

Contaminated drinking water can transmit a variety of infectious diseases. Proper construction and maintenance of water wells, and regular water testing, can minimize your risk of becoming ill. This brochure provides a basic understanding of the risks and steps that you as a well owner can take to protect yourself and your family from waterborne infectious diseases.

What are waterborne infectious diseases?

Waterborne infectious diseases are diseases caused by a number of different bacteria, viruses, or protozoa (one-cell animals), which are spread through contaminated drinking water. Examples of these diseases include diarrheas, dysenteries, salmonellosis, hepatitis, and giardiasis. Symptoms vary, but nausea, vomiting, and diarrhea, with or without fever, are most common. It's not unusual for people to mistake a case of waterborne disease for food poisoning or a "24-hour flu bug."

How are waterborne infectious diseases spread?

All major waterborne diseases are spread the same way—by drinking water that has become contaminated by infected human or animal fecal wastes. (The same diseases are also directly transmitted "hand to mouth" when good sanitary practices, like hand washing, are not followed.) It often takes only a small number of disease organisms to make someone sick. Contaminated drinking water can look, smell, and taste fine.

How are wells protected?

Most of Minnesota's groundwater is free of disease-causing organisms, because water is filtered by upper layers of soil and rock as it soaks into the ground. To maintain this protection around wells, there must be:

1) proper well construction, 2) proper well maintenance, 3) prompt sealing of unused wells, and 4) regular water testing.

What is proper well construction?

Since 1974, Minnesota's well regulations have required proper construction of new wells. Wells must be **separated** from sources of contamination, such as sewers and septic systems. When wells are drilled, **disinfectant chlorine** must be added to the drilling fluid, and the well casing must be made of **approved materials** and assembled watertight. In addition, the space between the drill hole and the well casing must be **grouted watertight** with a slurry of special clay or cement. The top of the well must **extend at least 12 inches** above the ground surface, and be covered with an **approved watertight well cap or seal**.

Many old wells in Minnesota **do not meet sanitary standards** for well construction and location, or they have deteriorated to the point where they can no longer keep surface contaminants out of the water. Examples of unsafe wells include old dug wells with leaking walls and rotten boards for covers, wells at the bottom of old frost pits which are susceptible to flooding, wells with holes corroded through the casing, and wells too close to contamination sources such as sewers or septic systems. These unsafe wells can present a very real health threat to anyone drinking the water. They need to be properly sealed by a licensed well contractor and replaced with a new, **properly constructed** well. How safe is **your** well?

What is proper well maintenance?

Modern drilled wells require remarkably little regular maintenance. It is important, however, to protect the top of the casing from physical damage, especially from bumping by cars, snow plows, riding mowers, etc. Also, be sure to leave the well cap securely fastened and the entry point for pump wiring properly sealed. Disinfect the well with chlorine any time it is opened up for service. (To protect the well from chemical contamination, store paints; gasoline; and lawn,

agricultural, and other household chemicals as far from the well as possible.)

Why should unused wells be sealed?

Unused wells provide an open channel for disease organisms and other contaminants to travel deep into the ground, by-passing the natural filtration which occurs when water moves through soil and rock. State law requires all unused wells to be either: **1) sealed** by a state licensed well contractor, **2) restored to service**, or **3) maintained** under a state issued annual **maintenance permit**.

How do I check my well for bacterial safety?

New wells can operate for many years without showing signs of bacterial contamination, but there are no guarantees. Private wells should be tested at least **once a year** for bacterial safety. It is also wise to test well water any time the water changes in taste, odor, or appearance.

Certified laboratories, located around Minnesota, will provide **sampling bottles and instructions** on collecting water samples for bacteria testing. Contact your local health department, look in the Yellow Pages under "Laboratories—Testing," or the Minnesota Department of Health (MDH) Certified Environmental Laboratories Web site at: www.health.state.mn.us/labsearch for a laboratory certified to test drinking water for bacteria.

How does a laboratory test my water for bacterial safety?

It is not practical to test water directly for every possible disease-causing bacterium, virus, and protozoan, so the water is tested instead for a group of **indicator bacteria**, which measure the sanitary protection of the well and water system. This group of common bacteria, called the "total coliform group," is a good indicator of sanitary protection for two reasons.

First, coliform bacteria are everywhere on the surface of the ground, but usually do not occur deeper than a few feet into the soil. Most coliform bacteria do not themselves usually cause disease, but if they show up in a water test, they can indicate that surface contamination has somehow gotten into the water, and disease organisms may also be present. Remember that waterborne infectious disease is caused by fecal contamination, and fecal contamination also occurs on the ground surface (in the case of animal waste), or near the ground surface (in the case of sewers and septic systems). Note: If a well is found to contain "E-coli" bacteria, the well has fecal contamination.

The second reason that coliform bacteria are such good indicators of sanitary protection is that they are killed by disinfection the same way that most disease organisms are killed. With few exceptions, if a well is disinfected with a strong solution of chlorine bleach, and the coliform bacteria disappear, disease organisms have also been killed.

If my well water is reported bacterially "unsafe," what should I do?

First, the water must not be used for drinking or food preparation unless it is brought to a full-rolling boil and then **boiled for at least one full minute**. Bottled water, or water from a known safe source, can also be used.

Second, the well should be **disinfected** with a strong solution of chlorine bleach and then retested. In some cases, the disinfection procedure must be repeated several times before the problem clears up. You must continue to boil the water, or use other water for drinking and food preparation, until the retest result indicates that the well water is now "safe."

How do I disinfect (chlorinate) an unsafe well?

You can perform a simple chlorination procedure yourself, or you can contact a licensed

well driller or pump installer to disinfect your well. Homeowner disinfection brochures and advice are available from MDH offices (listed at the end of this brochure). To find a licensed well driller or pump installer, see the Yellow Pages under "Well Drilling & Service," "Pumps," or "Water Supply Systems."

What if all disinfection attempts fail?

Most properly constructed wells can be effectively disinfected using the proper techniques, but there are exceptions. If small animals, pieces of wood, or other debris have gotten into an inadequately covered well, the well may have to be physically bailed out with special equipment before disinfection will be successful.

In some cases, openings or cracks may have developed in the upper part of the well casing, due to damage or corrosion. In other cases, the soil and rock of the area may not be adequately filtering percolating water, and surface bacteria may be traveling deeper than usual. In these instances, special measures will be necessary, possibly including well reconstruction or the construction of a new well. Your local licensed well driller can help with such situations, and you can also contact your nearest MDH office for advice.

Should I test my well water for anything beside bacteria?

Yes. Well water should be checked every two or three years for indications of **nitrate** contamination, more frequently if nitrate has been found before. Water exceeding the state health level for nitrate (10 parts per million as nitrogen) **must not be given to infants under six months of age.** (A companion brochure on *Nitrate in Well Water* is available from the MDH.)

Arsenic occurs naturally in about half the wells in Minnesota, and about 10 percent of wells produce water which exceeds 10 micrograms per liter, the federal drinking water standard. Arsenic

is more prevalent in western Minnesota, but can occur almost anywhere in the state. Long-term consumption of arsenic above the drinking water standard may increase the risk of health problems of the skin, circulatory system, or the nervous systems. Every private well should be tested at least once or twice to determine if arsenic is present in the water. (A brochure, *Arsenic in Minnesota's Well Water*, is available from the MDH.)

In addition, water can absorb **lead** from old lead pipes, lead-soldered copper pipes, or brass plumbing components, when the water stands idle in the pipes for more than a few hours. It is recommended to either **flush standing water** until you feel the water get colder (usually 30-60 seconds), or **have your water tested for lead** after it has been standing in the plumbing at least six hours. Also, never use water from hot water faucets for drinking or cooking. (A brochure, *Lead in Well Water Systems*, is available from the MDH.)

Other contaminants sometimes occur in private water systems, but much less frequently than bacteria, nitrate, arsenic, or lead. If the well is located close to fuel tanks or to a commercial or industrial area, a test for **volatile organic chemicals** is a good idea. **Agricultural chemicals** are sometimes found in a well located close to a cropped field or a handling area for agricultural chemicals; in these cases some testing may be warranted. Shallow wells are more vulnerable to pesticide contamination than are deep wells. If your well is located in an agricultural area, and especially if it is a shallow well, testing for several of the pesticides most commonly used in the area may be warranted.

If children or adolescents are drinking the water, a test for natural levels of **fluoride** will give your dentist useful information when considering fluoride supplements. A small number of wells in Minnesota (primarily northeastern Minnesota) do exceed the health standard for fluoride.

Where can I get more information or help?

If you have any questions about your well or well water quality, or would like more information, contact a well specialist at your local MDH district office.

MDH District Offices

625 North Robert Street
P.O. Box 64975
St. Paul, Minnesota 55164-0975
651-201-4600 or 800-383-9808

705 Fifth Street Northwest
Bemidji, Minnesota 56601
218-308-2100

320 West Second Street
Duluth, Minnesota 55802
218-723-4642

1505 Pebble Lake Road
Fergus Falls, Minnesota 56537
218-332-5150

3333 West Division Street
St. Cloud, Minnesota 56301
320-223-7300

1400 East Lyon Street
Marshall, Minnesota 56258
507-537-7151

18 Wood Lake Drive Southeast
Rochester, Minnesota 55904
507-206-2700

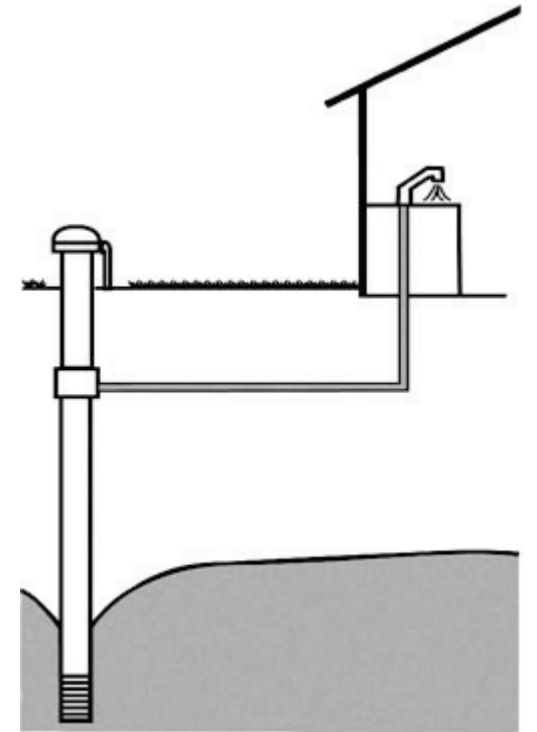
Visit the MDH Well Management Section Web site at: www.health.state.mn.us/divs/eh/wells.

To request this document in another format, call 651-201-4600.

Deaf and hard-of-hearing: TTY 651-201-5797.

IC# 141-0108 orig\Brochures\Bacterial 11/9/2010R
Printed on recycled paper.

Bacterial Safety of Well Water



Well Management Section
Environmental Health Division