Well Water and Drinking Water Analysis in LSU AgCenter

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Know Your Well Water

Wondering if your well water is safe? Whether your water causes illness, stains on plumbing, scaly deposits, or a bad taste, a water analysis identifies the problem and enables you to make knowledgeable decisions about water treatment. A good first step is to have your water tested at a certified lab, but lab test results are not always easy to interpret. Well owners sometimes find laboratory water test results confusing. It is particularly important to know if anything in the test results indicates a health risk. To assist you, the LSU AgCenter has created this website to help drinking water well owners test, understand and protect their well water.

This youtube is providing you for brief information in water sample preparation, https://www.youtube.com/watch?v=aUE7PcGRKxc

Health risks can vary based on several factors. Key factors in determining the amount of risk from a drinking water contaminant are the specific substance and the amount of that substance in the water. Another factor is the health or, in some cases, the age of the person. For instance, very young children who take in high levels of nitrate over a relatively short period of time can experience dangerous symptoms while an adult would not. Other contaminants pose a long-term or chronic threat to one's health due to small amounts consumed regularly over a long period of time.

Well owners can get guidance from U.S. EPA drinking water rules for public water systems, which are designed to protect people from both short- and long-term health hazards.
To find a certified water testing laboratory in your area, contact your state certification officer by visiting the U.S. EPA Web site at http://water.epa.gov/scitech/drinkingwater/labcert/statecertification.cfm.

The amounts of contaminants allowed are based on protecting people over a lifetime of drinking water. Private well owners can compare their test results to these federal or state drinking water standards to determine whether their test results represent any health risks.

Water Sample Report

Once the lab has completed testing your water, you will receive a report from the tested laboratory. It will contain a list of contaminants tested, the concentrations, and, in some cases, highlight any problem contaminants. An important feature of the report is the units used to measure the contaminant level in your water. Milligrams per liter (mg/l) of water are used for substances like metals and nitrates. A milligram per liter is also equal to one part per million (ppm)—that is one part contaminant to one million parts water. About 0.03 of a teaspoon of sugar dissolved in a bathtub of water is an approximation of one ppm. For extremely toxic substances like pesticides, the units used are even smaller. In these cases, parts per billion (ppb) are used. Another unit, picocuries per liter, found on some test reports is used to measure radon. Some values like pH, hardness, conductance, and turbidity are reported in units specific to the test.

Water test parameters

The following tables provide a general guideline to common water quality parameters that may appear on your water analysis report. The parameters are divided into three categories: health risk parameters, general indicators, and nuisance parameters. These guidelines are by no means exhaustive; however, they will provide you with acceptable limits and some information about symptoms, sources of the problem and effects.

Health Risk Parameters

In Table 1 are some commons parameters that have known health effects. The table lists acceptable limits, potential health effects, and possible uses and sources of the contaminant.

Table 1: Standards, symptoms, and potential health effects of regulated contaminants.

Contaminant	Acceptable Limit	Sources/Uses	Potential Health Effects at High Concentrations
* Recommended level in water at which remedial action should be taken. No mandatory standards have been set.			
Atrazine	3 ppb or 0.003 ppm	used as a herbicide; surface or ground water contamination from agricultural runoff or leaching	heart and liver damage
Benzene	5 ppb or 0.005 ppm	gasoline additive; usually from accidental oil spills, industrial uses, or landfills	blood disorders like aplasticaremia; immune system depression; acute exposure affects central nervous system causing dizziness, headaches; long term exposure increases cancer risks
Lead at tap	0.01 mg/l	used in batteries; lead gasolines and pipe solder; may be leached from brass faucets, lead caulking, lead pipes, and lead soldered joints	nervous disorders and mental impairment, especially in fetuses and infants; kidney damage; blood disorders and hypertension; low birth weights
Nitrates (NO_3)	10mg/l (nitrate-N) 45mg/l (nitrate)	soil by-product of agricultural fertilization; human and animal waste leaching into groundwater	methemoglobinemaia (blue baby disease) in infants (birth to 6 months); low health threat to children and adults
Total Coliform	<1 coliform per100 ml	possible bacterial or viral contamination from human sewage or animal manure	diarrheal diseases, constant high level exposure can lead to cholera and hepatitis
Radon	300 pCi/l	naturally occurring gas formed from uranium decay; can seep into well water from surrounding rocks and be released in the air as it leaves the faucet	breathing gas increases chances of lung cancer; may increase risk of stomach,

General Water Quality Indicators

General Water Quality Indicators are parameters used to indicate the presence of harmful contaminants. Testing for indicators can eliminate costly tests for specific contaminants. Generally, if the indicator is

present, the supply may contain the contaminant as well. For example, turbidity or the lack of clarity in a water sample usually indicates that bacteria may be present. The pH value is also considered a general water quality indicator. High or low pH value can indicate the corrosiveness of water. Corrosive water may further indicate that metals like lead or copper are being dissolved in the water as it passes through distribution pipes. Table 2 shows some of the common general indicators.

Table 2. General water quality indicators.

Indicator	Acceptable Limit	Indication
pH value	6.5 to 8.5	An important overall measure of water quality, pH can alter corrosivity and solubility of contaminants. Low pH will cause pitting of pipes and fixtures or a metallic taste. This may indicate that metals are being dissolved. At high pH, the water will have a slippery feel or a soda taste.
Turbidity	<5 TU	Clarity of sample can indicate contamination.
Total Dissolved Solids (TDS)	500 mg/l	Dissolved minerals like iron or manganese. High TDS also can indicate hardness (scaly deposits) or cause staining, or a salty, bitter taste.

Nuisance contaminants are a third category of contaminants. While these have no adverse health effects, they may make water unpalatable or reduce the effectiveness of soaps and detergents. Some nuisance contaminants also cause staining. Nuisance contaminants may include iron bacteria, hydrogen sulfide, and hardness. Table 3 shows some typical nuisance contaminants you may see on your water analysis report.

Table 3. Common nuisance contaminants and their effects.

Contaminant	Acceptable Limit	Effects
Chlorides	250 mg/l	salty or brackish taste; corrosive; blackens and pits stainless steel
Copper (Cu)	1.3 mg/l	blue-green stains on plumbing fixtures; bitter metallic taste
Iron (Fe)	0.3 mg/l	metallic taste; discolored beverages; yellowish stains, stains laundry
Manganese (Mn)	0.05 mg/l or 5ppb	black stains on fixtures and laundry; bitter taste
Sulfates (SO_4)	250 mg/l	greasy feel, laxative effect
Iron Bacteria	present	orangeish to brownish slime in water

Hardness is one contaminant you will also commonly see on the report. Hard water is a purely aesthetic problem that causes soap and scaly deposits in plumbing and decreased cleaning action of soaps and detergents. Hard water can also cause scale buildup in hot water heaters and reduce their effective lifetime. Table 4 will help you interpret the hardness parameters cited on your analysis. Note that the units used in this table are different from those indicated in Figure 1. Hardness can be expressed by either mg/l or a grains per gallon (gpg). A gpg is used exclusively as a hardness unit and equals approximately 17 mg/l or ppm. Most people object to water falling in the "hard" or "very hard" categories in Table 4.

Table 4. Hardness classifications.

Concentration of hardness minerals in grains per gallon (GPG)	**Hardness Level**
* level at which most people find hardness objectionable	
below 1.0	soft
1.0 to 3.5	slightly hard
3.5 to 7.5	moderately hard
7.5 to 10.5	hard
10.5 and above	very hard

Hydraulic fracturing brochure for water well owners

A water-testing brochure for household water well owners living near oil and gas development and completion activities, including hydraulic fracturing, has been produced by the National Ground Water Association and the Ground Water Protection Council.

Click here to view or download the brochure, http://www.wellowner.org/wp-content/uploads/2013/05/Hydraulic-Fracturing-brochure-2013.pdf

Brief information on Water Wells in Proximity to Natural Gas or Oil Development, http://www.ngwa.org/Media-Center/briefs/Documents/Water-Wells-Proximity-2013.pdf

Testing Your Well Water After Flood

The Louisiana Department of Health and Hospitals recommends testing of private well water for total coliform bacteria (fecal coliforms and E. coli) following flooding and total coliforms and nitrate annually. Additional analyses may be wise after a flood or chemical release, depending on several factors that could provide evidence of contamination.

Before sampling after a flood, answer these questions:

- ❏ What parish is the sample from?
- ❏ How old is the residence and when was the well constructed?
- ❏ From what source did the flooding occur—pond, river, salt or brackish water?
- ❏ How near a municipality is your well? What municipality? Was the municipality flooded? Were fuel stations with underground tanks flooded near your residence? Were chemical storage facilities or chemical points of sale flooded near your residence, and what chemicals may have been stored there?
- ❏ What is the land used for in the immediate location of the well? Farming? What crops? Confined animal operations? What animals? Industrial activities? What kind?
- ❏ Have there been unexpected chemical emissions from nearby industries? Before or during the flood?
- ❏ Is there a noticeable color or odor change from the water after 2-3 minutes of purging?
- ❏ Have contaminants been detected in nearby wells?

Taking Your Own Samples From the Well:

First, be sure to contact the laboratory before sample collection to determine appropriate analyses and necessary sample size.

- ❏ Obtain clean plastic or glass containers, washed with a phosphate-free soap, rinsed with good quality filtered water and air-dried. Never remove the cap until taking sample.
- ❏ Never touch the inside of the lid or container.
- ❏ Samples must be obtained from an inside faucet.

Water Well Purification

How do I clean and disinfect my well after a flood?

After a flood, it is important to take every precaution to ensure the safety of your well water. First, it is necessary to inspect and clean the well and pump before using them. You may want to have your water well driller or contractor check out the well before using it.

❏ Do not turn on the pump until an electrician or well contractor has checked the wiring because of the risk of electrical shock. After the proper inspections have taken place, run the pump and discard the water until the well water runs clear.

❏ Most important, after a flood, you should disinfect the well. This can be accomplished by following the procedures below; however, it is advisable to hire a well contractor to disinfect the well for you.

Pump the well for several hours to reduce the cloudiness and contaminant levels in the water.

Pour 4 gallons of a chlorine bleach solution into the well. Chlorine bleach solution consists of 1 gallon of bleach with 3 gallons of clean water. Open every faucet and pump the water until the water coming out of the faucet smells like chlorine, and then turn off each faucet. If you do not smell chlorine at the faucet, add a little more chlorine solution until the smell is detected.

Let the system sit for 24 hours.

Open the faucets and run the water until the chlorine smell disappears

❏ Have the water sampled and tested. The water is not safe for drinking until lab results show no indication of total coliform bacteria. You can discuss the final lab results with the lab or local parish health unit. It is important to remember that disinfection will not remove chemicals that may have contaminated your well during a flood.

Analysis Lab at LSU AgCenter

W.A. Callegari Environmental Center

W.A. Callegari Environmental Center offers analytical services to research, public and private clientele. http://www.lsuagcenter.com/en/our_offices/departments/W.A._Callegari_Environmental_Center/organic_water_labs/index.htm

The laboratories perform more than 50 analytical procedures from simple to the most sophisticated determination of chemicals in water, solid and semi-solid materials. The Center also has the capability of setting up additional analyses that may be needed. The lab understands in great depth the application of those analyses, and creates value by offering not only outstanding analytical capability but also guidance and interpretation of results that our clients can depend on. The staff is available to answer questions concerning submitting samples for analysis and sample preparation, preservation and storage. The laboratory can furnish results on your sample within a minimum time. The analysis and prices are provided below. The facility is located at:

1300 Dean Lee Drive
Baton Rouge, LA 70820
Phone: (225)765-5155
Fax: (225)765-5158

Table 5. Well Water Analysis Price

Well Water Tests

Individual Analyses	Method	Price
Anions by chromatography; Nitrate, Sulfate, Chloride,Bromide, Fluoride (ANIONS)	EPA 300.1	$8.00
Nitrite (NO2)	EPA 300.1	$7.00
Ortho-Phosphate (PIC)	EPA 300.1	$7.00
Silica (SiO2)	SM 4500-SiO2-C	$7.00
Specific Conductance (electrical conductivity) (EC)	SM 2510-B	$5.00
Ammonia (NH3)	SM 4500-NH3-E	$5.00
Fecal Coliforms (Fecals)	SM 9221-E	$8.00
E. Coli (E.coli)	SM 9221-F	$15.00
Total coliform test	SM 9221-B	$23.00
Semi-volatile organic compounds (fuels)	EPA 3511/8015	$15.00
Non-volatile organic compounds (oils/parafins)	EPA 3511/8015	$15.00
Volatile organic compounds (VOC)	EPA 3511/8015	$15.00
Metals (Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, P, K, Se, Na, Tl, V, Zn)	EPA 200.7	$13.00
Turbidity	SM 2130-B	$5.00
Hardness (calc.)	SM 2340-B	$5.00
Salinity	SM 2520-B	$5.00
Pesticide/herbicide speciation	EPA 507/508	$75.00

Basic Well Water Package

Analyses included	Method	Price
Anions by chromatography; Nitrate, Sulfate, Chloride, Bromide, Fluoride (ANIONS)	EPA 300.1	
Nitrite (NO2)	EPA 300.1	
Silica (SiO2)	SM 4500-SiO2-C	
Specific Conductance (electrical conductivity) (EC) SM 2510-B		
Turbidity SM 2130-B		
Ammonia (NH3) SM 4500-NH3-E		
Total Coliforms (with E. coli) SM 9221-B		
Volatile organic compounds (VOC) EPA 3511/8015		
Metals (Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, P, K, Se, Na, Tl, V, Zn)	EPA 200.7	

Salinity	SM 2520-B	
Pesticide/herbicide speciation	EPA 507/508	
Package price		**$165.00**

Hydrocarbon Package

Analyses included	Method	Price
Semi-volatile organic compounds (fuels)	EPA 3511/8015	
Non-volatile organic compounds (oils/parafins)	EPA 3511/8015	
Volatile organic compounds (VOC)	EPA 3511/8015	
Pesticide/herbicide speciation	EPA 507/508	
Package price		**$115.00**