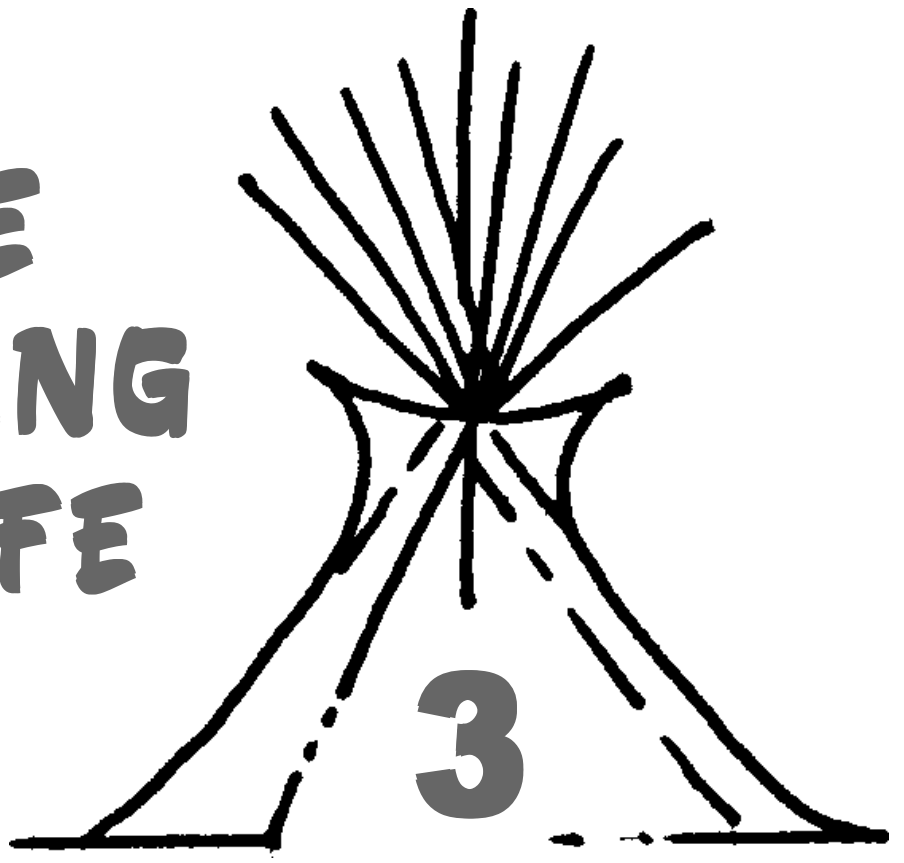
MAKING SURE YOUR DRINKING WATER IS SAFE



Keeping your well water safe is a top priority—for your health, for the health of your tribal community and for the environment. Activities on or near your property may affect the safety of your well's water quality.

This fact sheet helps you look at the condition of your well and find situations and things you do that could endanger your well water.

1. Well Location *How close is your well to pollution sources? How might your soil type affect water quality?*

2. Well Construction and Maintenance. *Do you know how old your well is and what type of well it is? Is your well casing well sealed?*

3. Water Testing and Unused Wells. *Do tests of your well water show any problems? Are abandoned wells protected against contamination?*

Connected to the Earth

Water is the blood and life of your Mother, the Earth.

—Plenty Coups, Crow

PART 1 • Well Location

Why should you be concerned?

About 95 percent of reservation residents use individual wells for drinking water. If a well was not built carefully or is not taken care of, it can let fertilizers, bacteria, pesticides or other hazardous materials into the water supply. Once they get into groundwater, pollutants can flow from your property to a neighbor's well, or from a neighbor's property to yours.

Contaminants often have no odor or color, so they are hard to detect. They can endanger the health of your family and community and it's difficult and expensive to remove them. Once your water is contaminated, the only options may be to treat it before use, drill a new well or get your water from another source, so preventing problems before they start is the best thing to do.

Is your well safely located?

The first things to check out about your well are:

1. how close it is to sources of pollution and
2. whether groundwater flows toward or away from it.

Whether groundwater in your area is just below the surface or hundreds of feet down, the location of your well is very important. Installing a well in a safe place takes thoughtful planning.

If you are building a well, put it where surface water (stormwater runoff, for example) drains away from it. If a well is downhill from a leaking fuel storage tank, septic system or overfertilized farm field, it is more likely to become contaminated. In places where the water table is near the surface, groundwater often flows in the same direction as surface water, but that is not always true. The water underground might flow in a different direction than the water on the surface.

Moving or deepening your well may temporarily improve your water supply, but will do nothing to protect the groundwater. You should get rid of any source that could cause groundwater contamination even if your well is far away from it.

Separate your well from things that might pollute it

Most tribal health departments require that new wells be located a minimum distance from sources that might cause pollution (figure 3.1). If no distance is specified by tribal law, provide as much separation as possible between your well and any potential pollution source (such as a septic system, fertilized field or fuel storage tank) —**at least 100 feet.** Separating your well from a pollution source may reduce the chance of contamination, but it does not guarantee that the well will be safe.

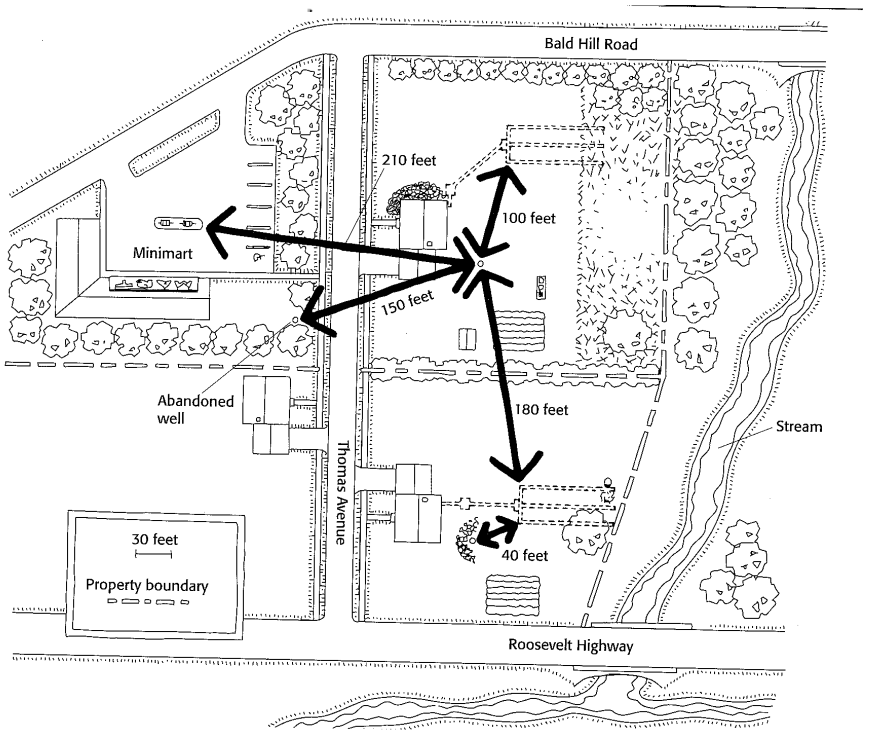


Figure 3.1 Map of homesite showing distances of pollution sources from well.

What's underground?

The risk of pollution is higher when the water table is near the surface because contaminants don't have far to go. Groundwater is more likely to be polluted if soils are shallow, or if they are sandy or gravelly, or if the bedrock below has cracks that allow water to seep down quickly. Check with neighbors, local farmers, or well drilling companies to learn more about what's under your property. For more information on soil type, bedrock, and the water table, see fact sheet 1, part 1, "Physical Conditions Around Your Home."

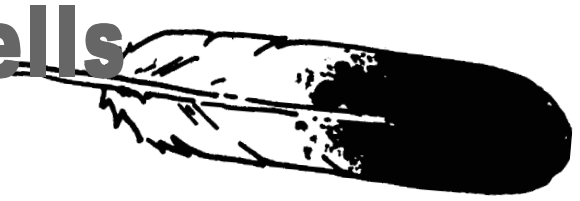
Do Table 1 - Well Location

Use the table on the next page to rate your well location risks. For each question, mark the risk level in the right-hand column that fits best to your situation.

Responding to risks

Try to lower your risks. Turn to the action checklist on the back page of this fact sheet to record the medium and high risks you checked. Then make a plan for reducing your risks.

PART 2 • Building/Maintaining Wells



Old or leaky wells may contaminate groundwater by allowing rain or snowmelt to get to the water table without being filtered through soil. If a well is in a depression or pit, or if it isn't well sealed and capped, surface water carrying nitrates, bacteria, pesticides and other pollutants can contaminate it.

Maintaining your well means keeping the well area clean and easy to get at, and keeping pollutants as far away as possible. It is also important to have a qualified well driller or pump installer check the well every 10-15 years or whenever you think there might be a problem.

At the end of this part, fill out the checklist to show risks related to your well's design or condition.

How old is your well?

The age of your well is helpful in predicting whether or not it might be contaminated. Wells built more than 50 years ago are likely to be shallow and poorly made. Older well pumps are more likely to leak lubricating oils, which can get into the water. They are also likely to have thinner casings that may be cracked or corroded. Even wells with modern casings that are 30-40 years old may have corrosion and leaks. If you have an older well, you may want to have it inspected by a qualified well driller. If you don't know how old your well is, assume it needs an inspection.

What kind of well do you have?

A dug well is usually more than 2 feet wide and often dug by hand. Dug wells are usually shallow and poorly protected from surface water runoff, which may cause contamination.

Driven-point (sand-point) wells pose a moderate to high risk. Made by driving lengths of pipe into the ground, they are normally around 2 inches in diameter and less than 25 feet deep. (They are called sand-point because they can only be installed in areas with loose soils such as sand.)

Most other types of wells are ***drilled wells*** which, for residential use, are usually 4 to 8 inches in diameter. Figure 3.2 on the next page shows a properly constructed drilled well.

Do Table 1 - Well location

Use the table below to rate risks related to your well's location. For each question, mark the risk level in the right-hand column that best fits your situation.

Responding to risks

Try to lower your risks. Turn to the action checklist on the back page of this fact sheet to record any medium and high risks that you found. Then make a plan to reduce your risks.

Table 1 - Well Location

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Position of well in relation to pollution source	Position of well in relation to pollution source. Well is uphill from all pollution sources. Surface water doesn' t reach well or is diverted.	Well is level with or uphill from most pollution sources. Some surface water runoff may reach well.	Well is downhill from pollution sources or in a pit or depression. Surface water runoff reaches well.	❒ Low ❒ Medium ❒ High
Separation distances between well and pollution sources*	Distances from potential pollution sources meet or exceed all state minimum requirements.	Some but not all distances from potential pollution sources meet state requirements.	Distances from most or all potential pollution sources do not meet state minimum requirements.	❒ Low ❒ Medium ❒ High
Soil type	Soil is fine-textured like clay loams or silty clay.	Soil is medium- textured like silt or loam.	Soil is coarse-textured like sand, sandy loam, or gravel.	❒ Low ❒ Medium ❒ High
Subsurface conditions	The water table or fractured bedrock are deeper than 20 feet.	The water table or fractured bedrock are deeper than 20 feet.	The water table or fractured bedrock are shallower than 20 feet.	❒ Low ❒ Medium ❒ High

**** Suggested minimum separation distance is 100 feet.***

Well casings and well caps

Well drillers install a steel or plastic pipe "casing" to prevent the well hole from collapsing. Space between the casing and the sides of the hole is a direct channel for surface water-and pollutants to reach the water table (figure 3.3). To seal off that channel, drillers fill the space with grout (cement or a type of clay called bentonite).

Look at your well casing for holes or cracks. First, look at the part that extends up out of the ground. Then remove the cap and look down inside the casing using a flashlight. If you can move the casing around by pushing it, your well casing may not be doing a good job of keeping out contaminants. Sometimes in damaged casings you can hear water running down into the well when the pump isn't running. If you hear water, there might be a crack in the casing, or the casing may not reach the water table. Either situation is risky.

The depth of casing required for your well depends on the depth to groundwater and the type of soil and bedrock below. In sand and gravel soils, well casings should extend to a depth of **at least 20 feet*** *and* should reach the water table. For wells in bed rock, the casing should extend through the weathered zone and into **at least 10 feet*** of bedrock. **A minimum of 20 feet*** of casing should be used for all wells.

The casing should extend **at least 12 inches* above** the ground's surface. If your area ever floods, the casing should extend **1 to 2 feet*** above the highest flood level. The ground around the casing should slope away from the well head in all directions to prevent water from pooling around it.

The well cap should be firmly attached to the casing, with a vent that allows only air to enter. If your well has a vent, be sure that it faces the ground, is tightly connected to the well cap or seal, and is screened to keep insects out. Wiring for the pump should be secured in an electric conduit pipe. ***Check with your Tribal Health Department for actual requirements.***

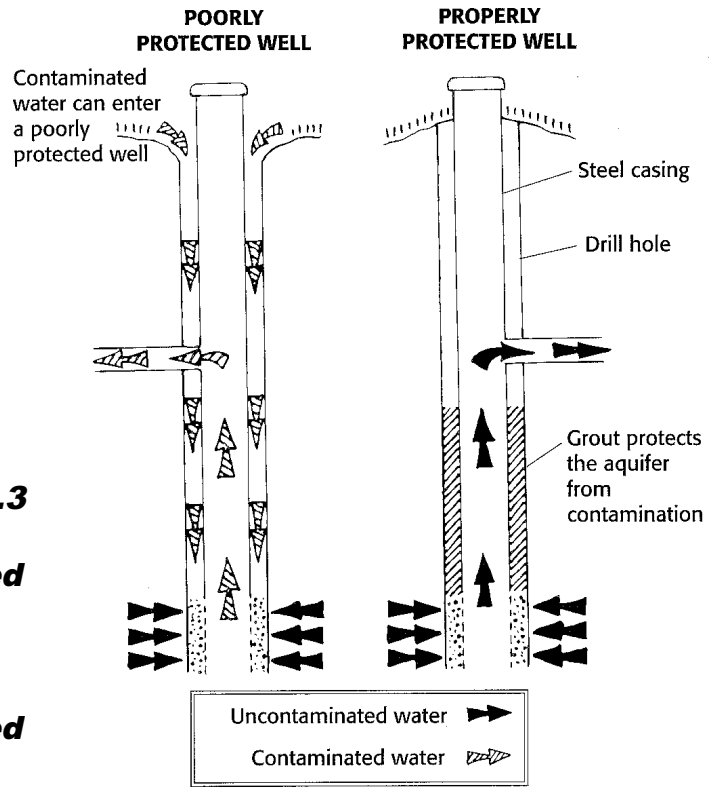


Figure 3.3 A poorly protected well versus a properly protected well.

Is your well shallow or deep?

As rain and surface water soak into the soil, they may carry pollutants down to the water table. In some places, the process happens quickly: in weeks, days, or even hours. Shallow wells are most likely to become contaminated.

Preventing backflow

Dirty water can flow back into your water supply if your system has a sudden pressure loss. This can happen if the well fails or, on a public water system, if there is a line break. The simplest way to prevent backflow is to leave a gap of air between the water

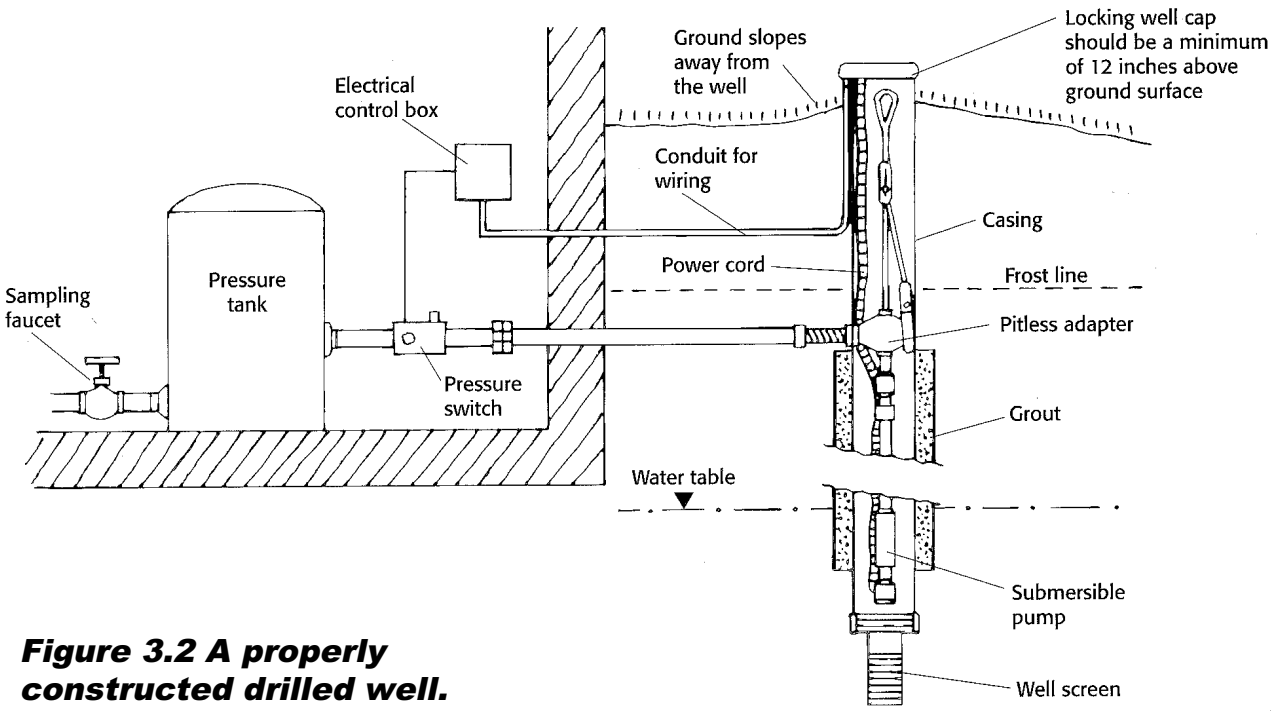


Figure 3.2 A properly constructed drilled well.

supply line and any “dirty” water. ***For example,*** if you are filling a wading pool, don’t put the end of the hose all the way in the pool. Leave an “air gap” between the end of the hose and the pool. Toilets and washing machines have built-in air gaps.

If you can’t keep an air gap between used water and your well source, you should have a check valve or vacuum breaker installed on the water supply line. *For example, if you are using a pesticide sprayer that attaches directly to a hose, you need a check valve on the faucet that the hose is connected to.* You can buy inexpensive check valves and vacuum breakers at a plumbing supplier or hardware store.

How long since your well was inspected?

Well equipment doesn’t last forever. Every ten to 15 years you should have your well inspected by a qualified well driller or pump installer. Keep all the papers and receipts that have dates and details about your well and pump and their maintenance. It is important to keep good records so you and future owners can take care of your well and your family will have safe water to drink.

Do Table 2 - Building and Maintaining Wells

Use the table below to rate risks related to your well’s construction and maintenance. For each question, mark the risk level in the right-hand column that best fits your situation.

Responding to risks

Try to lower your risks. Turn to the action checklist on the back page of this fact sheet to record any medium and high risks that you found. Using the ideas and information in this fact sheet and other resources, make a plan to reduce your risks.

Table 2 - Building and Maintaining Wells

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Well age	Well is less than 20 years old.	Well is 20-50 years old.	Well is more than 50 years old.	❒ Low ❒ Medium ❒ High
Well type	Drilled well.	Driven-point (sand- point) well.	Dug well.	❒ Low ❒ Medium ❒ High
Casing height above land surface	Casing is 12 or more inches above the surface. If the area floods, casing is 1-2 feet above the highest recorded flood level.	Casing is at the surface or up to 12 inches above the surface.	Casing is below the surface or in a pit or basement.	❒ Low ❒ Medium ❒ High
Condition of casing and well cap (seal)	No holes or cracks are visible. Cap is tightly attached. A screened vent faces the ground.	No holes or cracks are visible. Cap is loose.	Holes or cracks are visible. Cap is loose or missing. Running water can be heard or seen.	❒ Low ❒ Medium ❒ High
Casing depth relative to land surface	Casing extends 50 or more feet below the land surface.	Casing extends 20-50 feet below the land surface.	Casing extends less than 20 feet below the land surface.	❒ Low ❒ Medium ❒ High
Backflow protection	Measures are taken to prevent backflow and, where necessary, anti- backflow devices are installed.	Measures are sometimes taken to prevent backflow. No anti-backflow devices are installed.	No measures are taken to prevent backflow. No anti-backflow devices are installed.	❒ Low ❒ Medium ❒ High
Well inspection and "tune-up"	Well was inspected within the last 10 years.	Well was inspected 10-20 years ago.	Well was inspected over 20 years ago or don't know when well was last inspected.	❒ Low ❒ Medium ❒ High

PART 3 • Water Testing and Unused Wells

Water testing helps you keep track of water quality and find possible risks to your health. Contaminants enter drinking water from many sources, and many can only be detected through a water test.

Pollutants can enter the groundwater directly through abandoned wells. It is important to find old or abandoned wells and do something about them. At the end of this part, fill out the checklist to find water quality risks related to water contaminants and old wells.

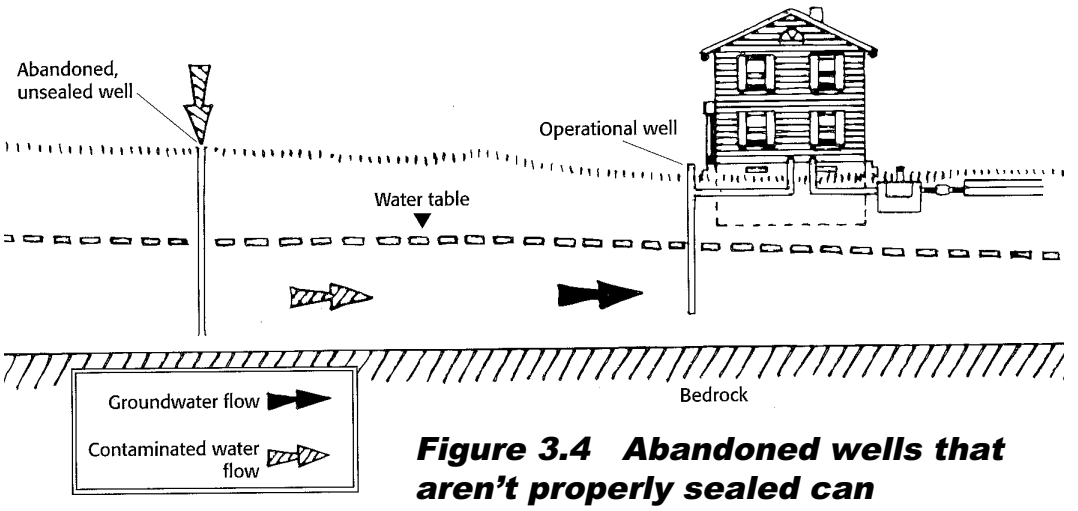


Figure 3.4 Abandoned wells that aren't properly sealed can contaminate groundwater.

Unused wells are more common than you think.

You may have an abandoned well somewhere on your property. Older homes often have a shallow well that was installed at first but is no longer being used. If they aren't properly filled and sealed, old wells can let pollutants reach groundwater (figure 3.4).

If you find that you own an abandoned well, hire a licensed, registered well driller or pump installer to close it. They will have the experience in well building and the knowledge of underground geology to do the job safely. The cost to close a well varies with its depth, diameter and type of soil and rock. But money spent sealing a well is a bargain compared to cleanup costs or the loss of property value if your water is contaminated.

When was your water last tested?

Your water should be tested **every year** for the four most common indicators of trouble: **bacteria, nitrates, pH, and total dissolved solids** (TDS). If you haven't had a full-spectrum, comprehensive water test, you should. Figure 3.5 shows how to take a water sample. However, **always follow lab instructions.**

A more complete water analysis for a private well will tell you about its hardness and tendency to corrode as well as iron, sodium, and chloride content. You may also want to get a broad-scan test of your water for other contaminants like pesticides.

A good source of information on well water quality may be your neighbors, your tribal housing authority or Indian Health Services. Ask them what their tests have shown.

What bad stuff should you look for?

Test for the kinds of contaminants that are likely to be found at your location. *For example, if you have lead pipes, soldered copper joints or brass parts in the pump, test for the presence of lead.* If oil, liquid fuels or solvents have been used or spilled nearby, test for *volatile organic chemicals* (VOCs). Figure 3.6 shows how to collect a water sample if testing for VOCs. However, you should **always follow lab instructions** to be sure your sample is taken in accordance with their specific testing procedures.

Pesticide tests may be worthwhile if your well has high nitrate levels (more than 10 milligrams per liter (mg/l) of nitrate-nitrogen or 45 mg/l of nitrate). You should also test for pesticides if a spill has occurred near the well. Pesticides are more likely to be a problem if your well has construction problems or if it's in sandy soil downhill from irrigated lands where pesticides are used, such as farms or golf courses.

You can get more advice on testing from your local Cooperative Extension office or Indian Health Department.

Test your water more than once a year if

1. someone in your household is pregnant or nursing;
2. there are unexplained illnesses in the family;
3. your neighbors find a dangerous contaminant in their water;
4. you note a change in water taste, odor, color, or clarity; or
5. you have a spill or back-siphonage of chemicals or fuels into or near your well.

Water can be tested by both public and private laboratories. Once it has been tested, keep a record of the results with your records on well construction and maintenance. This will help you to notice any changes in water quality over time.

Do Table 3 - Water Testing and Unused Wells

Use table 3 on the last page of this fact sheet to rate your risks. For each question, check the risk level in the right hand column that fits best with your situation.

Responding to risks

Try to lower your risks. Transfer any medium and high risks you found in table 3 to the action checklist at the end of this fact sheet. Then make plans to lower your risks.

Fig. 3.5. How to collect water samples*

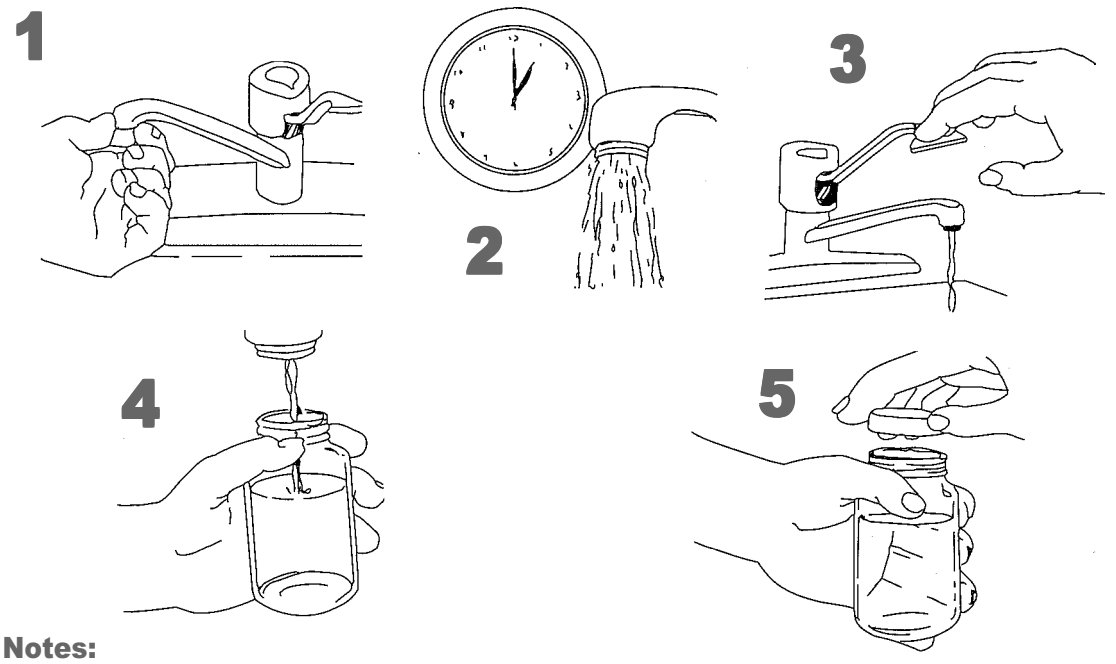
STEP 1: Remove the aerator from an indoor, leak-free cold water faucet. If testing for bacteria, flame the end of the faucet with a lighter. (Note: Flaming may discolor chrome or gold-finished faucets.)

STEP 2: Let water run for five minutes to bring in water that has not been in contact with household plumbing. (Skip this step if testing for corrosion of household plumbing-see notes.)

STEP 3: Reduce the water flow until the stream is about 1/4-inch in diameter.

STEP 4: Fill a specially prepared laboratory container as instructed by the laboratory. Do not let anything touch the inside of the cap or container.

STEP 5: Close the sample container and transport it as instructed by the laboratory.



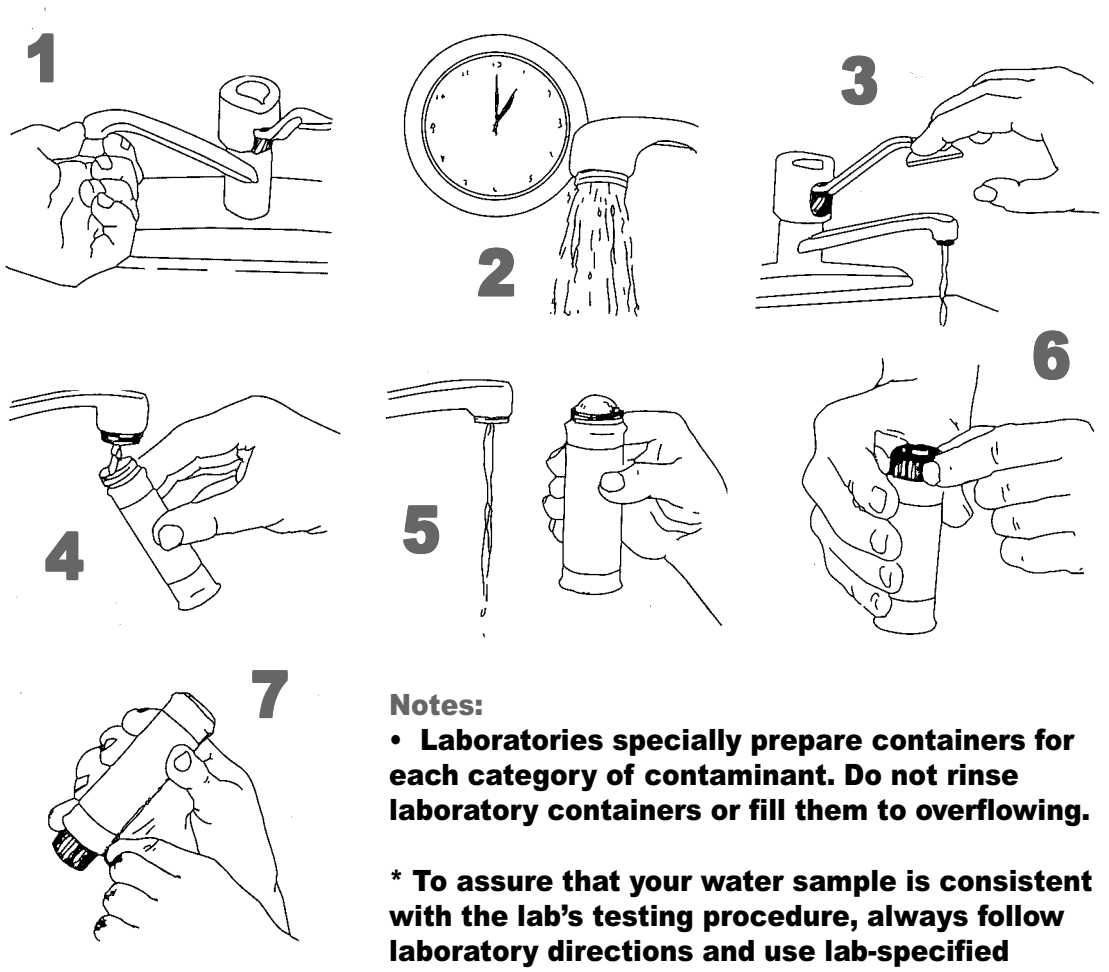
Notes:

- **Corrosive water may dissolve lead, copper, zinc, or iron contained in household plumbing. If testing for evidence of corrosion, let water stand in the plumbing system at least 12 hours.**

- **Laboratories specially prepare containers for each category of contaminant. Do not rinse laboratory containers or fill them to overflowing.**

**** To assure that your water sample is consistent with the lab's testing procedure, always follow laboratory directions and use lab-specified containers.***

Fig. 3.6 How to collect water samples if testing for volatile organic chemicals (VOCs).*



Notes:

- **Laboratories specially prepare containers for each category of contaminant. Do not rinse laboratory containers or fill them to overflowing.**

*** To assure that your water sample is consistent with the lab's testing procedure, always follow laboratory directions and use lab-specified containers.**

STEP 1: Remove the aerator from an indoor, leak-free cold water faucet.

STEP 2: Let water run for five minutes to bring in water that has not been in contact with household plumbing.

STEP 3: Reduce the water flow until the stream is about 1/4-inch in diameter.

STEP 4: Fill a specially prepared laboratory container as instructed by the laboratory. Hold the container at an angle to reduce aeration.

STEP 5: Carefully fill the container as full as possible, so that the surface of the water hills up at the top.

STEP 6: Replace the cap. Avoid trapping air between the sample and the cap.

STEP 7: Turn the vial upside down and tap. If bubbles appear, take another sample. If not, transport the container as instructed by the laboratory.

Table 3 - Water Testing and Unused Wells

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Water testing	Consistent, good water quality. Tests meet standards for bacteria, nitrate, and other contaminants.	Some tests do not meet standards or tests approach standards.	Water is not tested. Water is discolored after a rainstorm or during spring melt. There are noticeable changes in color, odor, and taste.	❒ Low ❒ Medium ❒ High
Unused wells on your property or in your area	There are no unused wells, or there are unused wells that are properly sealed.	There are unused wells that are not sealed but are capped and isolated from contaminants.	There are unused, unsealed wells that are in poor condition, near pollution sources, and/or uncapped.	❒ Low ❒ Medium ❒ High

TAKE ACTION

Go back over each table in this fact sheet and make sure that you have recorded any medium and high risks in the action checklist below. For each risk, write down improvements you plan to make. Use ideas from this fact sheet and other resources. Pick a target date that will keep you on schedule. You don't have to do everything at once, but try to eliminate the most serious risks as soon as you can. It helps to start with the least expensive actions.

For More Information

Well construction and maintenance

Contact Indian Health Services.

Water testing

Contact your Indian health department or Cooperative Extension office, private testing laboratories or a state environmental agency.

Drilling and sealing wells

Contact local plumbers, well drillers, or the government agency that regulates well drilling and health standards.

Groundwater, soil type, and geology

Contact your state or U.S. Geological Survey.

Drinking water quality standards

Call the U.S. Environmental Protection Agency's Safe Drinking Water Hotline toll-free at (800) 426-4791 from 9:00 A.M. to 5:30 P.M., EST, Monday through Friday.

Other Resources

You can find more information on how to safeguard all water sources at your local Cooperative Extension offices, soil and water conservation district staff, state and federal environmental agencies, your tribal college and the library.

Acknowledgments

This fact sheet was revised from the original prepared by Bill McGowan, University of Delaware Cooperative Extension.

ACTION CHECKLIST: Making Sure Your Drinking Water is Safe

Write all high and medium risks below.	What can you do to reduce the risk?	Set a target date for action.
Sample: Water has not been tested for 10 years. Smells different than it used to.	Have sample tested in state office of public health.	One week from today: April 8

4450-C — September 2001

To obtain additional fact sheets in the *Connected to the Earth* series, contact your local Extension office or call Montana State University's Extension housing program at (406) 994-3451.