

On Tap

Private Wells Are County's Main Water Source

by Kathy Jespersion
On Tap Editor

The scent of ripening apples tempts travelers as they pass orchards cut out of the landscape. Cattle tails wave greetings. Hay fields sway with the wind. West Virginia State Route 9 winds its way through Jefferson County, West Virginia, showing off this rural haven that survives on agriculture. Fifty-four percent of the county's land area is farmed for hay, corn, cattle, soybeans, and wheat.

Not many central drinking water systems exist this far out in God's country. But many of the residents of Kearneysville, Bardane, Molers Crossroads, and other eastern panhandle communities prefer it that way. They rely on private wells for their household water needs.

Some area folks have installed disinfection devices, such as ultraviolet light or chlorination units. But just as many use the water exactly as they draw it out of the ground.

A Little Elbow Grease Helps

Private wells aren't some new discovery. People have been digging wells for centuries—long before there was machinery to do the drilling—when it was just a pick, a shovel, and a bucket on a rope to haul out the dirt. They would dig until they reached the water table and water filled the bottom of the hole.

They then lined the hole with stones to avoid cave ins, built a stone well house around the top, and tied the bucket on a rope to a wooden crank and used it to haul water out of the well.

Later, when it occurred to folks that running water was a possibility, they built pump houses next to the well and

installed electric pumps to force the water out of the well and into lines going into their homes.

Nowadays, most well drilling companies use large, truck-mounted rotary drills or auger bits. Once the well has been drilled, water is forced out of the well through a pump placed inside the well. Modern wells can sometimes be as deep as 1,000 feet.

Private Wells Aren't Regulated

According to U.S. Environmental Protection Agency (EPA) statistics, approximately 23 million U.S. residents obtain their drinking water from private sources. Most of these supplies are drawn from groundwater through wells, but some households use water from streams or cisterns.

EPA does not regulate private wells; however, some state or local governments do set rules to protect well users. In any case, EPA encourages well owners to take precautions to protect and maintain their drinking water supplies.

Richard Latterell, a Jefferson County resident, has been using the same well for 28 years. The shallow, 70-foot deep well was on Latterell's farm when he moved in. He connected the well to the house. Prior to his arrival, past residents used the well for farming.

Many Jefferson County wells are older, existing on agricultural land for years. But new wells are drilled for new homes everyday.

"I have owned my property and well for four years," says

Paul Burke, another Jefferson County resident. "The well has been here since 1969, under the previous owner. I added a concrete pad around the well-head, and an extension pipe

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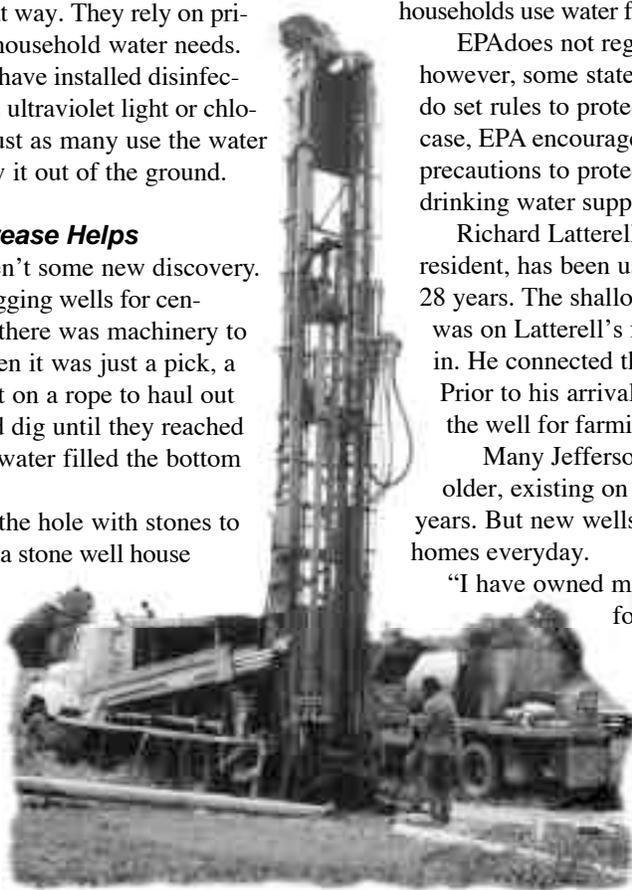


photo by Kathy Jespersion

Danny Dayton and Jason Moss of High Point Drilling in Kingwood, West Virginia, drill a well for a homeowner in a new Jefferson County, West Virginia development.

Reader Suggestion

Special
Private
Wells
Issue

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On Tap

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Private Well Owners Want Resources

This issue of *On Tap* is dedicated to private well owners. Through our readership survey, we found that our audience wants more information about private wells. Therefore, this issue includes a case study of a West Virginia county that depends on private wells, and also contains resources and tips about protecting private water supplies.

The National Drinking Water Clearinghouse (NDWC) also offers several products for private well owners. Some of these products are listed throughout the newsletter, and, of course, on our traditional product listing on the back cover. For more information about other private-well products that the NDWC has, log onto our Web site at www.estd.wvu.edu/ndwc/ and download the *Drinking Water Products Catalog* in a portable document format (PDF) file. You also may call (800) 624-8301 or (304) 293-4191 and request a catalog via snail mail.

This fall *On Tap* also includes a new fact sheet, Safety Tips, which will be a regular feature. The NDWC encourages system managers and operators to cut out and use these fact sheets to help develop safety programs.

In addition to Safety Tips, this issue includes another new column that can be cut out and saved—Tech Trends. This column discusses why certain technologies become trends in the drinking water industry.

These new fact sheets and articles are two of the items that survey respondents asked for. In other survey findings, many respondents said that they use *On Tap* articles for training and public education, especially the Tech Brief. Many of those respondents also noted that they collect Tech Briefs. Mohamed Lahlou, Ph.D., NDWC senior technical assistance specialist, researches and writes the Tech Brief. He always looks forward to comments from readers and can be reached at (800) 624-8301 or (304) 293-4191. You also may e-mail him at mlahlou2@wvu.edu.

My favorite survey comment was that *On Tap* has a “clear, concise, and unpretentious style.” It’s our hope that anyone who reads *On Tap* will be able to understand drinking water terminology and technology. The publication staff works hard to present technical information in a simple, conversational style.

But even with such a well-versed publication staff, *On Tap* would not be the publication it is without the skilled technical assistance staff that aids in the production process. With their assistance, the final product is always clear, concise, and unpretentious. Thank you for appreciating our work.

A number of you responded to the editorial board request. You will be hearing from us soon—especially since *On Tap* and *Water Sense* will be combined to create a new magazine next spring. The information will remain the same, only the appearance will be different. Look for more information about this evolution in the winter *On Tap*, which will also include a full report of the survey findings.

In NDWC news, congratulations to Jamie Knotts, *On Tap* assistant editor, for winning the American Water Works Association’s (AWWA) small systems Best Column award. This was the first year it was presented. Knotts received the award at AWWA’s June conference in Denver. His article explained how to tackle the Consumer Confidence Report. We hope it was helpful to all who had the opportunity to read it. The article appeared in the December 1998 edition of *Journal AWWA*. 

Correction

In the resource list of the Environmental Finance Centers that appeared in the summer issue of *On Tap*, we accidentally left the Environmental Finance Center at UNC-Chapel Hill off the list. For more information about the services they offer, log onto their Web site at www.unc.edu/depts/efcl. We apologize for any inconvenience.

RUS Loan Rates Remain Stable

Rural Utilities Service (RUS) interest rates remain the same for this quarter. These rates are issued quarterly at three different levels: poverty, intermediate, and market. As of July 1, 2000, the interest rates for RUS loans are:

- poverty: 4.5 percent
- intermediate: 5.125 percent
- market: 5.875 percent

RUS loans are administered through state Rural Development offices, which can provide

specific information concerning RUS loan requirements and application procedures.

For the phone number of your state’s Rural Development office, contact the National Drinking Water Clearinghouse at (800) 624-8301 or (304) 293-4191. The list is also available on the RUS Web site at www.rurdev.usda.gov/rus/recd_map.html. 

In Colorado

Operators Take Advantage of TA and Training

by Jamie Knotts
On Tap Assistant Editor

In a state whose growing population places great strains on utility infrastructure, it's important to have a good training and technical assistance program in place, especially for operators of smaller systems.

And Colorado has a fine assistance provider in the Colorado Rural Water Association (CRWA). Working out of offices in Pueblo, CRWA offers both drinking water and wastewater training and technical assistance.

"We have five infield service personnel technicians," says CRWA Executive Director Herman Wooten. "These technicians will be in almost every water system serving under 10,000 every year. And some will be in there two or three times. We'll probably make approximately 2,000 contacts a year, part will be training and some will be double and triple contacts when it's a long, drawn out problem." Two field personnel are located in outlying areas of the state, but the others work out of the main office in Pueblo and travel to sites when called.

Wooten says CRWA staff often receive referrals from the state department of health about small water systems that need help. "We send technicians in to look at the problem to find out if it's a personnel problem, a financial issue, or a mechanical problem.

"One of the biggest areas we focus on is non-compliant systems, the ones that are out of compliance with state regulations," he says. "In some cases their bacteriological tests fail or they have treatment failure in the plant."

Though reluctant to brag about the accomplishments of CRWA, he says that the membership numbers say a lot about what systems and operators think about the organization.

"We probably have a membership rate of 87 percent of all the 870 community water systems in the state," Wooten says. "Our membership fees are \$125 annually, but we're a nonprofit." He says membership fees and a grant contract with the

National Rural Water Association cover the cost of assistance services. "We don't look at membership when we get a call for help," he says. "We don't turn away anyone who is not a member."

Growth Stresses Infrastructure

Colorado's population has been growing dramatically in the past few years, and projections say the trend will continue. In 1990, the state had 3,304,042 residents. By 1995, the numbers were up to 3,782,175. Estimates for 2000 are listed at 4,227,389 and by 2005, the state expects to have 4,629,421 residents.

Wooten says that Douglas County is the fastest growing county in the state and nation. The county lies south of the Denver metro area. "High-tech



photo by Harriet Emerson

Clouds cast shadows on mountains along Interstate 70 west of Denver, Colorado.

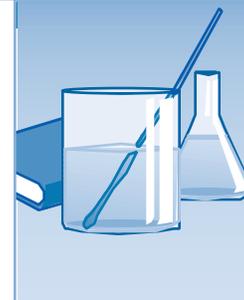
jobs are bringing them in, but there is also a large retirement community," he says. "The mountains, climate, and jobs are bringing people from hectic areas of the nation."

Keeping up with the population growth is a struggle for some drinking water systems' infrastructure. "Financing is always on everyone's mind," says Wooten. "Growth is a tremendous concern in both large and small towns. Systems are facing growing pains."

Most support for infrastructure improvements comes from the state's revolving plan, but Wooten says the state has put together a program aimed at small systems. "The state is active and contributes to the revolving fund. The Colorado Department of Public Health and Environment [the state primacy agency] is working directly with us."

One program was aimed at small systems that were out of compliance or having problems with

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water supplies or sources. The state put together a \$3 million grant program that served as seed money in obtaining other grant money.

“The program has just started and we’re seeing a real difference,” Wooten says. “It’s quicker and more accessible for emergency situations. The population growth has been so great for the past five to 10 years that we’ve just exceeded infrastructure in many places.”

Issues on the Minds of Operators

Because the headwaters of six major rivers are within Colorado, Wooten says drinking water professionals have a keen understanding of the importance of source water protection.

“There are still a lot of unknowns with the Source Water Protection Assessments (SWAP),” says Wooten. “Because we’re the source of many people’s water we have a greater obligation to see that the SWAP works, because what we do will affect states on both sides of us. It will be a concern for the next few years. This is not from a negative standpoint, but that it’s a tremendous undertaking for us.

“Colorado has good mixture of both surface and groundwater systems,” he says. “About 60 percent of systems are groundwater and 40 percent surface water, but the largest percentage of the population get their water from surface water.

“Smaller systems tend to have groundwater as their source. Because of Colorado being on the Continental Divide,” he says “the state has a little better quality of water to start with. When

you’re closer to the source it stands to reason that the water is going to be a little more pristine.”

Operators are facing some regulation changes in the near future.

“Upcoming regulations are the heaviest things on their (operators) minds,” Wooten says. “The thing that is concerning large and small systems are such issues as lowering the arsenic level, disinfection byproducts, Surface Water Enhancement Rule, and the biggest concern is how we’re going to make source water protection work. They’re also looking at filtration and disinfection changes.”

New Training Center to Open Soon

The CRWA will have one more tool to help operators when it opens a new training facility in late September. A new building being constructed in Pueblo West on the edge of Pueblo will house an 86-seat capacity training center.

“We’re looking at educating operators and management people, but also get into cross connection, operator certification, computer training, financial training, all municipal needs,” Wooten says. “The training will be free as our training is now.

“We’ll have hands-on training and join forces with AWWA [the American Water Works Association] with their satellite training.” Wooten says he expects there will be a fee for the satellite courses.

Operators will be able to attend both one-day seminars and five-day seminars. The CWRA expects to offer 10 to 12 five-day sessions for operator certification courses. “Colorado has had *continued on next page*

Colorado: Nation’s Highest State

In a state with 54 mountain peaks over 14,000 feet high and more than 1,000 peaks over 10,000 feet, one can see why Colorado has the geographical distinction of being the nation’s highest state.

But along with those mile-high elevations, the state also has a diverse region of plateaus, canyons, and plains, making for one of the most scenic and beautiful states in the country.

Lying 1,500 miles west of the Eastern coast of the U.S., 800 miles east of the Western coast, 650 miles south of Canada and 475 miles north of Mexico, the state is home to more than four million people. Colorado is bisected by the Continental Divide, so named because waters west of the divide flow toward the Pacific Ocean and those east of the divide flow toward the Atlantic Ocean. This divide separates the state into eastern and western slopes.

Colorado’s mountainous regions are the headwaters for six major rivers. West of the Continental Divide, the Colorado River flows southwest from high in the Rocky Mountains toward the Gulf of California. East of the Continental Divide, the North Platte, the South Platte, the Arkansas, the Republican, and the Rio Grande rivers all originate in Colorado’s mountains or plains and flow east toward the Missouri River, southeast to the Mississippi River, and then south to the Gulf of Mexico.

Colorado is the eighth largest state when measured in square miles. Measuring approximately 387 miles from east to west and 276 miles from north to south, the state’s land mass totals 104,247 square miles. Couple the area with the diversity of wide valleys, rugged canyons, high plateaus, and deep basins, one can see why providing drinking water services, including training and technical assistance, is no easy task.

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mandatory certification for water and wastewater systems for more than 25 years,” Wooten says. “Colorado’s program is one of the top six programs in the country. Our courses will meet the certification board’s requirements.”

AWWA Offers Small Systems Helpline

Colorado is home to the national headquarters of AWWA, which offers a number of services to drinking water systems across the country. One service small system operators use is the Small Utility Network, a toll-free helpline and Web site aimed at answering operation questions.

The helpline is open from 8 a.m. to 5 p.m. Mountain time and users may leave messages during off hours. Callers to the helpline will likely reach Nelson Yarlott, a senior small systems specialist, who runs the network. Yarlott has more than 17 years of operational and maintenance experience in water treatment plants.

“The Small Utility Network is an open-ended help system for advice,” Yarlott says. “We point people in the right direction if we can’t answer their questions. We’re a problem solving and information service, dedicated to water systems serving 10,000 or fewer people.”

The helpline gets roughly 100 calls a month, and it’s been growing, Yarlott says. He uses questions to the helpline in writing a question of the month column for AWWA’s magazine *Opflow*.

Yarlott says he gets a wide variety of questions from U.S. operators as well as international callers from such places as Japan, South America, Canada, and Europe.

“It goes in waves as the regulations have approached, such as arsenic, radon, and public notification,” he says. “Callers also ask for help in finding money to meet the capacity development regulations. We’re here to answer any utility operational questions a small system operator might have.”

College Courses Available

Colorado has one of only 12 centers in the country where students can gain the specific knowledge and skills needed to develop a career in water quality management technology.

The Environmental Training Center at the Red Rocks

Community College campus in Lakewood is home to the only two year Water Quality Management Technology Degree Program in Colorado. Larry Spraggs, Ph.D., Red Rocks vice-president of Instruction, calls the water quality management program “the graduate school of skills for operators.”

The center offers a comprehensive program for all levels and areas of water and wastewater industry operations. Students entering the program choose an educational program that best fits their goals and interests. Some operators take courses to meet requirements for higher operator certification. The center also offers special courses or seminars in new technology, regulatory changes, and materials and equipment.

“Our program provides educational and resource support to the student from enrollment to alumni status,” says Linda Himmelbauer, co-director of the Water Quality Management program, “We also offer job placement, career opportunities and higher education planning.” Past graduates have gone on to become recognized national and regional experts. “We also understand the schedules of those that work in this field, so we strive to offer a flexible associates of science degree,” she says.

The center has a complete water chemistry laboratory with instruments for analysis of inorganic chemicals, bacteria, water properties, and all water constituents. By producing chemical reagents, titrants and nutrients, students in the program learn

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photo by Harriet Emerson

The Rocky Mountains rise into the sky behind a picturesque scene along Interstate 70 west of Denver, Colorado.

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 the entire laboratory function from preparation and analysis to reporting. A special certificate program is available to students who wish to specialize in the water analysis side of operations and treatment.

A backflow prevention testing laboratory allows students to develop hands-on skills and earn Cross Connection Control certification. Students repair, test, or replace each type of backflow prevention device.

"We are in the process of modifying some of our courses so that students can take them online for college credit," says Himmelbauer. The program just received a grant for Web-based distance learning. "We get calls from all over the country as well as some international calls requesting to take our degree courses online. Now, we'll be able to meet the educational needs of these operators."

Primacy Agency Offers Help

The Colorado Department of Public Health and Environment, Water Quality Control Division serves as the state's drinking water primacy agency. And in addition to enforcing state regulations, it offers technical assistance and reviews design plans for utility construction.

Glenn Bodnar is a drinking water engineer with the department and his office fields 30 or more calls a day. He says approximately two-thirds are from small systems.

"Many of the calls are about interpretation of the rule system," he says. "We'll have an operator going along and things are fine with no problems for years and then suddenly they see a problem and need advice. They're looking for general help about what to do.

"A lot of systems are not prepared for the growth that is occurring in locations where growth hasn't occurred before," he says. "Add to that the new rules effecting small water systems and it becomes complicated for operators who are used to just changing out the chlorinator, greasing the pumps, taking a few water samples, and sweeping up. The combination of growth and new regulations is putting a strain on small system resources."

As part of Colorado's drinking water regulations, systems must have their construction design reviewed by the Primacy agency. Bodnar and 12 other district engineers inspect and review facility designs. These pre-construction and upgrade design reviews help to ensure that drinking water plants can adequately meet water quality standards for finished water.

Bodnar says the department also provides staff support to the state drinking water plant operator certification program. Colorado has long been a leader in certification, offering four certification levels with a class A being the highest

and a Class D being the entry level.

The Class D certification is the basic level an operator must achieve to legally operate a public water system. "This requires passing an examination which covers the basic principles of chlorination, pumping, and drinking water regulatory requirements," Bodnar says. In order to attain each higher level of certification, the applicant must pass additional written examinations and have one or two years experience working in a water treatment facility.

Bodnar says the department is reevaluating the state's certification standards. "We'll be raising the bar on those levels again. The department and the Plant Operators Certification Board will be putting additional efforts into validating test questions to ensure they completely cover all the need-to-know information for each certification category," he says.

Due to resource problems in the department, Bodnar says the department must maintain partnerships with other organizations. "We'll be using the capacity development set-aside money that will be given to other organizations, for instance CRWA and others."

Colorado is about to implement a special project where a contractor conducts comprehensive performance evaluations and onsite reviews of surface treatment plants.

"They [contractors] will go onsite and do complete evaluations of management and operations based on a set of goals and/or design criteria," he says. "We'll measure each facility against those goals and criteria.

"We had three meetings to introduce this concept to surface water systems and very few were reluctant to receive it. We consider this a voluntary project and better than 80 percent of systems requested to participate in the comprehensive review," Bodnar says. "Of the others, some were already in the process of evaluating and upgrading their own facilities. Less than two percent told us to go back to Denver."

Herman Wooten and the CRWA may be reached at (719) 545-6748 or by e-mail at crwa@coyotenet.net. Nelson Yarlott and the Small Utility Network may be reached at (800) 366-0107 or by e-mail at nyarlott@awwa.org. To reach the Environmental Training Center at Red Rocks Community College, phone (303) 914-6325. Contact the Colorado Department of Public Health and Environment and Glenn Bodnar at (303) 692-3548 or send e-mail to glenn.bodnar@state.co.us.

"Because we're the source of many people's water, we have a greater obligation to see that the SWAP [Source Water Protection Assessments] works, because what we do will affect sates on both sides of us."

Herman Wooten, executive director, Colorado Rural Water Association



WSC Supports Private Well Owners

If you're a private well owner and you want information about how to care for your investment, the Water Systems Council (WSC) is a very good place to begin. WSC is a nonprofit organization, founded in 1932 and dedicated to promoting the wider use of wells and to protecting groundwater resources.

WSC's mission is to educate consumers, community leaders, government agencies, and the general public about the cost-effectiveness and efficiency of modern wells as safe drinking water systems.

WSC actively educates well owners about their wells. They assist those who rely on individual wells to identify and access testing, operation and monitoring services, such as those provided to customers of other drinking water systems to ensure safe drinking water.

The council:

- promotes wells and groundwater protection through education, advocacy, and communication;
- identifies and creates financing options for public and private wells;
- opposes government restrictions on the use of private water wells; and
- establishes standards for well industry products and lists products in compliance with these standards.

In August 1999, WSC received a grant from the U.S. Department of Agriculture's Rural

Utilities Service for a project known as Wellcare™. Grant-funded activities in the Wellcare™ project help communities that rely on wells for potable drinking water gain operation and management services that are traditionally associated with larger water systems.

Other WSC programs are:

WSC's Promote Our Private Wells (POP)

Campaign educates the general public, regulators, and legislators about modern well systems. Today, wells are constructed to exacting standards that ensure safe water. Modern wells are reliable water sources and meet the increased demand in today's homes.

The Well Water—Naturally Better Initiative

constitutes WSC's groundwater protection efforts, including educational and communications activities related to safe drinking water from wells and good health.

WSC's International Initiatives are a partnership of corresponding international organizations committed to expanding the role of advanced well water information and technology around the world.

For more information about the Water Systems Council, write to WSC, National Programs Office, 13 Bentley Drive, Sterling, VA 20165, or call (703) 430-6045. You may also fax them at (703) 430-6185, or visit their Web site at www.watersystemscouncil.org.

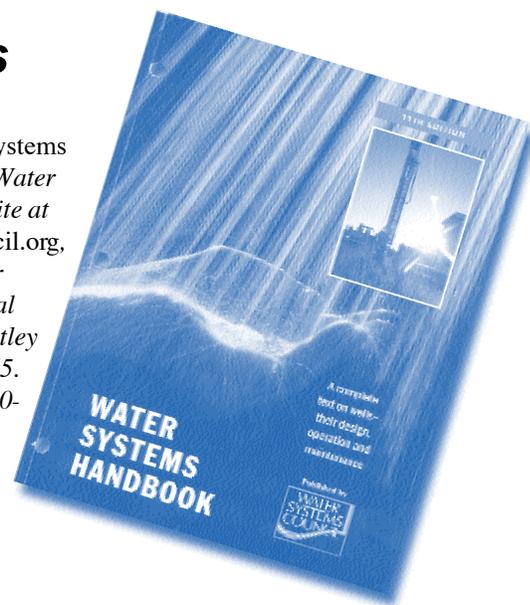


Handbook Available for Well Owners

The 11th edition of the *Water Systems Handbook* is now available from the Water Systems Council. This handbook is a comprehensive technical manual on the proper siting, construction, and operation of wells. It is written for novices in the industry as well as experienced drillers, pump contractors, engineers, and end-users.

The handbook, which was revised and updated this year, includes information that well owners should know—such as details about water sources, well construction, pump operation, well caps, electrical supply, disinfection, and well design. The handbook costs \$20, which includes shipping and handling.

To order the Water Systems Handbook, log onto the Water Systems Council's Web site at www.watersystemscouncil.org, or write to them at Water Systems Council, National Programs Office, 13 Bentley Drive., Sterling, VA 20165. You also may call (703) 430-6045 or fax (703) 430-6185.





How can I protect my private water supply?

Carefully managing activities near the well's water source can protect your water supply, including keeping contaminants away from sinkholes, the well, and septic systems. The following tips can help you protect your water source:

- Periodically inspect exposed parts of the well for problems, such as:
 - cracked, corroded, or damaged well casing;
 - broken or missing well cap; and
 - settling and cracking surface seals.
- Slope the area around the well to drain surface runoff away from the well.
- When landscaping, keep the top of your well at least 18 inches above the ground.
- Be careful when 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.
- Install a well cap or sanitary seal that prevents animals or other vermin from getting into your well, and that hinders the unauthorized use of, or entry into, the well.
- A sanitary seal or concrete platform should be set around the wellhead to keep pollutants from entering the well bore.
- The well's casing should extend a minimum of 20 feet below the ground surface and preferably be driven at least five feet into bedrock.
- Existing wells in areas with a history of flooding should have the casing elevated at least two feet above the highest known flood level and also should have a watertight sanitary well seal at the top of the grouted casing.
- Disinfect drinking water wells at least once per year with bleach or hypochlorite granules, according to the manufacturers' directions.
- Have the well tested once a year for coliform bacteria, nitrates, and other contaminants of concern. 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 accurate records of any well maintenance, such as disinfection or sediment removal, that may require the use of chemicals in the well.
- Keep your well records in a safe place. These include the construction report, as well as the annual water well system maintenance and water testing results.
- Hire a certified well driller for any new well construction, modification, or abandonment and closure.
- Avoid mixing or using pesticides, fertilizers, herbicides, degreasers, fuels, motor oil, and other pollutants near the well.
 - Don't allow back-siphonage. When mixing pesticides, fertilizers or other chemicals, don't put the hose inside the tank or container.
- Always maintain proper separation between your well and buildings, waste systems or chemical storage facilities. As a rule of thumb, maintain a minimum of 100 feet between the water source and a subsurface sewage absorption area. But contact a professional well contractor for specific information.
- Do not dispose of wastes in dry wells or in abandoned wells.
- Do not cut off the well casing below the land surface.
- Pump and inspect septic systems as often as recommended by your local health department.
- Never dispose of hazardous materials in a septic system.
- 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. 🌍



Water Fact

For emergency

disinfection, boil

water at least 3-5

minutes before use.

U.S. Environmental
Protection Agency

Glickman Announces Water 2000 Funding

Agriculture Secretary Dan Glickman announced on July 10, that the U.S. Department of Agriculture (USDA) will provide more than \$226 million to improve drinking water and wastewater service in America's rural areas. The funds, a combination of grants and loans, will benefit 380,000 rural residents through 113 projects in 41 states.

"It is simply unacceptable that at the start of the 21st century, there are Americans who have to haul their water from open wells and streams and boil it to make it safe to drink," said Glickman. "Investing in the safety and quality of a community's drinking water improves public health, enhances fire protection, expands economic opportunity, and conserves precious natural resources."

Vice President Al Gore added, "Today marks another significant step by our administration to ensure that all Americans enjoy the safest drinking water possible. In this time of unprecedented prosperity, we must do all we can to help the nearly two million rural Americans who have inadequate drinking water. This administration launched the Water 2000 initiative six years ago to address this serious problem. I am proud of the progress we have made, and we remain committed to investing in rural communities so that no American is left behind."

The Clinton-Gore Administration launched the Water 2000 initiative in August 1994 to

address the problem of inadequate drinking water quality and dependability in many rural areas, including approximately 690,000 people with no running water at all in their homes. This number is down significantly from an estimated 1.1 million people without water in 1990. An estimated five million additional rural residents are affected by less critical, but still significant water supply problems. These include under-sized or poorly protected water sources, lack of adequate storage facilities, and antiquated distribution systems.

Under Water 2000, USDA acts as a lender of last resort, targeting investments to communities that need it most. Water 2000 projects also leverage funds from local water districts, county governments, state agencies, and other federal sources to make the most effective use of all available resources. This year, \$85.6 million in additional funds will come from these other sources.

Water 2000 has helped upgrade and expand drinking water and wastewater disposal services in rural communities that have some of the nation's worst water quality, quantity, and dependability problems. The assistance package announced in July brings the total amount invested through Water 2000 to \$2.5 billion and the number of Americans assisted to more than three million. 

Federal Bills Promote Private Well Ownership

Approximately 40 million U.S. residents receive their drinking water from individually owned and operated sources, such as household wells, cisterns, and springs. And increasing numbers of people who have access to city water are turning to the fresh, clean-tasting, pure water from a well because city water costs more and more each day.

Two federal bills that are designed to assist well owners are now before Congress. Because both bills support developing and maintaining household well systems, as well as discouraging

unnecessary long-pipe projects, they may provide significant tax savings.

House Resolution 3910, known as the Affordable Drinking Water Act of 2000, introduced by Rep. John A. Boehner, R-Ohio, would establish a public-private partnership to provide financial assistance to low- and moderate-income people who wish to install, refurbish, or service household well systems. The bill, introduced this spring, is under review by a subcommittee of the House Agriculture Committee and a hearing is to be scheduled shortly.

House Resolution 3865, introduced by Rep. Richard Pombo, R-California, would prohibit using federal funds for any program that restricts the use of any privately owned water source. In some localities, ordinances are being passed that require residents to connect to long-pipe water supply systems even when a safe, household water well is already available. 



Water Fact

Private household wells constitute the largest share of all water wells in the U.S.—more than 15 million households have their own well.

National Ground Water Association





Agencies Offer Private Well Owners Help

by Caigan McKenzie
ESTD Staff Writer

More than 15 million individual households in the U.S. are served by private wells, according to the 1990 U.S. Census. If you add those who use streams and cisterns as private water sources, that number rises to around 23 million, according to U.S. Environmental Protection Agency (EPA) figures.

Michigan is the largest state market served by private wells, followed by Pennsylvania with 978,202 households, and North Carolina with 912,313 households, according to the National Well Owners Association (NWOA).

Rural Americans Prefer Private Wells

But would these private well owners prefer to get their water from a central water system? "No," says an independent 1998 survey sponsored by the National Ground Water Association (NGWA).

Eighty-one percent prefer the water from their wells, notes the survey. Water supplied by a water utility appealed to only 8.3 percent of rural Americans, while 7.5 percent preferred bottled water. Further, among the surveyed well owners, 84 percent said wells are their least expensive drinking water option.

"We're not surprised by the findings," explains Kevin McCray, NGWA executive director. "The results are consistent with other surveys of Americans interested in preserving their rural lifestyles."

Wells Need TLC, Too

"Wells are no different than any other household system," McCray explains. "Like your furnace, roof, or garbage disposal, wells and pumps wear out and when they do, you replace them. There are older household wells that are ready to be replaced with modern, state-of-the-art well technology the groundwater industry has invested in for the consumer's benefit."

Where's the help?

But where do you go to find the information you need about private wells? There are a variety of professional organizations, university extension offices, and government agencies that can help private well owners.

Professional Organizations:

- *Water Systems Council (WSC)* is a nonprofit organization, founded in 1932 and dedicated to promoting the wider use of wells and the protection of groundwater resources. WSC's mission is to educate consumers, community leaders, gov-

ernment agencies, and the general public about the cost-effectiveness and efficiency of modern wells as safe drinking water systems. (See article on page 9 for more information). For more information, see their Web site at www.watersystems-council.org.

- *The National Well Owners Association* provides information for purchasing and maintaining private water systems. Log onto NWOA's site at www.wellowner.org/ for answers to frequently asked questions about private wells, testing well water quality, finding a contractor, and financial advantages to owning a private well.

- *The National Ground Water Association's* mission is to "provide professional and technical leadership in the advancement of the groundwater industry and in the protection, the promotion, and the responsible development of groundwater resources." NGWA may be found at www.ngwa.org/. Here you can find a comprehensive database of groundwater literature, listing of conferences, pending regulations that impact well owners, and links to other well owner sites.

You may telephone NGWA toll-free at (800) 551-7379 or email them at ngwa@ngwa.org.

- *The American Groundwater Trust (AGWT)* is a national nonprofit public education organization. AGWT recently released an information kit to help citizens understand the economic and environmental importance of groundwater.

The Well Owner Information Kit, is a 9"x12" three-ring binder that contains information about wells, groundwater, water systems, water treatment, water conservation and water pollution. The kit includes folders for storing water quality test results, driller's well log, pump details, etc. The \$16 price covers shipping and handling plus a free one-year membership in the AGWT.

AGWT also has inexpensively priced well-water promotional posters, pencils, and a series of pamphlets.

Some of the pamphlets private well owners may be interested in include: *Bacteria and Water Wells Pamphlet*, *Oil and Water Pamphlet*, *When You Need a Water Well*, and *Rural Drinking Water—Private Wells or Public Water Supply*.

You may call AGWT toll-free at (800) 423-7748 or log on to their Web site at www.agwt.org.

Government Agencies:

- *EPA's Office of Ground Water and Drinking Water (OGWDW)* is a good source of information for private well owners.

Log onto OGWDW at www.epa.gov/ogwdw/. Here you may find some helpful articles, for *continued on next page*

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example, *Private Wells: Guidance for What to Do After the Flood*; *Private Drinking Water Wells*; and *Recommendations for People Who Get Water From Private Wells*. You may download these articles to your personal computer.

You may also call EPA's Safe Drinking Water Hotline toll-free at (800) 426-4791 for sources of state and local assistance.

- *The Educational Resources Information Center (ERIC)*, supported by the National Library of Education under the U.S. Department of Education's Office of Educational Research and Improvement, currently offers two publications for private well owners.

The Manual of Individual and Non-public Water Supply Systems supplies detailed well water information. Ask for item number G-119. The second publication is a pamphlet titled *Drinking Water from Household Wells*. Ask for item number G-711. There is a cost for each publication. You may telephone ERIC at (800) 276-0462.

- *Farm*A*Syst/Home*A*Syst* is a national program supported by government agencies and private business. Its mission is to help citizens prevent pollution on farms, ranches, and in homes.

You may contact Farm*A*Syst/Home*A*Syst at (608) 262-0024 or log onto its Web site at www.uwex.edu/homeasyst or www.uwex.edu/farmasyst. Here you can find information about testing your well water, maintaining your well, and how to handle abandoned wells on your property. This information can be downloaded to your personal computer.

Farm*A*Syst/Home*A*Syst also lists a variety of contacts for each state. For example, for Pennsylvania it lists the contact information for Farm and Home*A*Syst coordinators, extension service, and the state department of environmental protection.

Finally, local health departments and agricultural extension agents provide general technical assistance. These organizations can be found under "government" or "health" listings in your phone book.

Extension Offices:

- *In Idaho*, log onto the extension office site at the University of Idaho at www.uidaho.edu/ag/extension. For questions about your well, call your local county office listed under "government" or "health" in your phone directory. Or call the state cooperative extension office at (208) 885-5883.

The cooperative extension service, along with several government offices, produces a water update newsletter six times a year. Each

issue contains some information about private wells. The Web site for this newsletter is www.idahowaterupdate.com.

- *In Iowa*, log onto www.exnet.iastate.edu and do a search on private wells to find a variety of publications about this subject. For example, *Iowa Statewide Rural Well Water Survey*, *Good Wells for Safe Water*, *Coping with Contaminated Wells*, and *Abandoned Wells Pose Safety Hazards*. The county extension office offers videotapes about private wells that you may check out free of charge. For questions about well construction and maintenance and general water quality issues, telephone (515) 294-0463.

- Another resource in Iowa is the hygienic laboratory. You can find them at www.uhl.uiowa.edu/. Here you can talk to troubleshooters about your water quality issues. The lab can also provide you, free of charge, a *Water Sampling Kit*. A charge applies for testing the samples. The cost varies depending on the type of test performed. For testing water samples, contact either the hygienic laboratory in Des Moines at (515) 281-5371 or in Iowa City at (319) 335-4500.

- *In Michigan*, log onto Michigan State University at www.msue.msu.edu/. Here you can find a listing of county and regional offices to contact about well-water issues, a water quality database, and a list of publications related to private well issues.

For questions about well-water testing, contact your local health department or the Michigan Department of Public Health Water Supply Division at (517) 373-1376.

- *In Pennsylvania*, log onto Penn State University's site at www.extension.psu.edu. Here you can find information about constructing and maintaining a private well. There is also a link for local information and resources, Pennsylvania Department of Environmental Protection regional offices, EPA's Private Wells Website, the NGWA, and the NWOA.

- *In Wisconsin*, log onto www.dnr.state.wi.us. Wisconsin's Department of Natural Resources Web site, which touts this state as a "national leader in well protection." Its State Private Well Code is "based on the premise that if a well and water system are properly located, constructed, installed, and maintained, the well should provide safe water continuously without the need for treatment."

This site also covers frequently asked questions and links to related associations. 



*Eighty-one percent
of private well
owners surveyed in
a National Ground
Water Association
study said they
prefer their wells
to a public water
supply.*

National Ground
Water Association

Private Wells Are County's Main Water Source

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that's connected to the old casing with a rubber collar so that it's 18 inches above the surface to minimize surface water splashing in, and sealed the cap to keep out bugs."

EPA recommends that well owners install a sanitary seal or concrete platform around the wellhead to keep pollutants from entering the well bore. In addition, the wellhead should be at least 18 inches above the ground. EPA also advises that well owners install vermin-proof caps.

Well Owners Want Better Information

Many well owners are not aware of these recommendations. And they would like better information about how to care for their wells. "I would like information that would help me live better and safer," says Latterell. "I would also like to see a systematic testing program by the health department. I wouldn't even mind some kind of regulation. I would use these regulations as guidelines."

Burke agrees, adding that he would also like to have inexpensive at-home tests, with clear sampling instructions and a gadget of some sort to monitor electricity use, such as hours run and power consumption. He would also like advice on how to maintain parts, such as pump, cap, pressure tank, and pressure switch.



photo by Kathy Jespersion

Paul Burke (kneeling) and Richard Latterell (center), private well owners, discuss changes Burke made to his wellhead with Vipin Bhardwaj, NDWC technical assistance specialist.

Further, they would like information about what to do when the well runs dry during drought years or when nearby developments increase water use, as well as information about pollution and the cost of maintaining the well.

These residents are also concerned about agricultural pollution. A U.S. Geological Survey (USGS) study of the county in the early 1990s notes bacteria and nitrates are scattered throughout Jefferson County water sources.

"The highest nitrate reading (six times above EPA's advised level) is about one mile away from my home," says Burke. "They [USGS] judged that most pollution was from animal wastes, not human."

State Can't Afford New Labs

According to Randy DeHaven, administrator with the Jefferson County Health Department, a comprehensive testing program for private well owners isn't in the state's budget as much as he would like to offer one.

"The state's district laboratory doesn't have the equipment they need," he explains. "We would like to be able to offer a full range of testing. And we would like it all to be free. There's lots of testing that can be done, especially for minerals—iron, manganese, hardness. You also need to have a satisfactory test for nitrates. It would be nice to have a regional lab, but I don't see the state allocating that kind of money. They don't even have the equipment they need at the state facility."

For now, private well owners must collect their samples and send them to the lab of their choice. Of course, the well owner must pay the lab for its services.

"When you collect your samples, they can be sent to a state lab," says DeHaven. "But sending them to a private lab is not necessarily a disadvantage. Private labs are now doing many types of tests. Private labs are competitive and the consumer may get a better price. Government labs are not always convenient. And many people don't have access."

Karst Geology Creates Problems

Latterell notes that the county's geology is largely karst with a number of sinkholes and caves. Such regions are characterized by the presence of limestone or other soluble rocks, where drainage has been largely diverted into subterranean routes. Sinkholes, sinking streams, large springs, and caves dominate the topography of the areas.

According to the National Park Service, cave and karst systems are important because approximately 25 percent of the nation's groundwater is located in these regions. However, cave and karst systems can be easily contaminated.

Residents of these areas should never use sinkholes for refuse disposal. Doing so allows pollutants to drain directly into the groundwater through cracks and fissures in the limestone bedrock. Jefferson County is mostly limestone. *continued on next page*

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Public Education Is Necessary

DeHaven stresses that the most important things that private well owners can do during the construction process are to:

- make sure the well is properly located,
- be certain it meets design standards,
- ensure proper construction by using a reputable construction company, and
- include grouting in the construction.

(Grouting fills in openings around the casing.)

“The West Virginia State Planning Commission requires grouting in construction of any new well,” says DeHaven. “I can’t stress enough that this is probably the most important feature of well construction.” Proper grouting helps ensure that contaminants do not enter the groundwater supplies.

“We need to educate the public about well construction and design,” he continues. “Many people are moving here from the city, and are not used to having a well and a septic system to maintain. They’re used to just paying a bill for the water they use or for public sewers. If they have a leak, they just pay a higher bill. But here they risk running their wells dry and hydraulic failure of the septic system. A leak that’s only a drip every few seconds can overload the septic system.

“For example, a homeowner who had what he thought was a minor leak, later found that his septic system was failing,” DeHaven explains. “He had a leak in his toilet that he thought wasn’t much of anything to worry about. He said he could hear the toilet running every once in a while to fill the tank.

“I told him to turn the valve off and see how long it took the toilet’s tank to empty,” he says. “Well, it was empty in 10 minutes. It turned out that he had a leak of around 720 gallons per day. That’s about three times the amount of water a typical family of four uses in one day. Sometimes leaks are a significant amount of water, even if you think it’s only a little leak. He got the leak fixed, and guess what? The septic system drainfield dried up. So leaks have to be addressed. Besides septic system failure, you run the risk of running your well dry, which can turn into very expensive replacement costs.

“It may cost several thousand dollars to install a new well,” explains DeHaven. “Casing is about \$8 to \$10 a foot. It costs about \$6 a foot to have a well drilled. Then there’s the pump, the water line, and fixtures. It could cost in the ballpark of \$3,000.”

Where should the well be located?

Another important consideration is well location. It should be:

- a safe distance from all possible sources of pollution, including septic tanks and hazardous chemicals;

- sloped away from sources of pollution; and
- located in an area that is not likely to be inundated with floodwaters.

“My own well is on a hillside of sandstone and shale, about 300 feet from the Potomac River, about one mile from a hog farm,” says Burke. He had his water tested using a private lab in August



photo by Kathy Jespersion

Richard Latterell, a private well owner in Jefferson County, shows Vipin Bhardwaj, NDWC technical assistant, the inside of this beautiful, old pump house—meanwhile, “Percy,” the dog, keeps an eye out for any suspicious activity.

1999 and received the following results:

- copper: 0.24 milligrams per liter (mg/L),
- lead: not detected,
- nitrate: 0.72 mg/l,
- total coliform: present, and
- radon: 319 picocuries per liter (pCi/L)

plus or minus 26.

The maximum contaminant levels (MCLs) for central drinking water systems are:

- copper: 1.3 mg/L,
- lead: 0.015 mg/L,
- nitrate: 10 mg/L,
- total coliform: less than one positive sample for systems taking 40 or less samples per month or less than five percent positive samples for systems taking 40 or more samples per month, and
- radon: 300 pCi/L.

Burke’s samples from his private well are either at or below what central drinking water systems are expected to achieve. Burke does not treat his water. However, because of the presence of total coliform, Burke now boils his drinking water.

“The coliform is likely to be from a minor infection in the pipes, which I could kill by super chlorination. But it seems simpler to drink leftover boiled water from morning coffee.”

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Private Wells Are County's Main Water Source

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Super chlorination or shock chlorination means drawing a chlorine solution through the entire water system. The chlorine solution is left in the system for several hours and then flushed out. There are several different ways to pump a chlorine solution through the system. Call your local health department for advice.

How do I know if my well is contaminated?

DeHaven explains that private well owners are often concerned about bacteria in their water supplies.

"I went to inspect a well that the homeowner suspected had bacteria in it. Well, the well was in a pit, there was no cap on it at all, and there was a groundhog living in it. I tested the water, and frankly I was surprised that there was no bacteria. But

what was I supposed to tell the homeowner? In a situation like this, eventually, there would be bacteria as well as other types of contamination.

"Many problems are obvious," he continues. "A person can use his own senses to determine some water problems. Without doing any testing, you're going to know that you need a water softener if you have white scaling on kitchen fixtures," DeHaven cites these other examples:

- white scaling—calcium carbonate;
- water smells like rotten eggs—sulfur;
- red, rusty stains on enamel kitchen and bath fixtures—iron; or
- black stains on sinks and toilets—manganese.

"Contaminants in this area are mainly bacteria, nitrates, and some others from the agricultural industry," says DeHaven. "But if a well owner wanted to have his water tested, it's not really that expensive. It's about \$20 to test for nitrates. Most of the time, it's a good idea to just test for the basic parameters, such as nitrates and bacteria. Some tests cost considerably more just because of the equipment that must be used.

How do I disinfect my well?

DeHaven explains that private well owners often think there's inconsistency in how to disinfect their wells. "Depending on which agency you talk to, you may get a different opinion about how to disinfect your well. We get requests on different situations where a well needs to be sanitized.

"The Red Cross says to add 15 drops of chlorine for grossly contaminated well water," he says. "But if you just want to store your water for a short time—say you were worried about Y2K—you may only need to add a drop.

Storage and gross contamination are two different situations. So, it appears that there's inconsistency when there really isn't. There are different methods of disinfection for a variety of circumstances.

"Chlorine bleach isn't labeled for water disinfection,"

he continues. "And there's a good reason for that. Companies don't want to face liabilities. But how does an agency like the health department publicize disinfection? Boiling water is a better way to disinfect, but not always practical."

Wells should be disinfected under any of the following circumstances:

- after completing construction of a new well or spring;
- after completing repair or reconstruction of a well, pumps, or attached piping;
- if the well has been temporarily flooded or subjected to another source of bacteria; and
- when the well owner receives an unsatisfactory lab report for bacteria.

Many homeowners disinfect their wells using liquid chlorine, such as unscented laundry bleach or a solution of sodium hypochlorite. Granular chlorine is also available. Call your local health department for detailed instructions about how to disinfect the well.

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photo by Kathy Jespersen

Jay Cotta, a plumber with Comstock Plumbing in Charles Town, West Virginia, explains how a well pump works.

"A leak that's only a drip every few seconds can overload the septic system."

Randy DeHaven, administrator, Jefferson County Health Department



photo by Kathy Jespersen

This cut-away of a well casing illustrates the works inside, including water lines and electrical components, which bring well water to the surface and into well owners' homes.

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Other Area Residents Treat Water

Many area residents have installed disinfection devices to be sure their water is safe to drink. "I install reverse osmosis units and disinfection units, such as ultraviolet light and chlorination. And a lot of water softeners. The water is very hard here," says Jay Cotta, plumber, Comstock Plumbing, Charles Town, West Virginia.

"Water heater replacement has become more common now than 10 years ago," says Cotta. "But I'm not sure if it's due to the calcium sediment or that they're just not making water heaters the way they used to."

Cotta notes that only a few customers have their wells up to standard. "Most customers just install the standard well cap even though EPA and the National Ground Water Association recommend a vermin-proof cap. There's no one around to enforce what you should do, you just have to do it by conscience."

A Few Requirements Make a Difference

To protect those who buy property that relies on a private well, the U.S. Department of Housing and Urban Development will not grant a mortgage until the water has been tested under local and

state drinking water regulations for private wells.

If there are no state or local requirements or if they are not adequate for private wells, then the water must be tested for lead, nitrates, and acute contaminants, such as total coliform and fecal coliform, and, if of local concern, other contaminants.

According to DeHaven, Jefferson County also has a provision that a new well must be drilled and producing satisfactory water supplies before the county will issue a building permit.

For more information about private wells, contractors, and your private water supply, call the National Ground Water Association at (800) 551-7379, or visit their Web site at www.ngwa.org/.

You may also call the Water Systems Council at (703) 430-6045, or visit their Web site at www.watersystemscouncil.org.

In addition, EPA provides information to well owners. Call the Safe Drinking Water Hotline at (800) 426-4791, or visit their Web site at www.epa.gov/ogwdw000/pwells1.html.

NDWC Offers Products for Private Well Owners

Private well owners are often looking for more information to protect their investment. The National Drinking Water Clearinghouse offers several products that may help private well owners protect their drinking water supplies. For ordering information, see back cover or call (800) 624-8301 or (304) 293-4191 to request any of the following products.

Manual of Water Well Construction Practices

Item #DWBKDM01

This 1975 manual provides information about well construction techniques and addresses the intended use of the water, required capacity of the well, intended drilling method, and how the construction costs will be paid.

Citizen Monitoring: Recommendations to Household Well Users

Item #DWBLPE32

This 1990 booklet provides information on the steps consumers might use to protect their wells and become more informed about drinking water issues. It also provides a list of pertinent reference material.

Drinking Water from Household Wells

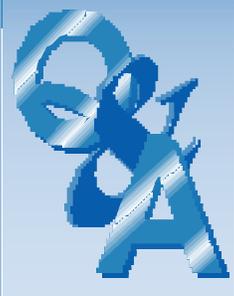
Item #DWBLPE05

This 1990 document discusses what threatens the safety of wells and groundwater, the health risks water may pose, and where people can turn for help or advice.

Shock Chlorination of Wells and Springs

Item #DWBL0M05

This 1991 booklet explains how shock chlorination can clean and sanitize a drinking water well or spring contaminated with bacteria. A table is provided to determine the amount of chlorine needed, and directions show how the chlorine should be applied.



Should I get my water tested?

by Babu Srinivas Madabhushi
NDWC technical assistance specialist

Many contaminants that pose health risks could be present in the water you drink. Unfortunately, your senses cannot detect these contaminants, and hence the water's taste, smell, or color may not indicate the actual water quality. It is a good idea to test the water so you will know exactly what is in it—especially since your health is involved.

When and how often the water needs to be tested depends on several factors, including the source of water, any plumbing changes, any indication of contamination, and any illness in the family that affected more than one person.

Below is a list of contaminants that you can test for:

- **Coliform bacteria** (a group of microorganisms): Coliform bacteria's presence indicates that disease-causing organisms may have entered the drinking water supply. Total coliform is an indicator of septic system problems and/or poor well construction. If you have replaced old pipes or installed a new well or pump, you should always test for total coliform bacteria.

- **Cysts and Viruses:** These are usually found in surface water supplies. *Giardia* cysts can cause giardiasis, a gastrointestinal disease. Another microbial contaminant, *Cryptosporidium*, may be found in many surface water supplies. However, they may also come

Testing for Suspected Contamination

Table 1

If you observe this:	You should test for these:
Agriculture	Nitrates, pesticides, coliform
Coal or other mining	Metals, pH, corrosion
Gas and oil drilling	Total dissolved solids, chlorides, sodium, barium, lead, strontium, pH, corrosion.
Gasoline odor, or a nearby gas station	Volatile organic compounds
Landfills, junkyard, dry cleaning operation	Total dissolved solids, pH, volatile organic compounds, sulfate, chlorides, metals
Road salt	Total dissolved solids, sulfates, chlorides
Salty taste, seawater, or brackish* water	Total dissolved solids, sulfates, chlorides
Septic systems	Coliform, nitrates, surfactants

* Brackish water is groundwater contaminated by salt water, but less salty than sea water.

Source: The Ohio State University

Sometimes water testing may be expensive, but it is the only way to make sure that the water is safe to drink. People using public water supplies pay for water testing as a part of their water bill. But private well owners must pay for water testing out of their own pockets.

What should I test for?

Though it is possible, it is unnecessary and expensive to test for ALL contaminants. It is wiser to test for certain contamination indicators on a regular basis. If you have concerns about well water contamination, contact your local health department for recommendations. They may handle certain tests, such as bacterial testing. A partial chemical test that detects magnesium, calcium, sodium, iron, fluoride, chloride, and nitrate is usually affordable. Tests for chemicals, such as solvents, pesticides, and petroleum products, can be very expensive since each contaminant requires a separate test.

from the intestines of warm-blooded animals. Only a few laboratories in the U.S. can analyze your water for *Cryptosporidium*.

- **Nitrates:** Nitrate in drinking water supplies could cause a disease called "methemoglobinemia," or "blue baby" syndrome. If a new baby is expected in the family, it is a good idea to have the water tested for nitrates. If nitrate tests are positive, you must treat the water or find an alternative source; however, boiling the water will increase the concentration of nitrates.

- **Lead:** Lead is known to leach from soldered joints in copper pipe networks. Lead poses greater risk to small children than to adults.

- **Pesticides:** Testing for pesticides requires more specialized laboratory equipment and training; it is more complex than testing for minerals or bacteria. If you observe pesticide contamination of your well, contact your state or local health officials to determine whether any contamination problems have been reported in your area. If contamination is confirmed in your area, *continued on next page*

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you should contact local health officials for advice on the necessary action to take and the frequency of testing.

- **Others:** If you reside in an industrial neighborhood, your well water should be tested for toxic metals, such as mercury, arsenic, and nickel. However, these tests are expensive. So unless you suspect that your water is contaminated, routine annual testing for these metals may not be practical.

How often should I test my water?

Currently, there are no laws that govern how often private wells should be tested. You may test your well water once a year for mineral content, lead, and radon, and once or twice a year for bacteria and nitrate. If you become aware of

family consumes. Although there are a few requirements for water quality testing and monitoring of private wells, it is recommended that all well owners have their water tested periodically. The frequency of water testing and the contaminants to test for depend upon factors, such as the potential sources of pollution and the type of well.

Even if the current water quality is good, periodic testing might help the owner in tackling future problems. If any of the tests reveal positive results, it is advised that the owner should contact the state health department or the U.S. Environmental Protection Agency's (EPA) Safe Drinking Water Hotline (800) 426-4791.

Table 2

Symptoms and Testing Schedule

Symptoms	Recommended Test	Frequency
Gastrointestinal disease	Coliform	Annual
Lead contamination	Lead, copper, pH	Immediate
Radon in indoor air	Radon	Immediate
Scaly residues, no lather with soaps	Hardness	3 years
Softener required	Iron, manganese	3 years
Stains on fixtures	Iron, copper, manganese	3 years
Bad taste or odor	Hydrogen sulfide, corrosion, metals	3 years
Corrosion of pipes, plumbing	Corrosion, pH, lead	3 years
Rapid wear of equipment	Corrosion, pH	3 years

Source: U.S. Environmental Protection Agency

any contamination or any potential sources of pollution in the vicinity of your well, you should have your water tested more frequently. If the taste, odor, or color of your water changes, or if your family experiences any serious, ongoing gastrointestinal illnesses, you should get your water tested.

Shallow wells are particularly vulnerable to bacterial contamination and need more frequent testing. But other types of wells with no history of problems may not need to be tested as often. You should test for sodium, sulfates, iron, manganese, and lead every three years unless there are specific problems with any of these contaminants.

If you are considering buying a home, it is best to assess the water quality in that area by testing the water for coliform, bacteria, nitrate, lead, radon, iron, hardness, pH, sulfate, total dissolved solids, and corrosion.

Should I test the water from my own well?

If you own a private well, you are the only person who is responsible for the water your

Should I be concerned about public water supplies, too?

EPA requires that all public water systems test for contamination and report to state or federal authorities. You can obtain the water quality details of your public drinking water supply from your local public water system. Consumers should check to see if their concentrations/quantities are below the EPA's maximum allowable limits. If you still want to get the water tested, you should contact your state health department for the names of state-certified independent laboratories that can test for common contaminants. The costs of these tests range from \$50 to \$150.

Will EPA test my water?

EPA does not test individual homes and cannot recommend specific labs to test your drinking water. The only way to determine whether the water you are drinking has certain harmful pollutants is to have it tested by an independent lab. However, states are required to certify

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Should I get my water tested?

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water-testing labs. It is always better to choose an EPA- or state-certified laboratory to ensure that the tests are performed properly.

Where can I have my water tested?

You can find an independent testing lab by contacting your water utility or the state health department. Private testing laboratories can also be found in the *Yellow Pages*. You can obtain more information about water quality and testing in your state or area from your local or state department of public health. You can call your state certification officer to get a list of certified water testing labs in your state.

Before you send water samples for testing, contact a state lab certification officer to make sure that the state health department has certified the lab. The water samples can also be tested at county and state health laboratories, or local health departments.

Can I get my water tested by any company that offers water testing?

Not all the companies that offer water testing are reliable. They might have some ulterior

motives, such as marketing their own treatment units. The Federal Trade Commission provides certain suggestions to consumers who want to get their water tested. They include:

- avoid free water tests, which might be a part of a promotion;
- get the water tested at a private independent laboratory; and
- make sure that the lab is certified to conduct water testing.

How do I collect samples?

Proper collection and handling of a water sample is very important for getting accurate test results. Most of the certified laboratories supply their own sample containers. The samples should be collected in those containers according to the laboratory's instructions. For example, you should only use the sterile containers the lab provides for bacterial analysis and use a fixing compound while collecting samples for chemical analysis. Sampling and handling requirements vary with the water's quality and the contaminant that is tested for.

How do I interpret the test data?

After performing tests on a water sample, the lab will send a report that contains a list of contaminants tested, their concentrations, and highlight any problem contaminants. The laboratory may also include the drinking water standards to help you interpret the results. You should retain your copy of the report as a future reference.

An important feature of the report is the units used to measure the contaminant level in the water. Milligrams per liter (mg/l) or one part per million (ppm) of water is typically used for contaminants, such as metals and nitrates. Some contaminants can be reported in parts per billion (ppb). Radioactive contaminants can be reported in terms of picocuries per liter. Other parameters like pH, hardness, and turbidity are reported in units specific to the test.

Laboratory personnel may indicate some contaminants that are present at levels above EPA or state drinking water standards. If the test results indicate any contaminants, you should ask the laboratory personnel to clearly explain the test results. They may also be able to help you determine the contamination source. Notify your local health department if contamination is confirmed. They can help you take the necessary action to treat your water supply as well as supply you with information about contaminants found in your well water and their health implications. 

References:
Mancl, K. 1993. *Water Testing*, Ohio Cooperative Extension Service of Ohio State University

U.S. EPA 1991. *Fact Sheet on Home Water Testing*, Office of Water, EPA 570/9-91-500.

Water Testing Scams, Facts for Consumers, Federal Trade Commission

Water FAQ Web site: siouxian.com/water/faq.html#test

Tice, M. 1998. "Water Testing, Top 10 Dealer FAQs," *Water Conditioning & Purification*, pp: 60-63.

NDWC Offers Well Water Testing Products

Private well owners are often frustrated about well water testing. The National Drinking Water Clearinghouse offers several products that private well owners may want to review before having their water tested. For ordering information, see back cover or call (800) 624-8301 or (304) 293-4191 to request any of the following products.

Water Testing

Item #DWBLPE58

This 1993 booklet explains water testing and treatment for households that depend on their own well, spring, or cistern for drinking water. Provided is information about choosing water tests, collecting water samples, and receiving test results.

Water Testing Scams

Item #DWBLPE97

This fact sheet offers suggestions to consider before having a water sample tested. There are many sales people who use scare tactics and fraudulent methods to market their water testing or treatment devices.

Bacteria and Water Wells

Item #DWPKPE78

This 1997 document provides information and guidance about what steps private well owners should take if bacteria are present in a water well. It also gives the necessary background information about bacteria, treatment technologies, and well water protection strategies. A list of sources for additional information is included.

Private Wells: What to Do After the Flood

After a flood, bacteria, viruses, parasites, or chemicals can contaminate your well or seep down along your well's casing and make your drinking water unsafe.

Even if floodwater did not rise over the top of your well casing, your neighbor's well may have been saturated, allowing contamination to migrate to your well. Also, if your well is not deeply cased, it may be more susceptible to contamination. Floodwater also can contaminate shallow, porous aquifers nearby.

If you suspect your drinking water is contaminated, you should obtain water from a known safe source for drinking, cooking, and food preparation. You can get water from a community water supply or purchase bottled water. If you can't find a convenient source of safe water, boil your well water at least 3 to 5 minutes before use.

The following information has been taken from the U.S. Environmental Protection Agency's fact sheet *What to Do After the Flood*, which may be downloaded from their Web site at www.epa.gov/ogwdw000/consumer/whatdo.html.

Inspect the Well and Pump

Conditions at the Well—If the well is not tightly capped, sediment and floodwater may enter the well and contaminate it. Wells that are more than 10 years old or less than 50 feet deep are likely to be contaminated, even if there is no apparent damage.

Electrical System—After floodwaters have receded and the pump and electrical system have dried, make certain a qualified electrician, well contractor, or pump contractor checks the equipment's wiring before you turn it on.

Pump Operation—Sediment and floodwater can damage pumps and their electrical components. Get assistance from a well or pump contractor who will know how to clean, repair, or maintain different types of pumps.

Clean the Well

Drilled, driven, or bored wells—To avoid damage to the well, contact a well or pump contractor to remove mud, silt, and other debris from around the top of the well. The pump may need to be removed so that mud and silt can be removed from the bottom of the well.

Dug wells—Do not attempt to disinfect or use a dug well that has been flooded.

Pump the Well

After the contractor services and cleans the well, pump the well until the water runs clear to rid the well of floodwater. If the water does not

run clear, get advice from a county or state health department or extension service.

Emergency Disinfection

Drilled, driven, or bored wells—It is best to have a well or pump contractor disinfect these wells because it is difficult for the private owner to thoroughly disinfect them.

CAUTION: Wells can become contaminated in a number of different ways, including bacteria, wastewater from malfunctioning septic tanks, or chemicals seeping into the ground. So taking long-range precautions is necessary, including repeated testing, to protect the safety of drinking water.

For information about long-term water quality conditions in the area, consult the state or county health department. Information about constructing or testing the well will be helpful to the health department in determining water quality conditions.

Do not use septic systems immediately after floods. Drainfields will not work until underground water has receded, and septic lines may have broken during the flood.

Sample and Test the Well Water

Have your local health department sample and test your well water for contamination, or call your state laboratory certification officer to locate a certified lab. You can get this number from the Safe Drinking Water Hotline (800) 426-4791.

If the health department issues sterile bottles for the private well owner to collect water samples, follow all instructions for the use of these bottles.

After the pump is back in operation, the health department should sample and test the water at regular intervals.

Concerns and Advisories

If in doubt about the well water supply, follow health department drinking and bathing advisories.

Well disinfection will not provide protection from pesticides, heavy metals, and other types of non-biological contamination. If you observe chemical containers—including barrels and drums—that have moved to your property, call your state or county health department or the Superfund Hotline (800) 424-9346. 🌐

WARNING!

DO NOT TURN ON THE PUMP

You can be shocked or damage your well or pump if they have been flooded.

WARNING!

DO NOT WASH WITH WELL WATER

Drinking or washing with water from a private well that has been flooded can make you sick.

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NDWC Offers Products for Private Well Owners

Note: Call (800) 624-8301 or (304) 293-4191 to order products and verify prices. Please allow three to four weeks for delivery, Actual shipping charges are added to each order. These products also may be ordered via e-mail at ndwc_orders@mail.estd.wvu.edu. Products are subject to availability.

■ **Update on Lead Leaching from Submersible Well Pumps and Private Drinking Water Systems**
Item #DWFSPE54

This 1995 fact sheet provides new information about potential lead leaching from submersible pumps used in drinking water wells. It also provides an explanation of studies conducted by the U.S. Environmental Protection Agency and explains when lead testing is appropriate and how to conduct and evaluate tests for lead in household drinking water.

■ **Fact Sheet on Home Drinking Water Treatment**
Item #DWBLPE96

This 1988 fact sheet explains the most common types of home water treatment units, and their capabilities. Technologies examined include filters, softeners, activated carbon filtration, reverse osmosis, and Ultraviolet disinfection.

■ **How To Protect Your Well**
Item #DWFSPE68

This 1994 fact sheet discusses how to protect your well's water quality as well as your financial

investment. It includes information about well installation and well casings. It also discusses keeping likely pollutants as far from the well area as possible.

■ **Home Water Treatment Units: Filtering Fact from Fiction**
Item #DWRPE03

This 1990 brochure provides information about the proper use of home water treatment units, the misconceptions about unit "approval," possible false or misleading promotions, and references to help consumers make informed decisions.

■ **Groundwater Contamination and Your Septic System**
Item #DWBRGN26

This 1991 brochure describes how groundwater can be contaminated by septic systems. It addresses the problems that can occur in septic systems when outside chemicals are introduced, and it offers suggestions for homeowners on keeping their systems functioning properly.

NDWC Mission Statement

The National Drinking Water Clearinghouse assists small communities by collecting, developing, and providing timely information relevant to drinking water issues.

National Drinking Water Clearinghouse

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