wellcare® information for Home Inspectors: Evaluating Water Wells

Water Systems Council

2009

About Water Systems Council

Water Systems Council (WSC) is the only national, nonprofit organization solely focused on household wells and small water well systems. WSC is committed to ensuring that Americans who get their water from household, private wells have safe, reliable drinking water and to protecting our Nation's groundwater resources.

WSC offers a wide variety of programs and services including public education, training and technical assistance, policy research, Children's Water Festivals, the **wellcare®** hotline, the **wellcare® Well Owners Network**, publications and technical manuals.

WSC maintains voluntary industry standards to promote excellence in the manufacturing of components for water well systems. WSC also provides its manufacturer and distributor members with statistical reports of interest to the water well industry.

WSC is a leader in groundwater protection efforts nationwide and works to promote responsible stewardship of water resources.

For more information on WSC, visit www.watersystemscouncil.org.

The wellcare® Well Owners Network is a new resource for well owners. Members have access to information that is critical to maintaining a safe supply of drinking water for their families. Encourage your clients to learn more about how to ensure their well will provide safe drinking water for years to come by joining the wellcare® Well Owners Network today!

Call 1-888-395-1033 or visit www.watersystemscouncil.org.
MEMBERSHIP IS FREE!

For answers to questions on wells or groundwater, contact the **wellcare® Hotline** at **888-395-1033 or** www.wellcarehotline.org.

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***** *Note: Additional copies of the "Well Inspection Checklist" and "Tips for Your Clients/Customers" can be downloaded at www.watersystemscouncil.org. Click on the "wellcare® Information Sheets" thumbnail on the right side of the screen and scroll down to the information "For Home Inspectors."*

Section I: Introduction

Modern wells provide a safe, efficient water supply to more than 21 million homes nationwide. Water from modern wells is naturally filtered and is cool, natural and pure. When properly installed and maintained, wells can provide many years of safe, affordable drinking water.

While the U.S. Environmental Protection Agency (EPA) regulates public water systems, the responsibility for ensuring the safety of water from private wells belongs to the well owner. These responsibilities should include knowing the well's history, testing the **water quality** annually (or more often as needed), and having the well system and its components inspected regularly by a professional well contractor.

Installation of private wells is regulated by various state agencies. Many local governments also have additional requirements. Before beginning an inspection, you will want to research state and local regulations regarding wells. See Appendix A of this guide for a list of state agencies that oversee and/or regulate private wells (hereafter referred to as "oversight agency"). The state or local health department may also play a role. Visit the WSC website at www.watersystemscouncil.org/wellcare-hotlinks.php for a list of state health departments.

State/Local Oversight Agency Responsibilities

State/local agencies that oversee private wells are usually responsible for:

- Issuing permits approving the location of a new well;
- Inspecting the well after construction to verify proper grouting (the seal) and sufficient water capacity (the yield);
- Maintaining records of well logs provided by well drillers;
- Taking or verifying drinking water test results and/or issuing certificates attesting to water quality; and/or
- Providing annual **water testing** and well maintenance recommendations to local residents.

Home Inspector Responsibilities

When purchasing a new home, families want to be assured that their water supply is safe and good-tasting. Including a well water evaluation in your inspection report will improve the value of your services and put your client's mind at ease. Although **water well** inspection is not typically included as part of a regular home inspection, home inspectors may be asked to perform a well inspection and water testing. The state where the well is located may have rules regarding who can inspect and/or perform water testing on private wells. See Appendix A of this guide for a list of state agencies that oversee private wells.

Section II: The Inspection

A well inspection should ensure that the well and its components are in good working order at the time of inspection. Water Systems Council (WSC) recommends that the water well be inspected as part of any real estate transaction; in fact, most real estate contracts require well testing.

The well inspection may include:

1) Reviewing the Well's History;
2) Examining the Well's Location;
3) Inspecting Well Components;
4) Testing the Water Quality; and
5) Determining the Well Yield/Flow.

This section discusses the ideal conditions of a water well. Keep in mind that state/local regulations may also exist. If state/local regulations differ from the guidelines in this booklet, the state/local regulations should be followed.

All of the information in this section is summarized in the form of a checklist in Section III.

Reviewing the Well's History

Try to get as much information as possible on the construction, maintenance and condition of the well to pass along to the purchasers. Ask the seller or contact the company that drilled the well for the **well log** or well history (also known as a water well record or drilling report). If the well owner (or seller) does not have a copy of the well log, contact the well contractor who installed the well or the oversight agency. Some states can provide copies of missing well logs upon request. Several states offer this information online.

The well log will include a reference number for the well, the well owner at the time of construction, location of the well and various construction details. These may include the drilling method used, the depth of the well, the strata penetrated, the depth at which water was found and the static water level at the time of completion. The well log may also include information on well components, such as the amount and type of casing, the size and type of screen, and the type of **pump**.

Find out if there are any abandoned or out-of-service wells on the property. Abandoned wells must be properly closed and sealed so that they do not pose a threat to groundwater quality and a potential safety hazard. See the wellcare® information sheet on "Closing an Abandoned Well" for more information on abandoned wells.

In addition to the well log, home owners should keep track of any maintenance on the well and annual well water test results. Keeping good, accurate records is essential to ensure good water quality and top performance in a water well. Ask the well owner for a copy of well maintenance records and well water test results, if available.

Examining the Well's Location

When inspecting a well, the inspector should evaluate – to the best of his ability – the well's location. The well should be uphill from possible contamination sources (e.g., septic systems, farms), to ensure that **surface water** doesn't reach the wellhead.

Check state/local regulations for well separation distances and any other **water well codes**. Although it varies with the **hydrogeology** of the site, the U.S. Environmental Protection Agency (EPA) experts suggest 50 feet for **septic tanks**, livestock yards, and septic leach fields; 100 feet for petroleum tanks, pesticide and fertilizer storage; and 250 feet for manure stacks. In addition, the well should be 10 feet from any property line.

A Note about Shared Wells:

Shared wells must serve connecting or adjacent properties. Properties sharing a private well should not be across the street or multiple lots away from the well location. Finally, for a FHA-insured property, evidence of water rights and recorded maintenance agreement must be provided for acceptance of the well as the primary source of water.

Finally, the soil around the well should be burmed as to prevent puddling around the well head and to divert any runoff water from going to the wellhead. In addition, there should be no voids in the soil around the top of the wellhead which could allow water to travel down the borehole to the aquifer.

Individual water systems/wells should be located on the subject property site. See the box on this page for special information pertaining to shared wells.

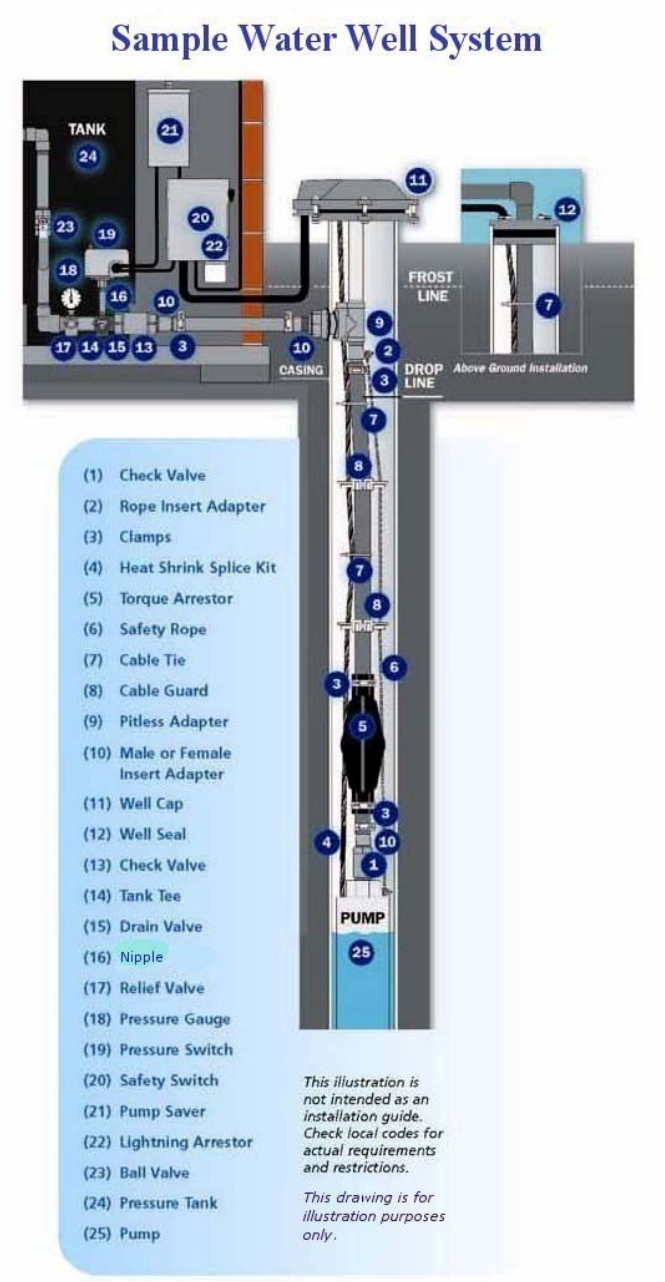
Inspecting Well Components

The well log should provide information about the age of the well, the drilling method used, the depth of the well and information on well components. Most private wells are drilled by one of two methods: **cable-tool or percussion method** and **rotary well drilling**. The U.S. Department of Housing and Urban Development (HUD) requires that new wells be drilled, no less than 20 feet deep and cased. Casing should be steel or other durable material that is leak-proof and acceptable to the local health authority and/or the trade or profession licensed to drill and repair wells in the local jurisdiction. *Detailed inspection of water well components should only be performed by a licensed well professional.*

Sample Water Well System Schematic

A modern water well system includes parts specifically manufactured to make sure the well operates properly and provides many years of service. Most well components must meet strict manufacturing standards, such as the American National Standards Institute/Water Systems Council Standard for Pressurized Water Storage Tanks (ANSI/WSC PST 2000-2005). See www.watersystemscouncil.org/standards.php.

The illustration below is intended to represent some of the components that can be included in a water well system.



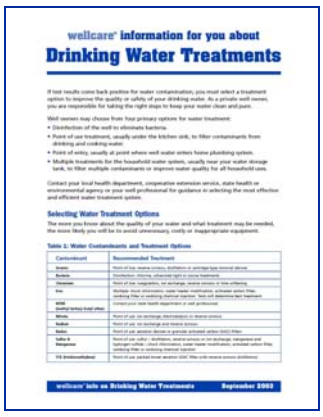
An inspection of well components should include the following:

- ***Casing height*** – The lining of the well (the well casing) is 12 or more inches above the land surface. In flood prone areas, the casing is one to two feet above the highest recorded flood level. This ensures that no substances can wash into the well.
- ***Condition of casing and well cap*** – No holes or cracks are visible in the well casing. The well cap is vermin-proof, watertight, and securely attached to the well casing.
- Common casing materials are carbon steel, galvanized steel, stainless steel and plastic, usually PVC. The type is dictated by the site's geologic formation and local codes.
- ***Casing depth*** – The casing depth, as recorded in the well log, is sufficient to meet state and local codes. If no codes exist, the casing should extend 50 or more feet below the land surface. If drilled into loose sand and gravel, the well casing should extend the full depth of the well. A well screen is fitted to the bottom to keep out sand. If the well is drilled into hard rock, the casing extends into the top of the rock and is sealed to keep out surface water, and no screen is needed.

- ***Well components*** – The pump, pressure tank and water treatment system, if any, have been regularly maintained, according to well records.
- Only high-quality pitless equipment, listed as approved under industry standard PAS-97(04), should be used. Refer to www.watersystemscouncil.org/standards.php for the most current standard and product list. This information should be obtained from the well log.
- Check for corrosion at the plumbing fittings and the pressure/storage tank.
- Check the pressure gauge. Pressure tanks have a "cut-in" and a "cut-out" pressure. The low number is the "cut-in" pressure and the high number is the "cut-out" pressure. Turn the water on at a laundry tub or sink and note the pressure when the pump comes on and when it goes off. These pressures will be the low and high limits, respectively. The difference between the "cut-in" and "cut-out" pressure is called the "differential."
- Measure the time it takes for the pump to go from the low limit to the high limit with no water running in the house. Depending on the size of the pressure/storage tank and the pump, it should take 1 to 2 minutes. If it is less than 45 seconds, further investigation by a professional well contractor should be done to diagnose the cause. *(Note: Special circumstances apply if the well has a constant pressure system. If you think this may be the case, consult a well professional or check with the manufacturer).*

All of the information sheets referenced in this guide can be found on WSC's website at http://www.watersystemscouncil.org/infoSheets.php.


wellcare® information for you about
Selecting a Well Contractor


wellcare® information for you about
Drinking Water Treatments

- If the home has any water treatment devices, these should be appropriate and regularly maintained. Water treatment devices include point-of-entry equipment, which treats the water as it enters the house, or point-of-use equipment, which treats the water at an individual tap, such as the kitchen sink. For more information on water treatment devices, see the wellcare® information sheets on "Drinking Water Treatments" and "Home Drinking Water Treatment Devices."

Testing the Water Quality

First, determine which types of water tests are needed. These typically include tests for bacteria, lead and nitrate/nitrites, as well as contaminants of local concern, such as arsenic or radon. More sophisticated tests can include Volatile Organic Compounds (VOCs). Test for these if the home is within a mile of a gas station.

Contact the wellcare® Hotline for assistance in identifying contaminants of local concern. You may also contact the state oversight agency, a local well professional or analytical lab. In addition, consider the following:

- Is there livestock nearby? If so, test for bacteria, nitrate/nitrite, pH, methane gas, and Total Dissolved Solids (TDS).

- Are pesticides being used on nearby agricultural crops or nurseries? If yes, test for pesticides and nitrates/nitrites.
- Are lawn fertilizers used near the well? If so, test for pesticides and nitrate/nitrite.
- Is the well "downstream" from any septic system on the property, or neighboring properties? If yes, test for bacteria and nitrate/nitrite.
- Is the well located near a road that is frequently salted or sprayed with de-icers during winter months? If yes, test for chloride, TDS, and sodium.
- Are household wastes or used motor oil disposed of in the backyard, even in small amounts? If so, test for VOCs.
- Is the well located within a mile of a gas station? If yes, test for VOCs.

State and local health departments maintain a list of state-certified laboratories, qualified to test for specific contaminants for the homeowner. The laboratory will provide specific sampling instructions and clean bottles in which to collect the water sample. These instructions should be followed carefully to avoid inaccurate results. For example, water samples may require refrigeration or need to get to the lab within a certain period of time.

What tests are required in order to sell a home with a well?
The requirements vary by state. Contact your state oversight agency or local well professional for current requirements in your state. A list of state oversight agencies is included in Appendix A of this guide.

Most real estate contracts require well testing. You may also refer to the U.S. Department of Housing and Urban Development (HUD) testing requirements, which are the minimum standard acceptable for Federal Housing Administration (FHA) insured loans. See the ***wellcare®*** *brochure, "A Real Estate Agent's Guide to Buying or Selling Homes with Wells," available on the WSC website at www.watersystemscouncil.org/infoSheets.php.*

In addition to any instructions provided by the laboratory, follow these steps to collect the water sample:

1. Identify the collection point (for example, the kitchen sink).
2. Remove the washer and aeration device from the faucet. This is usually required, depending on the type of water test(s) you're performing.
3. Disinfect the faucet with either isopropyl alcohol or bleach, and let it stand for 4-5 minutes. Some states require that you use a flame to superheat the metal to disinfect it.
4. Turn the water on and allow it to run until there is a noticeable change in temperature or until you've ensured the well pump has come on and started to fill the tank.
5. Fill your container according to the lab's instructions.

Compare test results with U.S. Environmental Protection Agency (EPA) **maximum contaminant levels** for the contaminant, which are guidelines used for public water supplies. EPA does not regulate private wells. Go to www.epa.gov/safewater/hfacts.html for individual standards. There also may be state or local standards for contaminants, such as sodium, that EPA does not regulate. For more information on testing and test results,

see the **wellcare®** information sheets on "Drinking Water Testing" and "Understanding Your Drinking Water Test Results."

If the well tests positive for bacteria or other contaminants, the home inspector should recommend well disinfection by a local well professional (for bacteria). Consult a water treatment expert, and refer to the **wellcare®** information sheets.

Determining the Well Yield/Flow

The minimum safe yield of a well represents its dependable and continuous output during a long drought. The **well yield** at the time the well was drilled may be found in the well log. Many communities also require a yield test when a property is bought or sold.

> ***Note: A yield test or flow test is not necessarily indicative of how the well will perform; it is only to be used as a guide as to how much water the well may yield. This is because it is a snapshot of the well, not a long-range test. There are many variables, such as the amount of rainfall the area has recently received, the level of the water table at that time, the type of aquifer and the specific usage or demands on the well.***

What is a Well Yield Test?

Determining the yield of a well involves a complex test to see the balance between the maximum amount of water that can be pumped out of the well and the amount of water that recharges back into the well from the surrounding ground water source. These tests, if required, should be performed by a local well professional. Many communities set minimum levels. The state/local oversight agency or a well professional can provide this information.

> ***A Few Notes about Well Capacity and Yield:***
>
> - *The well log or drilling report contains information on the well's estimated capacity and yield in gallons per minute, at the time the well was drilled.*
> - *There is a minimum well yield of one gallon per minute, which amounts to 1,440 gallons of water per day. The average family of four consumes 300 gallons per day.*
> - *The ideal yield is five gallons or more per minute to accommodate all water uses typical of a suburban or rural family home.*
> - *Planned use should also be taken into consideration. For example, the well yield may not be adequate for a large family, but may be sufficient for an elderly person living alone.*
> - *With proper storage equipment, low producing wells can be a reliable water source.*
> - *The yield test will generate lots of water that must be discharged to an appropriate location. Take care not to let the water flow towards or back into the well being pumped. Try to direct the water to a stream, pond or wetlands.*

How to Conduct a Flow Test

A flow test involves pumping water from an outside hose bib for 30 minutes to determine if the well can sustain an adequate flow for normal peak demand. The flow is noted every 10 minutes. If the flow is less than 8 gallons per minute (GPM), this can be due to pump sizing, backflow prevention on the fixture and possibly small plumbing lines. In these cases, a well professional can investigate further to determine if anything can be done to improve the flow. *The flow test does not represent actual recovery in the well and may only reflect adequate storage in the well at the time of testing. This test represents conditions and data collected on the day of testing.* If more extensive testing is needed, such as a true yield test where static, drawdown and recovery rates are determined, the home inspector should contact a local well professional.

Section III: Well Inspection Checklist

Part 1: Well Location and Condition

1. According to the well log, is the well a drilled well?
   - ☐ Yes
   - ☐ No; if no, how was the well constructed? _____
2. If the well is NOT a drilled well, has it been brought up to current standard or code, according to well records?
   - ☐ Yes
   - ☐ No
3. How old is the well, according to the well log? _____
4. How deep is the well, according to the well log? _____feet
5. Are well records available? Check all that are available and attach a copy with the report.
   - ☐ Well Log
   - ☐ Maintenance Records
   - ☐ Water Testing Results
   - ☐ Other: _____
6. According to well maintenance records, how often has the well been inspected? _____
7. According to well maintenance records, how often were water tests performed on the well? _____
8. Where is the well located on the property?
   _____
   _____
9. Is the soil around the well burmed, so as to prevent puddling around the wellhead and to divert any runoff water from going to the wellhead?
   - ☐ Yes
   - ☐ No
10. Are there any voids in the soil around the top of the wellhead which could allow runoff to travel down the borehole to the aquifer?
    - ☐ Yes
    - ☐ No
11. Is the wellhead visible and above ground?
    - ☐ Yes
    - ☐ No
12. Are any permanent structures located within 10 feet of the wellhead?
    - ☐ Yes; if so, is the well still accessible for future repairs and service? _____
    - ☐ No

13. Is it apparent from a site inspection that the well location meets the minimum distance from contamination sources as outlined by state or local regulation?
    - ☐ Yes
    - ☐ No; if no, please explain:

      _____

      _____

      _____

14. According to well records, are there any abandoned wells on the property?
    - ☐ Yes; if so, are there records showing that these have these been properly closed? _____
    - ☐ No

Part 2: Well Components

15. Is the lining of the well (the casing) 12 or more inches above the land surface? *Note: In flood prone areas, the casing should be one to two feet above the highest recorded flood level.*
    - ☐ Yes
    - ☐ No; if no, indicate height of casing: _____
16. Are there any visible holes or cracks in the well casing?
    - ☐ Yes; if yes, please describe:

      _____

      _____

    - ☐ No
17. According to the well log, does the casing depth meet state and local codes?
    - ☐ Yes
    - ☐ No; if no, please describe:

      _____

      _____

18. Is the well cap vermin-proof, watertight and securely attached to the well casing?
    - ☐ Yes
    - ☐ No; if no, please describe:

      _____

      _____

19. Is there any corrosion visible at the plumbing fittings and/or the pressure/storage tank?
    - ☐ Yes; if yes, describe _____
    - ☐ No

20. According to the well log, is pitless equipment used?
    - ☐ Yes; if yes, what type? _____; is this listed as approved under industry standard PAS-97(04)? (The most current standard and product list is available at www.watersystemscouncil.org/standards.php).
    - ☐ No
21. Pressure Tank
    - ☐ What is the pump cut-in pressure? _____
    - ☐ What is the pump cut-out pressure? _____
    - ☐ What is the pressure differential? _____
22. How long does it take for the pump to go from the low limit to the high limit with no water running in the house? _____
23. Does the home have any water treatment devices?
    - ☐ Yes; if so, list:
      _____
    - ☐ No
24. Have water treatment systems been regularly maintained, according to well maintenance records?
    - ☐ Yes
    - ☐ No; please explain:
      _____
      _____

Part 3: Water Testing

25. Is a water sample needed?
    - ☐ Yes; if yes, what types?
      - ☐ Bacteria
      - ☐ Nitrate/Nitrite
      - ☐ Lead
      - ☐ Arsenic
      - ☐ Radon
      - ☐ VOCs
      - ☐ Other (Please list):
        _____
        _____
    - ☐ No

Part 4: Well Yield/Flow

26. Well Flow Test Results: _____ gallons per minute (GPM)
27. Is a more extensive test needed to evaluate well yield?
    - ☐ Yes
    - ☐ No

If the well falls short of ideal conditions, the home inspector should recommend that the homeowner contact a local well professional about further well inspection, water testing and/or the need for well repair or replacement.

Section IV: Tips for Your Clients/Customers

Properly constructed private water supply systems require little routine maintenance. These simple steps will help protect your system and investment.

- Always use a licensed or certified water well driller and pump installer when a well is constructed, a pump is installed or the system is serviced.
- An annual well maintenance check, including a water test for bacteria, is recommended. Any source of drinking water should be checked any time there is a change in taste, odor or appearance, or anytime a water supply system is serviced.
- Keep hazardous chemicals, such as paint, fertilizer, pesticides, and motor oil, far away from your well.
- Periodically check the well cover or well cap on top of the casing to ensure it is in good repair.
- Always maintain proper separation between your well and buildings, waste systems or chemical storage facilities. Your water well professional knows the rules.
- Take care in working or mowing around your well. A damaged casing could jeopardize the sanitary protection of your well. Don't pile snow, leaves, or other materials around your well.
- Keep your well records in a safe place. These include the well log completed at the time of construction, as well as annual water well system maintenance and water testing results.
- When your well has come to the end of its serviceable life (usually more than 20 years), have your qualified water well contractor properly decommission your well after constructing your new system.

The wellcare ® Hotline: Answering Your Questions about Wells

If you have a question about wells or need help, contact the wellcare® Hotline Monday through Friday at 888-395-1033, or visit www.wellcarehotline.org at any time for information on:

- *Well construction codes and other regulations related to wells or water well systems*
- *Well care and maintenance*
- *Water testing*
- *Water quality*
- *Identifying potential contaminants*
- *Avoiding seasonal threats*
- *Understanding well mechanics*
- *Learning well basics*
- *Well components*
- *Water conservation*
- *Finding a licensed well contractor...and much more!*

More than 42 million people in the U.S. rely on private wells to supply drinking water for their families. These wells tap into groundwater supplies stored beneath the earth's surface.

If you have a private water well, learn more about how you can ensure it will provide safe drinking water for years to come by joining Water Systems Council's **wellcare® Well Owners Network**.

The **wellcare® Well Owners Network** is a new resource for well owners. As a member of the network, you will have easy access to information that is critical to maintaining a safe supply of drinking water for you and your family.

Join the network today! Call 1-888-395-1033 or visit www.watersystemscouncil.org.

wellcare® Well Owners Network Members enjoy…

- Access to information and tools to help you better understand your drinking water source
- A quarterly e-newsletter with information on wells, well water and practical tips for protecting the nation's groundwater resources
- Annual reminders to test your well water
- Opportunities for discount well water test kits

The ***wellcare® Well Owners Network*** is part of WSC's **wellcare®** Program, a national program that offers a free hotline for answers to questions about wells, well water and source water protection. The **wellcare®** program also offers workshops and publishes information sheets on well maintenance, well water testing and groundwater quality. It issues reports on national data related to the number of wells, water usage, groundwater resources, water rights, and related subjects.

MEMBERSHIP IS FREE!

Appendix A: State Oversight Agencies

Before beginning an inspection, you will want to research state and local regulations regarding wells. The following is a list of state agencies that oversee and/or regulate private wells. For more on state/local oversight agency responsibilities, see page 4 of this guide.

State	Agency	Website
Alabama	Alabama Department of Environmental Management	www.adem.state.al.us
Alaska	Alaska Department of Natural Resources/Division of Mining, Land & Water	dnr.alaska.gov/mlw/water/wrfact.htm
	Alaska Department of Commerce, Community & Economic Development	www.commerce.state.ak.us
Arizona	Arizona Department of Water Resources	www.azwater.gov/azdwr
Arkansas	Arkansas Water Well Construction Commission	www.arkansas.gov/awwcc
California	California Department of Water Resources	www.dpla2.water.ca.gov
Colorado	Colorado Division of Water Resources	water.state.co.us
Connecticut	Connecticut Department of Consumer Protection	www.ct.gov/dcp/site
Delaware	Delaware Department of Natural Resources & Environmental Control	www.dnrec.delaware.gov
Florida	Northwest Florida Water Management District	www.nwfwmd.state.fl.us
	South Florida Water Management District	www.sfwmd.gov
	Suwannee River Water Management District	www.srwmd.state.fl.us
	St. Johns River Water Management District	sjr.state.fl.us
	Southwest Florida Water Management District	www.swfwmd.state.fl.us
Georgia	Georgia Department of Natural Resources	www.gadnr.org
Hawaii	Hawaii Department of Natural Resources	www.ehawaii.gov/dakine/index.html
Idaho	Idaho Department of Water Resources	www.idwr.idaho.gov
Illinois	Illinois Department of Public Health	www.idph.state.il.us
Indiana	Indiana Department of Natural Resources, Division of Water	www.in.gov/dnr/water
Iowa	Iowa Department of Natural Resources	www.iowadnr.gov
Kansas	Kansas Department of Health and Environment	www.kdheks.gov/waterwell/index.html
Kentucky	Kentucky Department for Environmental Protection, Division of Water	www.water.ky.gov

State	Agency	Website
Louisiana	Louisiana Department of Transportation & Development	www.dotd.state.la.us
Maine	Maine Geological Survey	www.maine.gov/doc/nrimc/mgs/mgs.htm
Maryland	Maryland Department of the Environment	www.mde.state.md.us/
Massachusetts	Massachusetts Department of Conservation and Recreation	www.mass.gov/dcr/
Michigan	Michigan Department of Environmental Quality	www.michigan.gov/deq
Minnesota	Minnesota Department of Health	www.health.state.mn.us/divs/eh/
Mississippi	Mississippi Department of Environmental Quality	www.deq.state.ms.us/MDEQ.nsf/page/L&W_Home?OpenDocument
Missouri	Missouri Department of Natural Resources, Water Protection Program	www.dnr.mo.gov/env/wpp/index.html
Montana	Montana Department of Natural Resources & Conservation, Water Resources Division	www.dnrc.mt.gov/wrd/default.asp
Nebraska	Nebraska Department of Health and Human Services	www.hhs.state.ne.us/
	Nebraska Department of Natural Resources	www.dnr.state.ne.us/
Nevada	Nevada Department of Conservation & Natural Resources, Division of Water Resources	www.water.nv.gov/
New Hampshire	New Hampshire Department of Environmental Services, Water Division, Drinking Water and Groundwater Bureau, Water Well Board	des.nh.gov/organization/divisions/water/dwgb/wwb/index.htm
New Jersey	New Jersey Department of Environmental Protection, Division of Water Supply	www.nj.gov/dep/watersupply/
New Mexico	New Mexico Office of the State Engineer	www.ose.state.nm.us/
New York	New York State Department of Health	www.health.state.ny.us/
	New York State Department of Environmental Conservation	www.dec.ny.gov/
North Carolina	North Carolina Department of Environment and Natural Resources, Division of Water Quality	h2o.enr.state.nc.us/agw.html
North Dakota	North Dakota State Water Commission	www.swc.state.nd.us/4dlink9/4dcgi/redirect/index.html
Ohio	Ohio Department of Health	www.odh.ohio.gov/odhPrograms/eh/water/water1.aspx
	Ohio Department of Natural Resources, Division of Water	ohiodnr.com/water/tabid/3252/Default.aspx

State	Agency	Website
Oklahoma	Oklahoma Water Resources Board	www.owrb.ok.gov/
Oregon	Oregon Water Resources Department	www.wrd.state.or.us/
Pennsylvania	Pennsylvania Geological Survey	www.dcnr.state.pa.us/topogeo/
Rhode Island	Rhode Island Department of Environmental Management	www.dem.ri.gov/pubs/index.htm
South Carolina	South Carolina Department of Health & Environmental Control	www.scdhec.gov/environment.htm
South Dakota	South Dakota Department of Environment & Natural Resources	denr.sd.gov/
Tennessee	Tennessee Department of Environment & Conservation, Division of Water Supply	www.state.tn.us/environment/dws/
Texas	Texas Department of Licensing and Regulation, Water Well Drillers and Pump Installers Advisory Council and Authority	www.license.state.tx.us/wwd/wwdcouncil.htm
	Texas Water Development Board	www.twdb.state.tx.us/home/index.asp
Utah	Utah Division of Water Rights	www.waterrights.utah.gov/
Vermont	Vermont Department of Environmental Conservation	www.anr.state.vt.us/dec/dec.htm
Virginia	Virginia Department of Health	www.vdh.state.va.us/index.htm
Washington	Washington Department of Ecology	www.ecy.wa.gov/water.html
West Virginia	West Virginia Bureau for Public Health, Office of Environmental Health Services, Environmental Engineering Division	www.wvdhhr.org/oehs/eed/
	West Virginia Department of Environmental Protection, Division of Water and Waste Management	www.wvdep.org/
Wisconsin	Wisconsin Center for Watershed Science and Education, Central Wisconsin Groundwater Center	www.uwsp.edu/cnr/gndwater/
	Wisconsin Department of Natural Resources	dnr.wi.gov/org/water/dwg/
Wyoming	Wyoming State Engineer's Office	seo.state.wy.us/

Appendix B: Glossary of Terms

Cable-tool method (also called percussion method): A drilling method that involves raising and dropping a heavy chisel-shaped bit to break up the soil in a borehole.

Groundwater: Water stored underground in rock and unconsolidated materials.

Hydrogeology: The part of hydrology that deals with the occurrence, movement and quality of water beneath the Earth's surface.

Maximum Contaminant Level (MCL): Standards that are set by the United States Environmental Protection Agency (EPA) for drinking water quality in Title 40 of the Code of Federal Regulations. A Maximum Contaminant Level (MCL) is the legal threshold limit on the amount of a hazardous substance that is allowed in drinking water under the **Safe Drinking Water Act**.

Pressure Tank: Vessel used to provide cycle control of the pump.

Pump: A mechanical device that moves liquid or gas by pressure or suction; a device that converts mechanical torque and motion into hydraulic fluid power.

Rotary well drilling: Method in which a rotating bit fixed to the lower end of a steel pipe chews into the rock or other earth materials.

Safe Drinking Water Act: Federal law established to protect the quality of drinking water in the U.S. This law focuses on all waters actually or potentially designed for drinking water use, whether from above-ground or underground sources.

Septic tank: A tank used to detain domestic wastes to allow the settling of solids prior to distribution to a leach field for soil absorption.

Shared well: Wells drilled to serve two or more nearby homes; sometimes referred to as cluster wells.

Surface water: Water that is on the Earth's surface.

Tank: A container that stores water from a well before it enters the distribution system.

Water quality: A term used to describe the physical, chemical and biological characteristics of water.

Water table: The top of the water surface in the saturated part of an aquifer.

Water testing: Process of collecting a water sample from a clean faucet (some states require a sampling faucet) for laboratory analysis to determine whether it is safe to drink.

Water well: An excavation or structure created in the ground by digging, driving, boring or drilling to access groundwater in underground aquifers.

Water well code: State law that regulates potable water testing to verify that it is safe to drink.

Well cap: Protective cover, usually made of aluminum or thermoplastic, that seals the upper end of a well to keep out the elements, contaminants and vermin.

Well casing: Steel or plastic lining permanently installed in drilled wells to prevent cave-ins or contamination by surface water.

Well log: A written form on which the driller lists well characteristics; required in many states.

Well screen: Installed at bottom of a well casing to prevent sand and sediment from contaminating the well.

Well yield: The volume of water that can be pumped during a specific period of time, usually expressed in gallons per minute.

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