

In 2009, the U.S. Geological Survey (USGS) released a report on private water well sampling results from across the United States. Private wells were tested from 1991-2004 in 30 of the nation's 62 principal aquifers used for water supply. Important findings were that one out of every five private wells sampled in the U.S. contained one or more contaminants at concentrations exceeding EPA or human health benchmarks. Approximately half of all wells had at least one problem, and a third of all wells indicated microbial contamination. A number of private water wells sampled in Louisiana showed potentially unsafe levels of arsenic, volatile organic compounds (VOCs) and pesticides, as well as secondary contaminants in standard system tests for pH, hardness, alkalinity, dissolved solids and manganese.

DeSimone, L.A., Hamilton, P.A. and R.J. Gilliom. 2009. "Quality of Water from Domestic Wells in Principal Aquifers of the United States, 1991-2004." USGS NAWQA Scientific Investigations Report 2008-5227. water.usgs.gov/nawqa/

Which contaminants should I test for?

Beyond routine well inspections and standard system tests, preliminary tests for biological and chemical contaminants are recommended each year for private water wells in Louisiana.

Biological Contaminants

Recommended Tests: Total/Fecal Coliform Bacteria

Coliform bacteria sampling will indicate if surface waters, and possibly poorly-managed septic systems or debris, are contaminating your well. Bacteria, except in rare cases, are not naturally present at the depths where private water wells extract groundwater, but are naturally filtered out as they are drawn down through the silts and sands above the water table. Coliform bacteria are a generic indicator of the types of bacteria that originate in soil, vegetation or the intestinal tract of animals and people. Although coliform bacteria are not usually harmful, high levels in your well water may indicate the presence of other disease-causing bacteria, viruses or parasites. For example, certain *E. coli* bacteria, as well as cryptosporidium (protozoan parasites) can be very dangerous — even fatal — if they intrude into your well from outside sources. If preliminary bacterial sampling results return high coliform counts, well owners should take additional steps to determine the source of the problem and ensure the water supply is free from biological contamination.



Chemical Contaminants

Recommended Tests: Nitrates/Nitrites and Metals

Most private wells are located in rural areas, so a test for nitrate is important as an additional indicator of surface water or other wastewater intrusion into your well. This nutrient originates mainly in agricultural areas where there is fertilizer use, livestock or poultry but can also be introduced by poorly-managed septic tanks. Excessive levels of nitrate/nitrite in drinking water can be a serious health risk for newborns under 6 months of age. Positive sample results may warrant further testing for pesticides as well. General tests for metals, including arsenic, lead, and cadmium (see the following chart) are also recommended. Heavy metals, such as arsenic, have also been detected in private wells in some Louisiana alluvial aquifer systems.

Other tests for consideration:

The following chart provides a quick reference for a number of primary water contaminants^{5, A} that are routinely tested in public water systems due to their set health limits. These should be among those considered for additional testing in private wells. The chart also includes some secondary^{5, B} and other water contaminants which well owners may encounter. These tend to be more noticeable (by color, taste or smell) and a nuisance, but in typical concentrations are not currently known to cause health risks.

Please refer to the CDC and EPA public health information sites listed in this brochure for detailed information on exposure (dose, frequency, length of exposure, toxicity, and route), susceptibility and health effects of these contaminants.

A, B This table includes only a partial listing of potential drinking water contaminants that could exist in private water wells. Please refer to the EPA National Primary and Secondary Drinking Water Regulations for a more comprehensive listing.

- i Water Softeners/salts (e.g. NaCl, KCl) may be used for "cation exchange" to balance hard water problems*
- ii Concentrated Animal Feeding Operations (CAFOs)*
- iii Tests for lead can be performed on groundwater (at the well) or on the distribution system (at the tap). In older homes with possible lead plumbing and/or corrosion issues, distribution system tests are recommended to more accurately determine lead levels.*
- iv Gross-alpha and gross-beta tests are a preliminary test for radionuclides. If samples generate a positive detect, further clarifying tests can be performed.*

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CONTAMINANT	CONTAMINANT SOURCE/POSSIBLE INDICATORS
STANDARD SYSTEM TESTS	
Water hardness ¹ , pH ^B (e.g., Calcium, Ca ²⁺ , Magnesium, Mg ²⁺), Alkalinity, Corrosivity ^B	Natural properties of the source water or surface water intrusion/System corrosion and staining of toilet, bathtub, or sinks. Formation of scale (white-colored hard water deposits) on plumbing fixtures
BIOLOGICAL CONTAMINANTS, MICROORGANISMS (M)	
Total/Fecal Coliform ^A , <i>E. coli</i> ^A , <i>cryptosporidium</i> ^A	Surface water intrusion in areas of intensive agriculture, livestock, CAFOs ^A , construction, development, flooding or leaking septic tanks/ Water may be cloudy, taste salty or gritty; recurring gastrointestinal problems
Turbidity ^A , Total Dissolved Solids (TDS) ^B	
Iron bacteria, Iron ^B (Fe ²⁺)	Naturally occurring but more likely to be present in corroding systems where iron source is high/ Red or brown staining; slimy, stringy brown growth in toilet; low water pressure
Hydrogen Sulfide (H ₂ S) gas	Surface water intrusion creates a favorable environment for anaerobic bacteria, supplying decaying vegetation/Water has rotten egg smell
INORGANIC CHEMICALS (IOCs), METALS	
Arsenic (As) ^A	Naturally occurring, detected in Louisiana Alluvial Aquifers (Red and Mississippi Rivers). Runoff from orchards, industrial sources (e.g., electronics production, glass), waste sites or treated wood sites
Cadmium (Cd) ^A	Naturally occurring, but man-made sources include manufacturing (batteries, pigments, coatings, plating, metal production) and phosphate fertilizers
Chromium (Cr) ^A	Naturally occurring, other potential sources include industrial wastewater (e.g., steel, pulp mills)
Copper (Cu ²⁺) ^{A,B}	Naturally occurring, or caused by system corrosion/ Blue or green stains on fixtures and laundry
Lead (Pb) ^{iii, A}	Naturally occurring or caused by system corrosion/ Older homes with lead plumbing or solder ⁱⁱⁱ ; possibly in homes located near historical highways (leaded gasoline run-off pre-1980s), industrial areas (battery production), landfills, agriculture, or gasoline storage (above or below ground)
Manganese (Mn ²⁺) ^B	Naturally occurring/ Brown or black stains on fixtures and laundry
Nitrates/Nitrites (NO ⁻ , NO ²⁻) ^A	May occur naturally, but man-made sources include areas of intensive agriculture (runoff from fertilizer use), CAFOs ^A , landfills, dumps, sewage and leaking septic tanks
ORGANIC CHEMICALS (OCs) - *likely very rare and limited to a small area	
Dioxin ^{A*} , PCBs ^{A*} (Polychlorinated Biphenyls)	Emissions from waste incineration or combustion, landfills, chemical industrial discharge, older submersible pumps, underground waste; persistent in the environment
Pesticides: Herbicides (e.g., Atrazine ^A); Insecticides (e.g., DDT, organophosphates); Fungicides; Rodenticides	Nearby agricultural or residential areas, gardens, cattle or lumber (to control weeds, bugs, or other pests); may be introduced through back-flow or flooding; some are no longer used yet persist in the environment (e.g. lead arsenate, chlordane ^A)
Volatile Organic Chemicals (VOCs) [*] (e.g., Benzene ^A , Penta-chlorophenol ^A , Trichloro-ethane ^A , Vinyl Chloride ^A)	Sources tend to be industrial, and may include paints, solvents, gas stations, dry cleaners, industrial waste sites and buried fuel tanks. Sources may also include pesticide application
RADIONUCLIDES^v	
Radium ^A , Uranium ^A , Radon gas	Naturally occurring from erosion of natural deposits, but in rare cases may be introduced from man-made sources. In Louisiana this would mainly include oil pits or waste ponds, drilling pipes or equipment

For information on chemicals & their health effects:

Louisiana Department of Health and Hospitals (DHH)
Section of Environmental Epidemiology & Toxicology (SEET)
(225) 342-7136 or (888) 293-7020

For more information on specific water contaminants and tests:

DHH Louisiana Safe Drinking Water Program (SDWP)
(225) 342-7499

U.S. Environmental Protection Agency (EPA) Safe Drinking Water
Hotline: (800) 426-4791 or visit: water.epa.gov

To contact your parish sanitarian about submitting well samples in your area:

DHH Onsite Wastewater Program
(225) 342-7643
privatewaterandsewage.dhh.louisiana.gov

To submit notification and register your private water well:

Louisiana Department of Natural Resources (LDNR)
Environmental Division Ground Water Resources Program
(225) 342-8244 or visit: dnr.louisiana.gov/groundwater

For more information on aquifer monitoring and water quality:

Louisiana Department of Environmental Quality (LDEQ), Business
Community Outreach & Incentives Division: (225) 219-3510,
(866) 896-LDEQ (5337) or visit: deq.louisiana.gov

Louisiana Department of Agriculture and Forestry (LDAF), 24-hour
pesticide hotline: (225) 925-3763 or visit: ldaf.louisiana.gov

Additional information on private water well health and safety:

National Ground Water Association (NGWA): (800) 551-7379
or visit: ngwa.org, wellowner.org

Louisiana Ground Water Association (LGWA): (225) 229-0666
or visit: lgwa.org

U.S. Centers for Disease Control and Prevention (CDC)
Water-related Diseases and Contaminants in Private Wells
cdc.gov/healthywater/drinking/private/wells/diseases.html
(800) 232-4636 or visit: cdcinfo@cdc.gov

U.S. Environmental Protection Agency (USEPA)
Private Drinking Water Wells
epa.gov/safewater/privatewells/index2.html
Drinking Water Contaminants
water.epa.gov/drink/contaminants/index.cfm#List
or visit: water.epa.gov

US Geological Survey and Louisiana Department of Transportation
of Development Reports — la.water.usgs.gov

USGS - Louisiana Water Science Center
la.water.usgs.gov/GWRresources.htm

LSU Ag Center
Food & Water Safety, Testing Your Well Water for Safety
lsuagcenter.com

Private Water Well Testing in Louisiana



What You Need to Know to Protect Your Water

DEPARTMENT OF HEALTH AND HOSPITALS
Center for Environmental Health Services



NEARLY one out of every eight people in Louisiana get their drinking water from privately-owned domestic water wells¹.

Most private wells in Louisiana are supplied by aquifers¹. An aquifer, which is a natural underground water supply, requires little—if any—treatment and is generally safe^{1,3}. However, some aquifers in Louisiana have high concentrations of naturally-occurring elements^{2,4}. In addition, nearby activities have the potential to impact well water quality.

Pollutants such as harmful bacteria, chemicals and heavy metals can enter the water supply from above or below ground. Sources can range from natural mineral deposits and naturally-occurring bacteria, to smaller or unseen pollution sources such as leaking underground storage tanks, abandoned wells or waste pits. Hurricanes, major rain storms, floods, and damaged wells can also introduce contamination.

It is recommended that owners of domestic water wells have their systems routinely inspected and tested for biological and chemical contaminants each year.

REFERENCES

1. Sargent, B.P. "Water Use in Louisiana, 2005" 2007. Louisiana Department of Transportation and Development and USGS Water Resources Special Report No. 16, page 14.
2. Louisiana Department of Natural Resources, Office of Conservation General Water Quality Summary, Louisiana Groundwater—Alluvial Aquifer Systems Fact Sheet, August 2010.
3. LDEQ ASSET Sampling Program, Reports/Aquifer Summaries, Fiscal Years 2007-2009. No primary MCLs were exceeded for field or conventional parameters in any of the currently monitored wells/aquifer systems under this program, with the exception of elevated arsenic in the Mississippi River Alluvial Aquifer System. Some secondary MCLs were also exceeded.
4. DeSimone, L.A., Hamilton, P.A. and R.J. Gilliom. 2009. "Quality of Water from Domestic Wells in Principal Aquifers of the United States, 1991–2004." USGS NAWQA Scientific Investigations Report 2008-5227. water.usgs.gov/nawqa/
5. USEPA Office of Water. June 2006. National Primary and Secondary Drinking Water Regulations. Publication No.: EPA 816-K-06-003.

MAJOR LOUISIANA AQUIFERS



Approximate surface extent of major Louisiana aquifers. Adapted from map sources: USGS/LDOTD Guide to Louisiana's Ground-Water Resources, 1994; LDEQ and USGS Aquifer shapefiles.

Louisiana has two major **alluvial aquifer systems**, with recharge areas generated by the **Red River** and the **Mississippi River** as well as by rainfall and infiltration from other aquifer systems. Although some water from these aquifer systems is of good quality, **geologists have found that not all water is suitable for untreated private water wells due to naturally-occurring contaminants. Localized areas of these aquifers have been shown to contain concerning levels of arsenic**, secondary contaminants and other problems.² Arsenic can cause serious acute and chronic health issues, ranging from developmental to neurologic or carcinogenic effects.

It is very important to test wells in these aquifer systems for biological and chemical contaminants each year. If sampling results indicate problems (and the well is otherwise working properly), consider additional water treatment technologies or, if possible, plugging your well and switching to treated public water supplies. It's also helpful to inform the sanitarian at your parish health unit of sample results so he or she will be aware of contaminants detected in your local area.



Unsuitability of Alluvial Aquifer Systems for Private Well Water Use



Unconsolidated (sand and gravel) alluvial aquifer systems in Louisiana which may be unsafe for domestic water well use.²



Who is responsible for monitoring privately-owned domestic water wells?

In Louisiana, the individual well owner is responsible for testing their private well. DHH enforces regulations such as the Safe Drinking Water Act for public water systems, and the Louisiana Department of Environmental Quality (LDEQ), Department of Agriculture and Forestry (LDAF), USGS, and USEPA conduct monitoring of aquifer systems and wells for pesticides and other potential contaminants. However, private wells in Louisiana are not currently required by any agency or law to be regularly tested to federal or state health standards. Individual well owners must take the necessary steps to ensure their well water is safe.

How often should I inspect and test my well?

Annual well inspection and testing for biological and chemical contaminants is the best way to monitor your well water for any problems. It is also important to have your well inspected and water tested:

- ▶ any time you notice a change in your water quality, especially if you notice a strange color, odor, or taste;

- ▶ a pregnant woman, infants or young children, elderly, or people with chronic disease or conditions that impair their immune system reside in the home;
- ▶ if there have been unexplained illnesses in the household, such as recurring gastrointestinal problems or skin irritation;
- ▶ if there has been a chemical or hazardous incident or spill near your home or well;
- ▶ following a hurricane, flood or major rainfall that may have contaminated the well;
- ▶ if contaminants have been found in a neighbor's water or reported to the local community (contact your parish sanitarian for reported or known problems in your area);
- ▶ if you live in an area that is prone to a specific type of water contamination, OR if you live near areas of extensive land development, construction (including highway expansion or repair), agriculture, animal operations, mining, oil or gas drilling, industrial or waste operations, or abandoned waste sites or wells.



Well Inspection and Maintenance—was my well properly constructed? Is it functioning properly?

The construction of water wells in Louisiana is addressed by the regulations of LAC 56:I Chapter 3. In addition, the state sanitary code outlines how private water wells in Louisiana should be constructed to ensure water quality while maintaining the integrity of the underground water supply.

Safe distances must be maintained between wells and possible contamination sources, with proper grading to ensure flood waters drain away from the well (Title 51 Public Health Sanitary Code, Part XII. Water Supplies, §327 Ground Water Supplies). Protective features, such as impenetrable well casings installed to the correct depth, and watertight well covers over venting, prevent well water contamination by surface waters or other debris. However, underground contamination sources will only be detectable with annual water sampling.

Routine inspection and maintenance of your well by a licensed contractor is the best way to ensure important features are in use, intact and functioning properly. You can locate a Louisiana licensed contractor in your local area through the Louisiana State Licensing Board for Contractors; in the yellow pages under "Environmental

Services;" or by contacting a local water well drilling company. Other contacts include the NGWA wellsowner.org website and your local AgCenter or cooperative extension office.

Be sure to manage the activities near the water source. This includes keeping all chemicals, gasoline, paint, pesticides, and solvents away from the well-head, and preventing backflow or cross-connections when using hoses with household, gardening, agricultural or automotive chemicals.

Well disinfection following a flood

Major rainfall events and hurricanes are common in Louisiana and they can impact the health and safety of your private water well. Storm damage and flooding often introduce pollution into the water system by overtopping well-heads and compromising containment systems. After a storm or flood, it is important to have your well and pump cleaned and inspected. The EPA, CDC and others have developed standard protocols for emergency disinfection of private water wells following a storm. As a resourceful Louisiana well owner you may be inclined to "do-it-yourself," but to ensure health and safety it is best to have a professional, licensed contractor disinfect and test the well.

How do I test my water?

Water well owners can contact their parish sanitarian, usually located at the parish health unit, to get the latest information on private water well testing. He or she will advise you of any contaminants that are known problems in your area. Working closely with parish sanitarians and engineers through the Safe Drinking Water Program, state-certified labs may be available to perform some bacteriological or chemical tests on your private water well for a fee. A listing of state-certified labs is available at www.dhh.la.gov. Using the search feature type in "Laboratory Certification" to get listing. In other cases, parish sanitarians may refer well owners to local or national testing laboratories.

