Copper					X	X	X			
Corrosion		X							X	
Endrin	X									
Fluoride				X	X	X		X		
Giardia cysts		X			X	X				
Hardness					X	X	X			
Iron (Fe ²⁺)			X		X	X	X		X	
Iron (Fe ³⁺)		X			X	X				
Lead ^b	X			X	X	X				
Lindane	X									
Manganese			X		X	X	X			
Mercury					X	X				
Methoxychlor	X									
Nitrate					X	X		X		
Particulates		X			X	X				
Pesticides, herbicides, PCBs	X									
Radium					X	X	X			
Radon	X									
Selenium				X	X	X				
Silver					X	X	X			
Tannic acids	X					X				
Taste and odor	X	X	X		X				X	
TDS ^c					X	X				
TTHMs ^d	X									
Toxaphene	X									
Turbidity	X	X			X	X				

(continued)^e

Filter equipment options					Other equipment options					
Problem pollutant	Activated carbon	Mechanical	Oxidizing	Activated alumina cartridge	Reverse osmosis	Distillation	Cation exchange	Anion exchange	Chemical feed (chlorinator)	UV light
VOCs ^e	X									
Zinc					X	X	X			
2,4-D	X									
2,4,5-TD Silvex	X									

^a Not all reverse osmosis units reduce chlorine effectively. Ask for proof of performance.

^b Not all activated carbon filters reduce lead effectively. Ask for proof of performance.

^c TDS=Total Dissolved Solids

^d TTHMs=Total Trihalomethanes

^e VOCs=Volatile Organic Compounds

Source: NSF International, 1991.

References

"Water Testing," Publication AEX-314, Ohio Cooperative Extension Service.

"Determining the Quality of Your Drinking Water: A Step by Step Guide," NSF International.

"Groundwater: Household Water Treatment," Montana Cooperative Extension Service.

"Home Water Treatment Systems," Publication L-2280, Texas Cooperative Extension.

"Home Water Treatment Equipment: An Overview," Cooperative Extension, University of Nebraska Institute of Agriculture and Natural Resources.



This publication was funded by the Rio Grande Basin Initiative administered by the Texas Water Resources Institute of Texas Cooperative Extension, with funds provided through a grant from the Cooperative State Research, Education, and Extension Service, U.S. Department of Agriculture, under Agreement No. 2001-45049-01149.

Producido por *AgriLife Communications and Marketing*, El Sistema Texas A&M
Las publicaciones de *Texas AgriLife Extension* se pueden encontrar en Internet en: <http://AgriLifebookstore.org>

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Emitido para el desarrollo del Trabajo de la Extensión Cooperativa en Agricultura y Economía del Hogar, Leyes del Congreso del 8 de mayo de 1914 con sus reformas y del 30 de junio de 1914 junto con el Departamento de Agricultura de los Estados Unidos, Edward G. Smith, Director, *Texas AgriLife Extension Service*, Sistema Texas A&M.