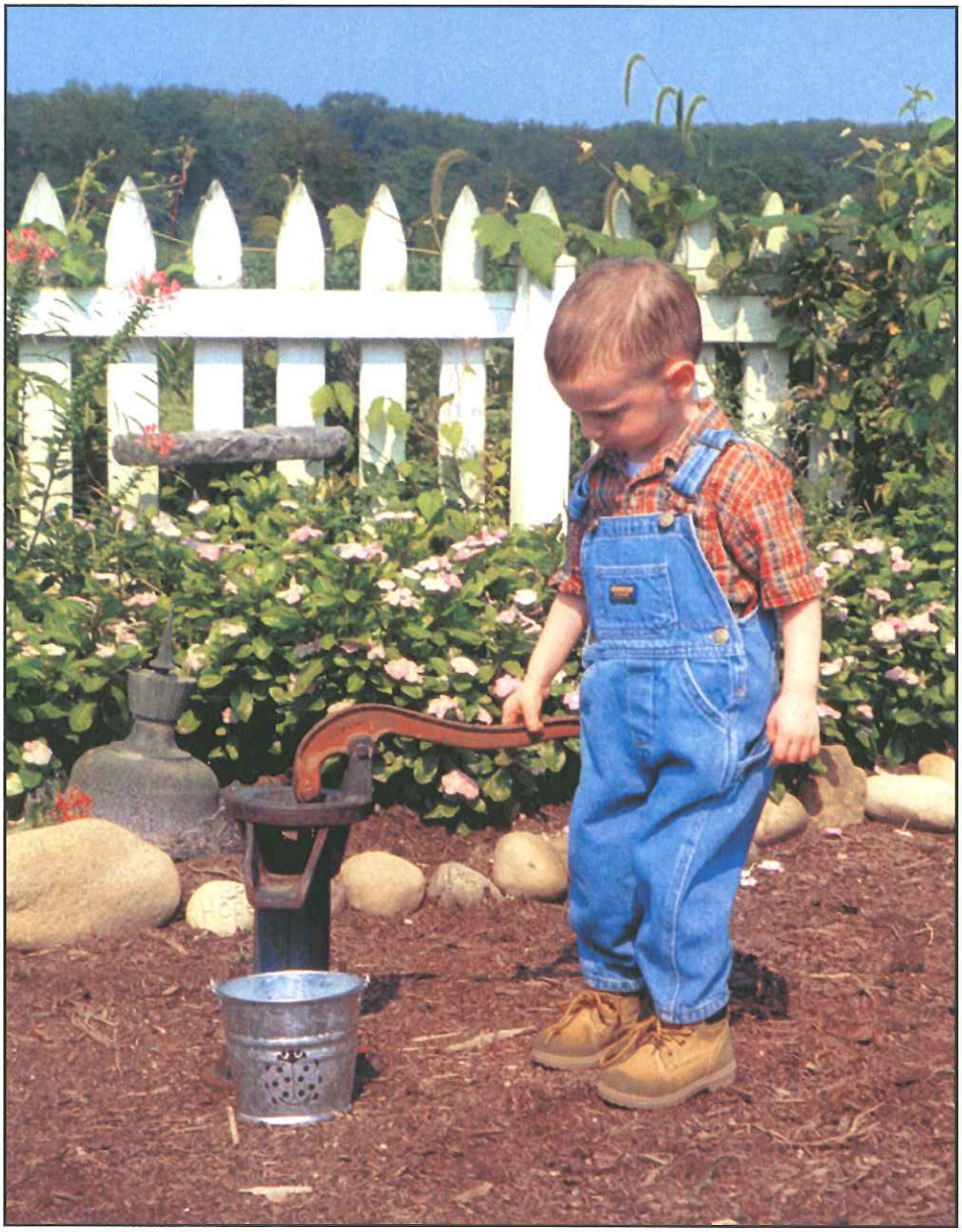
Drinking Water From Household Wells



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Drinking Water From Household Wells

Introduction

If your family gets drinking water from your own well, do you know if your water is safe to drink? What health risks could you and your family face? Where can you go for help or advice?

This pamphlet helps answer these questions. It gives you general information about drinking water from home wells (also considered private drinking water sources). It describes types of activities in your area that can create threats to your water supply. It also describes problems to look for and offers maintenance suggestions. Sources for more information and help are also listed.

All of us need clean water to drink. We can go for weeks without food, but only days without water. Contaminated water can be a threat to anyone's health, but especially to young children.

About 15 percent of Americans have their own sources of drinking water, such as wells, cisterns, and springs. Unlike public drinking water systems serving many people, they do not have experts regularly checking the water's source and its quality before it is sent through pipes to the community.

To help protect families with their own wells, almost all states license or register water-well installers. Most also have construction standards for home wells. In addition, some city and county health departments have local rules and permitting. All this helps make sure the well is built properly. But what about checking to see that it is working correctly and the water is always healthy to drink? That is the job of the well owner, and it takes some work and some knowledge.

What Is Ground Water And How Can It Be Polluted?

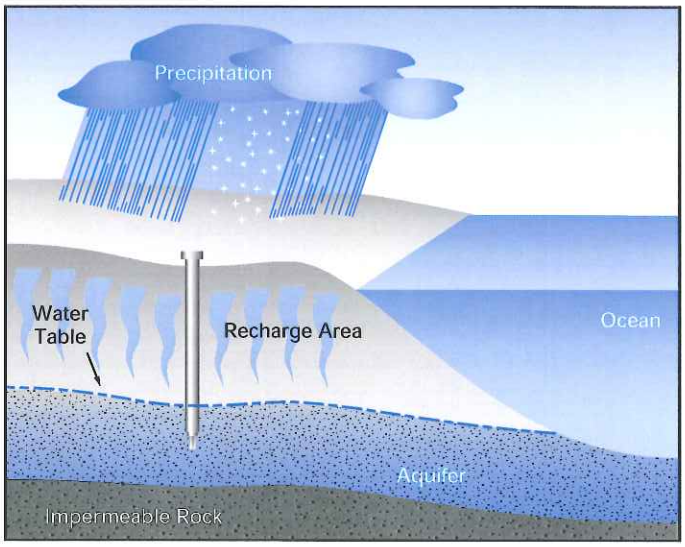
Ground water is a resource found under the earth's surface. Most ground water comes from rain and melting snow soaking into the ground. Water fills the spaces between rocks and soils, making an "aquifer". (See Watershed Graphic.) About half of our nation's drinking water comes from ground water. Most is supplied through public drinking water systems. But many families rely on private, household wells and use ground water as their source of fresh water.

Ground water — its depth from the surface, quality for drinking water, and chance of being polluted — varies from place to place. Generally, the deeper the well, the better the ground water. The amount of new water flowing into the area also affects ground water quality.

Ground water may contain some natural impurities or contaminants, even with no human activity or pollution. Natural contaminants can come from many conditions in the watershed or in the ground. Water moving through underground rocks and soils may pick up magnesium, calcium and chlorides. Some ground water naturally contains dissolved elements such as arsenic, boron, selenium, or radon, a gas formed by the natural breakdown of radioactive uranium in soil. Whether these natural contaminants are health problems depends on the amount of the substance present.

In addition to natural contaminants, ground water is often polluted by human activities such as

- Improper use of fertilizers, animal manures, herbicides, insecticides, and pesticides



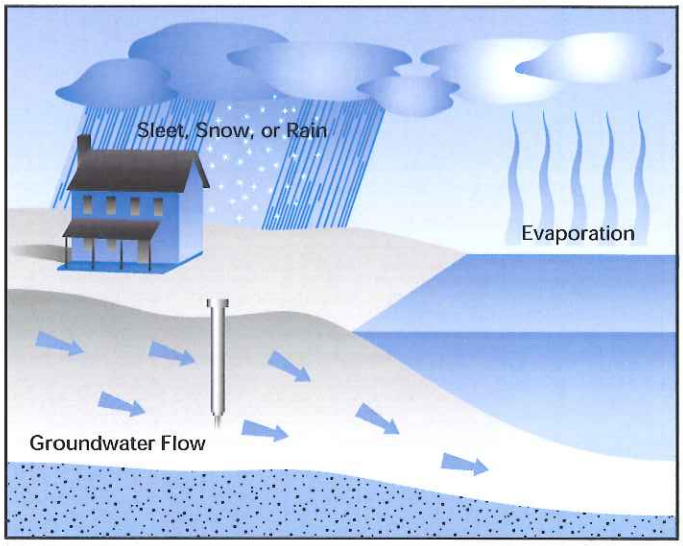
A "watershed" is the land area where water soaks through the earth filling an underground water supply or aquifer. It is also called a recharge area. The "water table" is the line below which the ground is saturated or filled with water and available for pumping. The water table will fall during dry seasons. A well can pump water from either the saturated zone or an aquifer. Wells must be deep enough to remain in the saturated zone.

- Improperly built or poorly located and/or maintained septic systems for household wastewater
- Leaking or abandoned underground storage tanks and piping
- Storm-water drains that discharge chemicals to ground water
- Improper disposal or storage of wastes
- Chemical spills at local industrial sites

These problems are discussed in greater detail later in this brochure.

Suburban growth is bringing businesses, factories and industry (and potential sources of pollution) into once rural areas where families often rely on household wells. Growth is also pushing new home developments onto the edge of rural and agricultural areas. Often municipal water and sewer lines do not extend to these areas. Many new houses rely on wells and septic tanks. But the people buying them may not have any experience using these systems.

Most U.S. ground water is safe for human use. However, ground water contamination has been found in all 50 states, so well owners have reason to be vigilant in protecting their water supplies. Well owners need to be aware of potential health problems. They need to test their water regularly and maintain their wells to safeguard their families' drinking water.



The hydrologic cycle is the natural process of rain and snow falling to earth and evaporating back to form clouds and fall again. The water falling to earth flows into streams, rivers, lakes and into the soil collecting to form groundwater.

Where Do Ground Water Pollutants Come From?

Understanding and spotting possible pollution sources is important. It's the first step to safeguard drinking water for you and your family. Some threats come from nature. Naturally occurring contaminants such as minerals can present a health risk. Other potential sources come from past or present human activity — things that we do, make, and use — such as mining, farming and using chemicals. Some of these activities may result in the pollution of the water we drink.

Several sources of pollution are easy to spot by sight, taste, or smell. (See "Quick Reference List.), however many serious problems can only be found by testing your water. *Knowing the possible threats in your area will help you decide on the kind of tests you need.*

Quick Reference List of Noticeable Problems

Visible

- Scale or scum from calcium or magnesium salts in water
- Unclear/turbid water from dirt, clay salts, silt or rust in water
- Green stains on sinks or faucets caused by high acidity
- Brown-red stains on sinks, dishwasher, or clothes in wash points to dissolved iron in water
- Cloudy water that clears upon standing may have air bubbles from poorly working pump or problem with filters.

Tastes

- Salty or brackish taste from high sodium content in water
- Alkali/soapy taste from dissolved alkaline minerals in water
- Metallic taste from acidity or high iron content in water
- Chemical taste from industrial chemicals or pesticides

Smell

- A rotten egg odor can be from dissolved hydrogen sulfide gas or certain bacteria in your water. If the smell only comes with hot water it is likely from a part in your hot water heater.
- A detergent odor and water that foams when drawn could be seepage from septic tanks into your ground water well.
- A gasoline or oil smell indicates fuel oil or gasoline likely seeping from a tank into the water supply
- Methane gas or musty/earthy smell from decaying organic matter in water
- Chlorine smell from excessive chlorination.

Note: Many serious problems (bacteria, heavy metals, nitrates, radon, and many chemicals) can only be found by laboratory testing of water.

What are Some Naturally Occurring Sources of Pollution?

Microorganisms: Bacteria, viruses, parasites and other microorganisms are sometimes found in water. Shallow wells — those with water close to ground level — are at most risk. Runoff, or water flowing over the land surface, may pick up these pollutants from wildlife and soils. This is often the case after flooding. Some of these organisms can cause a variety of illnesses. Symptoms include nausea and diarrhea. These can occur shortly after drinking contaminated water. The effects could be short-term yet severe (similar to food poisoning) or might recur frequently or develop slowly over a long time.

Radionuclides: Radionuclides are radioactive elements such as uranium and radium. They may be present in underlying rock and ground water. Radon — a gas that is a natural product of the breakdown of uranium in the soil — can also pose a threat. Radon is most dangerous when inhaled and contributes to lung cancer. Although soil is the primary source, using household water containing Radon contributes to elevated indoor Radon levels. Radon is less dangerous when consumed in water, but remains a risk to health.

Nitrates and Nitrites: Although high nitrate levels are usually due to human activities (see below), they may be found naturally in ground water. They come from the breakdown of nitrogen compounds in the soil. Flowing ground water picks them up from the soil. Drinking large amounts of nitrates and nitrites is particularly threatening to infants (for example, when mixed in formula).

Heavy Metals: Underground rocks and soils may contain arsenic, cadmium, chromium, lead, and selenium. However, these contaminants are not often found in household wells at dangerous levels from natural sources.

Fluoride: Fluoride is helpful in dental health, so many water systems add small amounts to drinking water. However, excessive consumption of naturally occurring fluoride can damage bone tissue. High levels of fluoride occur naturally in some areas. It may discolor teeth, but this is not a health risk.

What Human Activities Can Pollute Ground water?

Bacteria and Nitrates: These pollutants are found in human and animal wastes. Septic tanks can cause bacterial and nitrate pollution. So can large numbers of farm animals. Both septic systems and animal manures must be carefully managed to prevent pollution. Sanitary landfills and garbage dumps are also sources. Children and some adults are at extra risk when exposed to water-born bacteria. These include the elderly and people whose immune systems are weak due to AIDS or treatments for cancer. Fertilizers can add to nitrate problems. Nitrates cause a health threat in very young infants called "blue baby" syndrome. This condition disrupts oxygen flow in the blood.

Concentrated Animal Feeding Operations (CAFOs): The number of CAFOs, often called "factory farms," is growing. On these farms thousands of animals are raised in a small space. The large amounts of animal wastes/ manures from these farms can threaten water supplies. Strict and careful manure management is needed to prevent pathogen and nutrient problems. Salts from high levels of manures can also pollute groundwater.

Heavy Metals: Activities such as mining and construction can release large amounts of heavy metals into nearby ground water sources. Some older fruit orchards may contain high levels of arsenic, once used as a pesticide. At high levels, these metals pose a health risk.

Fertilizers and Pesticides: Farmers use fertilizers and pesticides to promote growth and reduce insect damage. These products are also used on golf courses and suburban lawns and gardens. The chemicals in these products may end up in ground water. Such pollution depends on the types and amounts of chemicals used and how they are applied. Local environmental conditions (soil types, seasonal snow and rainfall) also affect this pollution. Many fertilizers contain forms of nitrogen that can break down into harmful nitrates. This could add to other sources of nitrates mentioned above. Some underground agricultural drainage systems collect fertilizers and pesticides. This polluted water can pose problems to ground water and local streams and rivers. In addition, chemicals used to treat buildings and homes for termites or other pests may also pose a threat. Again, the possibility of problems depends on the amount and kind of chemicals. The types of soil and the amount of water moving through the soil also play a role.

Industrial Products and Wastes: Many harmful chemicals are used widely in local business and industry. These can become drinking water pollutants if not well managed. The most common sources of such problems are:

- *Local Businesses:* These include nearby factories, industrial plants, and even small businesses such as gas stations and dry cleaners. All handle a variety of hazardous chemicals that need careful management. Spills and improper disposal of these chemicals or of industrial wastes can threaten ground water supplies.

- *Leaking Underground Tanks & Piping:* Petroleum products, chemicals, and wastes stored in underground storage tanks and pipes may end up in the ground water. Tanks and piping leak if they are constructed or installed improperly. Steel tanks and piping corrode with age. Tanks are often found on farms. The possibility of leaking tanks is great on old, abandoned farm sites. Farm tanks are exempt from the EPA rules for petroleum and chemical tanks.

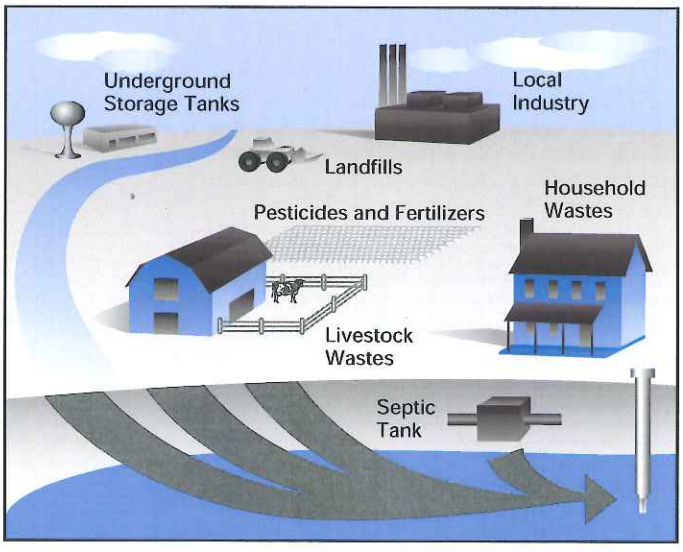
- *Landfills and Waste Dumps:* Modern landfills are designed to contain any leaking liquids. But floods can carry them over the barriers. Older dumpsites may have a wide variety

of pollutants that can seep into ground water.

Household Wastes: Improper disposal of many common products can pollute ground water. These include cleaning solvents, used motor oil, paints, and paint thinners. Even soaps and detergents can harm drinking water. These are often a problem from faulty septic tanks and septic leaching fields.

Lead & Copper: Household plumbing materials are the most common source of lead and copper in home drinking water. Corrosive water may cause metals in pipes or soldered joints to leach into your tap water. Your water's acidity or alkalinity (often measured as pH) greatly affects corrosion. Temperature and mineral content also affect how corrosive it is. They are often used in pipes, solder, or plumbing fixtures. Lead can cause serious damage to the brain, kidneys, nervous system, and red blood cells. The age of plumbing materials — in particular, copper pipes soldered with lead — is also important. Even in relatively low amounts these metals can be harmful. EPA rules under the Safe Drinking Water Act limit lead in drinking water to 15 parts per billion. Since 1988 the Act only allows "lead free" pipe, solder, and flux in drinking water systems. The law covers both new installations and repairs of plumbing. For more information on avoiding lead in drinking water, visit the EPA Website at *www.epa.gov/safewater/Pubs/lead1.html*

Water Treatment Chemicals: Improper handling or storage of water-well treatment chemicals (disinfectants, corrosion inhibitors, etc.) close to your well can cause problems.



Septic tanks are deigned to have a "leach field" around them — an area where wastewater flows out of the tank. This wastewater can also move into the ground water

Should I Be Concerned?

You should be aware because the Safe Drinking Water Act does not protect private wells. EPA's rules only apply to "public drinking water systems" — government or privately run companies supplying water to 25 people or 15 service connections. While most states regulate private household wells, most have limited rules. Individual well owners have primary responsibility for the safety of the water drawn from their wells. They do not benefit from the government's health protections for water systems serving many families. These must comply with federal and state regulations for frequent analysis, testing, and reporting of results.

Instead, household well owners should rely on help from local health departments. They may help you with yearly testing for bacteria and nitrates. They may also oversee the placement and construction of new wells to meet state and local regulations. Most have rules about locating drinking water wells near septic tanks, drain fields, and livestock. But remember, the final responsibility for constructing your well correctly, protecting it from pollution, and maintaining it falls on you, the well owner.

How Much Risk Can I Expect?

The risk of having problems depends on how good your well is — how well it was built and located, and how well you maintain it. It also depends on your local environment. That includes the quality of the aquifer from which you draw your water and the human activities going on in your area that can affect your well water.

Some questions to consider in protecting your drinking water and maintaining your well are:

- What distance should my well be from sources of human wastes such as septic systems?
- How far should it be from animal feedlots or manure spreading?
- What are the types of soil and underlying rocks? Does water flow easily or collect on the surface?
- How deep must a well be dug to avoid seasonal changes in ground water supply?
- What activities in my area (farming, mining, industry) might affect my well?
- What is the age of my well, its pump, and other parts?
- Is my water distribution system protected from cross connections and backflow problems?

What Should I Do?

Listed below are the six basic steps you should take to maintain the safety of your drinking water. After the list you'll find "how to" suggestions for each point to help you protect your well and your drinking water.

1. Identify potential problem sources
2. Talk with "local experts"
3. Have your water tested periodically.
4. Have the test results interpreted and explained clearly.
5. Set a regular maintenance schedule for your well, do the scheduled maintenance and keep accurate, up-to-date records.
6. Remedy any problems.

Protecting Your Ground Water Supply

When Building, Modifying Or Closing A Well

- Hire a certified well driller for any new well construction or modification
- Slope well area so surface runoff drains away
- When closing a well:
  - Do not cut off the well casing below the land surface
  - Hire a certified well contractor to fill or seal the well

Preventing Problems

- Install a locking well cap or sanitary seal to prevent unauthorized use of, or entry into, the well
- Do not mix or use pesticides, fertilizers, herbicides, degreasers, fuels, and other pollutants near the well
- Never dispose of wastes in dry wells or in abandoned wells
- Pump and inspect septic systems as often as recommended by your local health department
- Never dispose of hazardous materials in a septic system
- Take care in working or mowing around your well

Maintaining Your Well

- Each month check visible parts of your system for problems such as:
  - Cracking or corrosion,
  - Broken or missing well cap,
  - Settling and cracking of surface seals
- Have the well tested once a year for coliform bacteria, nitrates, and other contaminants
- Keep accurate records in a safe place, including:
  - Construction contract or report
  - Maintenance records, such as disinfection or sediment removal
  - Any use of chemicals in the well
  - Water testing results

After A Flood — Concerns And Advisories

- Stay away from the well pump while flooded to avoid electric shock
- Do not drink or wash from the flooded well to avoid becoming sick
- Get assistance from a well or pump contractor to clean and turn on the pump
- After the pump is turned back on, pump the well until the water runs clear to rid the well of flood water
- If the water does not run clear, get advice from the county or state health department or extension service
- For additional information go to *http://www.epa.gov/safewater/consumer/whatdo.htm*

1. How Can I Spot Potential Problems?

The potential for pollution entering your well is affected by its placement and construction — how close is your well to potential sources of pollution? Local agricultural and industrial activities, your area's geology and climate also matter. This document includes a checklist to help you find potential problems with your well. Take time to review it in the box labeled "Protecting Your Ground water Supply." Because ground water contamination is usually localized, the best way to identify potential contaminants is to consult a local expert. For example, talk with a geologist at a local college or someone from a nearby public water system. They'll know about conditions in your area. (See item # 5)

2. Have Your Well Water Tested

Test your water every year for total coliform bacteria, nitrates, total dissolved solids, and pH levels. If you suspect other contaminants, test for these also. Chemical tests can be expensive. Limit them to possible problems specific to your situation. Again, local experts can tell you about possible impurities in your area.

Often county health departments do tests for bacteria and nitrates. For other substances, health departments, environmental offices, or county governments should have a list of state certified laboratories. Your State Laboratory Certification Officer can also provide one. Call EPA's Safe Drinking Water Hotline, (800) 426-4791, for the name and phone number of your state's certification officer.

Before taking a sample, contact the lab that will perform your tests. Ask for instructions and sampling bottles. Follow the instructions carefully so you will get correct results. The first step is getting a good water sample. It is also important to follow advice about storing the samples. Ask how soon they must be taken to the lab for testing. These instructions can be very different for each substance being tested.

Remember to test your water after replacing or repairing any part of the well system (piping, pump, or the well itself.) Also test if you notice a change in your water's look, taste, or smell. The chart below ("Reasons to Test Your Water") will help you spot problems. The last five problems listed are not an immediate health concern, but they can make your water taste bad, may indicate problems, and could affect your system long term.

Reasons to Test Your Water

Conditions or Nearby Activities:	Test for:
Recurring gastro-intestinal illness	Coliform bacteria
Household plumbing contains lead	pH, lead, copper
Radon in indoor air or region is radon rich	Radon
Corrosion of pipes, plumbing	Corrosion, pH, lead
Nearby areas of intensive agriculture	Nitrate, pesticides, coliform bacteria
Coal or other mining operations nearby	Metals, pH, corrosion
Gas drilling operations nearby	Chloride, sodium, barium, strontium
Dump, junkyard, landfill, factory, gas station, or dry- cleaning operation nearby	Volatile organic compounds, total dissolved solids, pH, sulfate, chloride, metals
Odor of gasoline or fuel oil, and near gas staion or buried fuel tanks	Volatile organic compounds
Objectionable taste or smell	Hydrogen sulfide, corrosion, metals
Stained plumbing fixtures, laundry	Iron, copper, manganese
Salty taste and seawater, or a heavily salted roadway nearby	Chloride, total dissolved solids, sodium
Scaly residues, soaps don't lather	Hardness
Rapid wear of water treatment equipment	pH, corrosion
Water softener needed to treat hardness	Manganese, iron
Water appears cloudy, frothy, or colored	Color, detergents

3. Understanding Your Test Results

Have your well water tested for any possible contaminants in your area. Use a state-approved testing lab. (See below for sources of approved laboratories.) Do not be surprised if a lot of substances are found and reported to you.

The amount of risk from a drinking water contaminant depends on the specific substance and the amount in the water. The health of the person also matters. Some contaminant cause immediate and severe effects. It may take only one bacterium or virus to make a weak person sick. Another person may not be affected. For very young children, taking in high levels of nitrate over a relatively short period of time can be very dangerous. Many other contaminants pose a long-term or chronic threat to your health — a little bit consumed regularly over a long time could cause health problems such as trouble having children and other effects.

EPA drinking water rules for public water systems aim to protect people from both short and long term health hazards. The amounts of contaminants allowed are based on protecting people over a lifetime of drinking water. Public water systems are required to test their water regularly before delivery. They also treat it so that it meets drinking water standards, notify customers if water does not meet standards and provide annual water quality reports.

Compare your well's test results to federal and state drinking water standards. (You can find these standards at www.epa.gov/safewater/mcl.html or call the Safe Drinking Water Hotline 800-426-4791.) In some cases, the laboratory will give a very helpful explanation. But you may have to rely on other experts to aid you in understanding the results.

The following organizations may be able to help:

- The state agency that licenses water-well contractors can help you understand your test results. It will also provide information on well construction and protection of your water supply. The agency is usually located in the state capital or other major city. It is often part of the department of health or environmental protection. Check the blue "government pages" of your local phone book or call the American Ground Water Trust at (614) 761-2215 or the EPA Hotline at (800) 426-4791 for your licensing agency's phone number.
- The local health department and agricultural agents can help you understand the test results. They will have information on any known threats to drinking water in your area. They can also give you suggestions about how to protect your well water.
- The state drinking water program can also help. You can compare your well's water to the state's standards for public water systems. State programs are usually located in the state capital or another major city. They are often part of the department of health or environmental

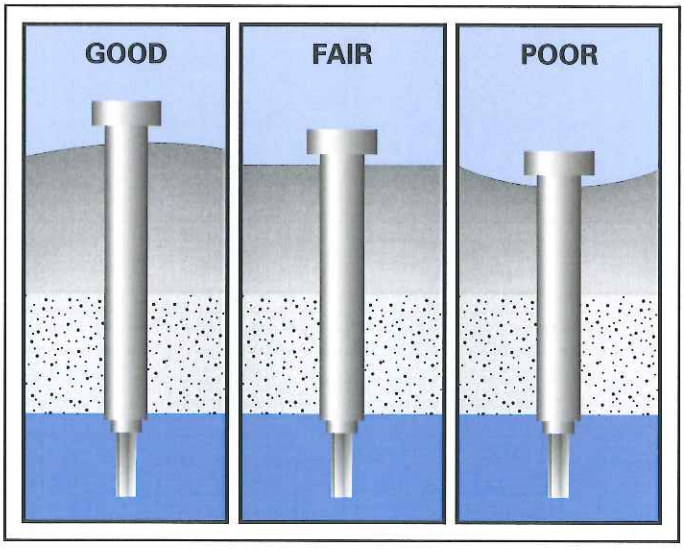
regulation. Again, consult the blue "government pages" in your local phone book for the address and phone number or call or the EPA Hotline — (800) 426-4791.

- The Safe Drinking Water Hotline at (800) 426-4791, mentioned above — can help in many ways. The Hotline can provide a listing of contaminants public water systems must test for. EPA also has copies of health advisories prepared for specific drinking water contaminants. The EPA Hotline staff can explain the federal regulations that apply to public water systems. They compare your lab results to the federal standards. In addition, they can give you the phone number and address of your state drinking water program, and of your state laboratory certification officer. That officer can send you a list of approved labs in your area.

4. Well Construction and Maintenance

Proper well construction and continued maintenance are keys to the safety of your water supply. Your state water-well contractor licensing agency, local health department, or local water system professional can provide information on well construction. (See the two graphics below. One shows three types of well locations and how surface water drains. The other lists the distances from the well to guard against possible sources of pollution.)

Water-well drillers and pump-well installers are listed in your local phone directory. The contractor should be bonded and insured. Make certain your ground water contractor is registered or licensed in your state, if required. If your state does not have a licensing/registration program contact the National Ground Water Association. They have a voluntary



The well should be located so rainwater flows away from it. Rainwater can pick up harmful bacteria and chemicals on the land's surface. If this water pools near your well, it can seep into it, potentially causing health problems.

certification program for contractors. (In fact, some states use the Association's exams as their test for licensing.) For a list of certified contractors in your state contact the Association at (614) 898-7791 or (800) 551-7379. There is no cost for mailing or faxing the list to you.

Many homeowners tend to forget the value of good maintenance until problems reach crisis levels. That can be expensive. It's better to maintain your well, find problems early, and correct them to protect your well's performance. Keep up-to-date records of well installation and repairs plus pumping and water tests. Such records can help spot changes and possible problems with your water system. If you have problems, ask a local expert to check your well construction and maintenance records. He or she can see if your system is okay or needs work.

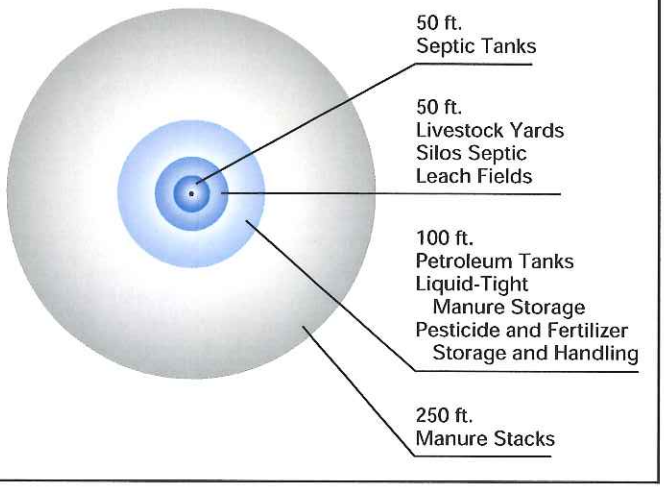
The graphic on the next page shows a good example of an animal-proof cap or seal and the casing of a well.

Protect your own well area. Be careful about storage and disposal of household and lawn care chemicals and wastes. Good farmers and gardeners minimize the use of fertilizers and pesticides. Take steps to reduce erosion and prevent surface water runoff. Regularly check underground storage tanks that hold home heating oil, diesel, or gasoline. Make sure your well is protected from the wastes of livestock, pets, and wildlife.

5. Talk With Local Experts

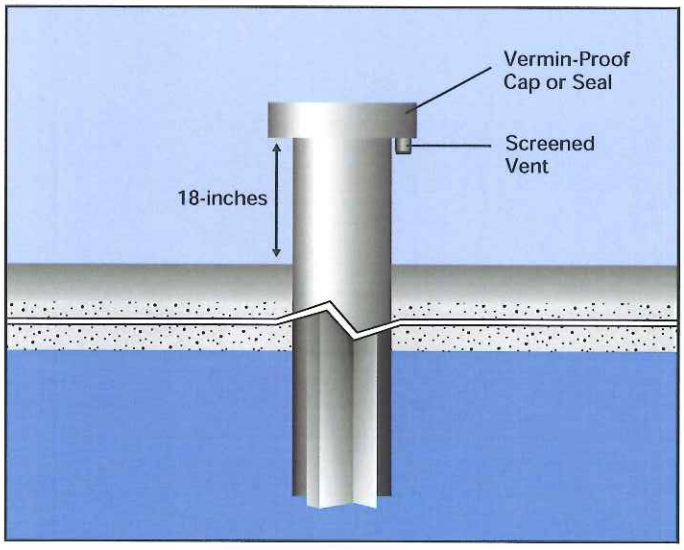
Good sources of information and advice can be found close to home. The list below tells about some "local experts":

- The local health department's registered "sanitarian" is a health specialist. He or she likely knows the most about any problems with private wells.



To keep your well safe, you must be sure possible sources of contamination are not close by. Experts suggest these separation distances as a minimum for protection — farther is better.

- Local water-well contractors can tell you about well drilling and construction. They are also familiar with local geology and water conditions. Look in the yellow pages of your phone book or contact the agency in your state that licenses water well contractors. Call the National Ground Water Association (NGWA) at (614) 898-7791 or (800) 551-7379 to find NGWA-certified water-well contractors in your area.
- Officials at the nearest public water system may explain any threats to local drinking water and may be developing plans to address potential threats. They may advise you on taking samples and understanding tests done on your water. Ask the local health department or look in your phone book for the name and address of the closest system.
- Local county extension agents will know about local farming and forestry activities that can affect your water. They may also have information about water testing.
- The Natural Resources Conservation Service (NRCS) replaced the old U.S. Soil Conservation Service. It is part of the U.S. Department of Agriculture. The NRCS and the U.S. Geological Survey have information about local soils and ground water. They can tell you where a local water supply is located and how it is recharged or replenished. They would know of any pollution threats and if radon is a problem in the area. Look for both in the blue pages of your local phone book.
- Local or county planning commissions can be good sources. They know about past and present land uses in your area that affect water.
- Your public library may also have records and maps that can provide useful information. Nearby colleges and universities have research arms that can provide facts and expertise. They may also have a testing lab.



An animal or vermin proof cap prevents rodents from entering your well, being trapped and dying. Paving around your well will prevent polluted runoff from seeping into your water supply.

6. Fix Problems Immediately

If you find that your well water is polluted, fix the problem as soon as possible. You may need to disinfect your water, have a new well drilled, replumb or repair your system. Consider hooking into a nearby community water system (if one is available). If you have a new well drilled or connect to a community water system, the old well must be closed properly. Consult "local experts" for help. You might consider installing a water treatment device to remove impurities. Information about treatment devices can be obtained from the following sources:

Water Quality Association
P.O. Box 606
4151 Naperville Road
Lisle, IL 60532
www.wqa.org

National Sanitation Foundation
P.O. Box 130140
789 N Dixboro Road
Ann Arbor, MI 48113-0140
(734) 769-8010, (800) NSF-MARK
www.nsf.org

U.S. Environmental Protection Agency
(to visit in person)
Office of Water Resource Center
1200 Pennsylvania Avenue, NW
Ariel Rios Building
Washington, DC 20460
Phone: (202) 260-7786

Monday through Friday,
except federal holidays,
8:30AM – 4:30PM ET

E-mail address:
center.water-resource@epa.gov

There are many home water treatment devices. Different types remove different pollutants or impurities. **No one device does it all.** *Also, you must carefully maintain your home treatment device so your water stays safe. For more information, get a copy of EPA's pamphlet, "Home Water Treatment Units" from the U.S. EPA Resource Center or call the Hotline at (800) 426-4791.*

Find Out More

To find out more about your watershed and its ground water visit "Surf Your Watershed" at *www.epa.gov/surf*. Also look at the "Index of Watershed Indicators" at *www.epa.gov/iwi*. These websites can also tell you possible sources of problems. Companies with permits to release their wastewaters in your area are listed. You can see if they meet pollution control laws. You can also learn how your watershed compares to others in the country.

The U.S. Department of Agriculture and EPA support a program to help farmers, ranchers and rural homeowners. Called Farm*A*Syst or Home*A*Syst, it helps identify and solve environmental problems, including protecting drinking water. Obtain a copy of the Home*A*Syst questionnaire/checklist that can help you find possible threats to your water supply from:

National Farm*A*Syst/Home*A*Syst Program
303 Hiram Smith Hall
1545 Observatory Drive
Madison, WI 53706

Ph: 608.262.0024, Fax: 608.265.2775
homeasys@uwex.edu

For more information on current and future federal drinking water standards and for general information on drinking water topics and issues, contact the EP A at www.epa.gov/safewater or at:

U .S. Environmental Protection Agency
Office of Ground Water and
Drinking Water
1200 Pennsylvania Avenue, NW
Washington, DC 20460

Or call:

The Safe Drinking Water Hotline
(800) 426-4791
The hotline operates from 9:00 AM to 5:30 PM (EST)
The hotline can be accessed on the Internet at
www.epa.gov/safewater/drinklink.html

You can get a list of Federal drinking water standards from the EPA website. In addition, the EPA Office of Ground Water and Drinking Water gives chemical and health risk information for a number of drinking water problems through its Safe Drinking Water Hotline (800) 426-4791. This information is also on the internet at *www.epa.gov/safewater*. If you do not have a computer, most public libraries offer internet access. Even though federal standards do not apply to household wells, you can use them as a guide to potential problems in your water. Be aware that many states have their own drinking water standards. Some are stricter than the federal rules. To get your state standards, contact your state drinking water program or local health department.

Other sources of information include:

Ground Water Protection Council
http://gwpc.site.net

American Water Works Association
www.awwa.org

National Rural Water Association
www.nrwa.org

National Drinking Water Clearinghouse
www.estd. wvu.edu/ndwc

Rural Community Assistance Program
www.rcap.org

U.S. Geological Survey
water.usgs.gov

U.S. Department of Agriculture
Natural Resources Conservation Service
www.nrcs.usda.gov

Water Systems Council
www.watersystemscouncil.org

Definitions

Aquifer – An underground formation or group of formations in rocks and soils containing enough ground water to supply wells and springs.

Backflow – A reverse flow in water pipes. A difference in water pressures pulls water from sources other than the well into a home's water system, for example waste water or flood water. Also called back siphonage.

Bacteria – Microscopic living organisms; some are helpful and some are harmful. "Good" bacteria aid in pollution control by consuming and breaking down organic matter and other pollutants in septic systems, sewage, oil spills, and soils. However, "bad" bacteria in soil, water, or air can cause human, animal, and plant health problems.

Confining layer – Layer of rock that keeps the ground water in the aquifer below it under pressure. This pressure creates springs and helps supply water to wells.

Contaminant – Anything found in water (including microorganisms, minerals, chemicals, radionuclides, etc.) which may be harmful to human health.

Cross-connection – Any actual or potential connection between a drinking (potable) water supply and a source of contamination.

Heavy metals – Metallic elements with high atomic weights, such as, mercury chromium cadmium, arsenic, and lead. Even at low levels these metals can damage living things. They do not break down or decompose and tend to build up in plants, animals, and people causing health concerns.

Leaching field – The entire area where many materials (including contaminants) dissolve in rain, snowmelt, or irrigation water and are filtered through the soil.

Microorganisms – Also called microbes. Very tiny life forms such as bacteria, algae, diatoms, parasites, plankton, and fungi. Some can cause disease.

Nitrates – Plant nutrient and fertilizer that enters water supply sources from fertilizers, animal feed lots, manures, sewage, septic systems, industrial wastewaters, sanitary landfills, and garbage dumps.

Protozoa – One-celled animals, usually microscopic, that are larger and more complex than bacteria. May cause disease.

Radon – A colorless, odorless naturally occurring radioactive gas formed by the breakdown or decay of radium or uranium in soil or rocks like granite. Radon is fairly soluble in water, so well water may contain radon.

Radionuclides – Distinct radioactive particles coming from both natural sources and human activities. Can be very long lasting as soil or water pollutants.

Recharge area – The land area through or over which rainwater and other surface water soaks through the earth to replenish an aquifer, lake, stream, river, or marsh. Also called a watershed.

Saturated zone – The underground area below the water table where all open spaces are filled with water. A well placed in this zone will be able to pump ground water.

Unsaturated zone – The area above the ground water level or water table where soil pores are not fully saturated, although some water may be present.

Viruses – Submicroscopic disease-causing organisms that grow only inside living cells.

Watershed – The land area that catches rain or snow and drains it into a local water body (such as a river, stream, lake, marsh, or aquifer) and affects its flow, and the local water level. Also called a recharge area.

Water table – The upper level of the saturated zone. This level varies greatly in different parts of the country and also varies seasonally depending on the amount of rain and snowmelt.

Well cap – A tight-fitting, vermin-proof seal designed to prevent contaminants from flowing down inside of the well casing.

Well casing – The tubular lining of a well. Also a steel or plastic pipe installed during construction to prevent collapse of the well hole.

Wellhead – The top-of a structure built over a well. Term also used for the source of a well or stream.