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What You Should Do If Your Water Well Has Been Flooded

It is best to assume water from a well that has been flooded is contaminated. Do not use the well water for drinking, cooking, making ice, brushing teeth or even bathing until you are satisfied that the water is not contaminated.

Floodwater can be contaminated by substances from upstream, such as sewage from flooded septic systems or wastewater treatment plants, manure, pesticides or fertilizer applied to cropland that was flooded. A septic system in the vicinity of a well also can cause contamination when the soil is flooded. Wells that are inside pits may be flooded even if the surface is not covered with water. In order to ensure that the water is safe, the well should be disinfected and then tested for pathogens.

Disinfecting a Well

Well contractors or drillers may be contacted to disinfect the well, or you can do it yourself in some cases. The Indiana Department of Environmental Management's illustrated guide for disinfecting a well is included in the notebook and is available on the world wide web at the following address:

http://www.ecn.purdue.edu/SafeWater/drinkinfo/welldisinfection.pdf

Be sure to follow the instructions carefully, which include the following steps:

- Turn off electric power to the pump and remove the well cap.
- Prepare a bleach and water solution and pour the solution into the top of the well.
- Circulate the water by connecting a hose to a faucet and spraying the water back into the well and down the sides of the well for at least 15 minutes.
- Open every faucet in the system and let the water run until the smell of chlorine can be detected, then close all the faucets and seal the top of the well.
- Keep the chlorinated water in the system for several hours, preferably overnight.
- On the following day, open all the faucets until there is no chlorine odor.

Testing Well Water

Before you resume using the well, collect a water sample and have it tested by a certified laboratory. Call your county health department to find a laboratory near you. Well disinfection will not provide protection from pesticides, heavy metals and other types of non-biological contamination. If such contamination is suspected, due to the nearness of sources for these types of contaminants, special treatment is required. Homeowners can call the EPA Well Care Hotline at (888) 395-1033 if contamination by non-biological elements is suspected.

Well Damage

Another implication flooding can have on your well is the damage or deconstruction of the well in general. Fast-moving floodwater can carry debris that could dislodge well construction materials or distort the casing. The coarse sediment in floodwater also could erode pump components. Inspect the well for physical damage or look for signs of leakage. In the case of a damaged well, consult a licensed water well contractor to find out if repairs are needed.

Additionally, flooding can damage your well pump and electrical systems. If the pump and/or electrical system have been under water, **do not turn on the pump** because of the potential danger of electrical shock or damage to your well or pump. Once floodwaters have receded and the pump and electrical system have dried, have a qualified electrician check the wiring system.

Obtaining Clean Water

Individuals with flooded wells are encouraged to find an alternative source of water for drinking, cooking and washing. For example, you may be able to get water from a neighbor's well if you know it is safe, or from a public water supply. Purchasing bottled water also is a good alternative. If you can't find a convenient source of safe water, boil your well water for five minutes before use.

Homeowners returning to their home after a flood may be eager to use the water. But remember that flooding presents special health risks and requires extra attention to protect your family's health.

Arkansas residents can contact their University of Arkansas Division of Agriculture Cooperative Extension Service county office for a copy of "Improving Home Water Quality." Of particular usefulness, when well contamination is an issue, is a section entitled "Shock Chlorination." This publication has a number of practical solutions to typical water system problems for those using their own well. Contact your local county Extension agent for more information on techniques to improve the quality of the water supplied to your home.

Adapted from Purdue "Safe Water for the Future" web site, Purdue University, Lafayette, IN.

Phil Tacker, Associate Professor - Extension Engineer

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What to Do With Private Wells and Pumps After a Flood

WARNING!
DO NOT TURN ON THE PUMP.
There is danger of electrical shock and damage to your well or pump if it has been flooded

WARNING!
DO NOT WASH WITH WELL WATER.
People drinking or washing with water from a private well that has been flooded will risk getting sick.

Drilled, driven or bored wells are best disinfected by a well or pump contractor, because it is difficult for the private owner to thoroughly disinfect these wells.

If you suspect that your well may be contaminated, contact your local or state health department or county Extension agent for specific advice on disinfecting your well. The suggestions below are intended to supplement flood precautions issued by state and local health authorities.

Well and Pump Inspection

Flood Conditions at the Well – Swiftly moving floodwater can carry large debris that could loosen well hardware, dislodge well construction materials or distort casing. Coarse sediment in the floodwaters could erode pump components. If the well is not tightly capped, sediment and floodwater could 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. Floods may cause some wells to collapse.

Electrical System – After floodwaters have receded and the pump and electrical system have dried, do not turn on the equipment until the wiring system has been checked by a qualified electrician, well contractor or pump contractor. If the pump's control box was submerged during the flood, all electrical components must be dry before electrical service can be restored. Get assistance in turning the pump on from a well or pump contractor.

Pump Operation – All pumps and their electrical components can be damaged by sediment and floodwater. The pump including the valves and gears will need to be cleaned of silt and sand. If pumps are not cleaned and properly lubricated they can burn out. Get assistance from a well or pump contractor who will be able to clean, repair or maintain different types of pumps.

Emergency Disinfection of Wells That Have Been Flooded

Before Disinfection: *Check the condition of your well. Make sure there is no exposed or damaged wiring. If you notice any damage, call a professional before the disinfection process.*

Materials Needed:
- **One gallon of non-scented household bleach;**
- **Rubber gloves;**
- **Eye protection;**
- **Old clothes; and**
- **Funnel**

Step 1 – If your water is muddy or cloudy, run the water from an outside spigot with a hose attached until the water becomes clear and free of sediments.

Step 2 – Determine what type of well you have and how to pour the bleach into the well. Some wells have a sanitary seal with either an air vent or a plug that can be removed (a). If it is a bored or dug well, the entire cover can be lifted off to provide a space for pouring the bleach into the well (b).

Step 3 – Take the gallon of bleach and funnel (if needed) and carefully pour the bleach down into the well casing.

Step 4 – After the bleach has been added, run water from an outside hose into the well casing until you smell chlorine coming from the hose. Then turn off the outside hose.

Step 5 – Turn on all cold water faucets, inside and outside of house, until the chlorine odor is detected in each faucet, then shut them all off. If you have a water treatment system, switch it to bypass before turning on the indoor faucets.

Step 6 – Wait 6 to 24 hours before turning the faucets back on. It is important not to drink, cook, bathe or wash with this water during the time period – it contains high amounts of chlorine.

Step 7 – Once the waiting period is up, turn on an outside spigot with hose attached and run the water into a safe area where it will not disturb plants, lakes, streams or septic tanks. Run the water until there is no longer a chlorine odor. Turn the water off.

Step 8 – The system should now be disinfected, and you can now use the water.

Step 9 – Have your water tested for bacteria 7 to 10 days after disinfection.

Sampling and Testing the Well Water

Contact the local health department to have well water sampled and tested for contamination. Or, call your state laboratory certification officer to find a certified lab near you. You can get this number from the Safe Drinking Water Hotline (1-800-426-4791).

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.

CAUTION: Because of the extensive flood area and the speed and direction of groundwater flow, your well may not be a safe source of water for many months after a flood. The well can become contaminated with bacteria or other contaminants. Waste water from malfunctioning septic tanks or chemicals seeping into the ground can contaminate the groundwater even after the water was tested and found to be safe. It will be necessary to take long-range precautions, including repeated testing, to protect the safety of drinking water.

Concerns and Advisories

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

Remember that there is a danger of electrical shock from any electrical device that has been

flooded; consult a certified electrician. Rubber boots and gloves are not adequate protection from electric shock.

Well disinfection will not provide protection from pesticides, heavy metals and other types of non-biological contamination. If such contamination is suspected, due to the nearness of these contaminant sources, special treatment is required.

Information on home water treatment units (also called point-of-use and point-of-entry units) is available from U.S. EPA by phoning the **Safe Drinking Water Hotline (1-800-426-4791)**.

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 (1-800-424-9346)**.

For information on long-term water quality conditions in the area, consult the state or county health department.

Well owners may have information about the construction or testing of their well, and this information will be helpful to the health department in determining water quality conditions.

Septic systems should not be used immediately after floods. Drain fields will not work until underground water has receded. Septic lines may have broken during the flood.

Source: United States Environmental Protection Agency, Office of Water (4606 M), www.epa.gov/safewater, EPA 816-F-05-021, August 2005.

Phil Tacker, Associate Professor - Extension Engineer 3/2006

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Well Disinfection

Why Disinfect?

Well disinfection can eliminate or reduce many different kinds of harmful bacteria and viruses as well as harmless bacteria which can cause unpleasant taste and odors. However, disinfection will **not** correct water problems caused by chemical contamination from nitrate, fuels, pesticides or other substances. Well disinfection should be performed under the following circumstances:

- When coliform bacteria are present in the water;
- After flooding of the well;
- After plumbing installation, e.g., softeners, sinks, filters;
- After casing or pump repairs – submersible types or other;
- When water taste or odor changes, e.g., from iron or sulfur reducing bacteria;
- As part of annual maintenance; or
- During startup of seasonal wells.

Safety Precautions

ELECTRICAL

EXTREME CAUTION is advised as you will be working with electricity and water. Potentially lethal voltages exist – if you are not acquainted with working with electricity, seek professional advice. Your safety precautions should include:

- Turn off all power to the pump before removing the well cap.
- While the power is off, examine for chaffed wire insulation or missing wire nuts and repair as necessary.
- Wear rubber-soled shoes or boots, preferably waterproof.

CHEMICAL

Severe eye damage may result from contact with chlorine, including bleach and highly chlorinated household water.

- Warn users of the water to not drink or bathe in the water while chlorine is still present in the system.
- Do not leave bleach jugs within reach of children – ingestion of bleach is the most common toxic exposure for children in the United States.
- Wear protective goggles or a face shield when working with the bleach.

RESPIRATORY

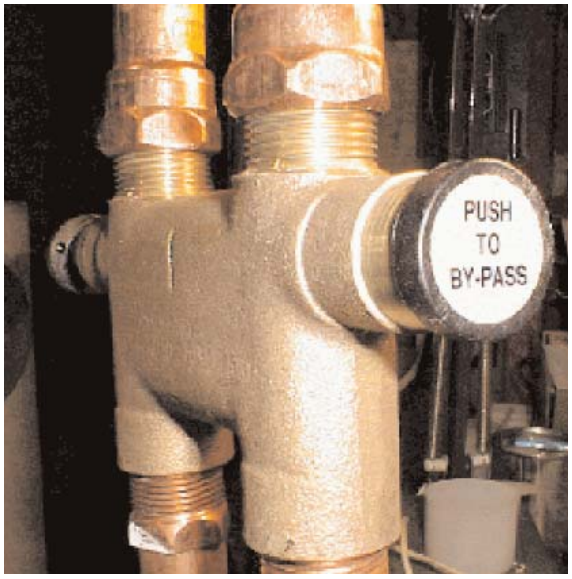
Well pits pose an extreme hazard as they frequently contain a build-up of toxic gases or simply lack sufficient oxygen to sustain life.

- DO NOT ENTER WELL PITS. Death can occur in even a shallow well pit – refer disinfection of wells in pits to licensed well or pump contractors.

Procedure

STEP 1 – Isolate critical areas

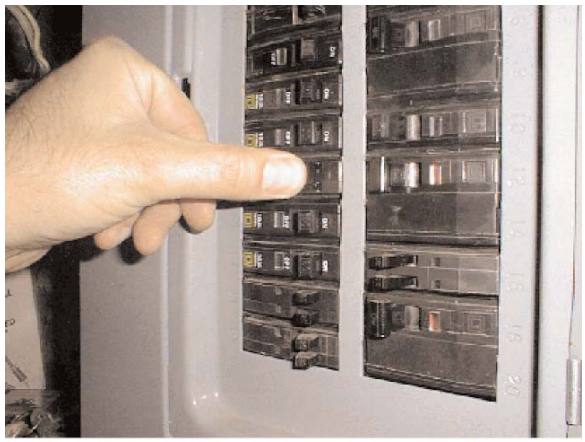
Bypass devices such as softeners, bait tanks and livestock to prevent damage to the device or animals. This would also be a good time to install a new filter element if the water system has one. Since softeners themselves may be a source of contamination, it is good to disinfect the softener at the same time the well is being disinfected. See the end of this document for a softener disinfection procedure.



STEP 2 – Electrical safety

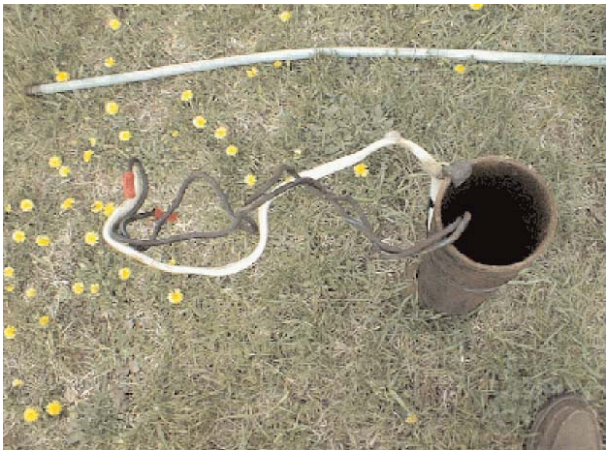
Turn off electrical power to the pump.

If the breaker box has a “lockout” hasp to prevent someone from accidentally turning on the water pump circuit breaker, use it.



STEP 3 – Remove well seal/cap

With electrical power off, remove the well cap and lift the wires/wire nuts aside.



STEP 4 – Mixing a chlorine solution

Add 1/2 gallon of bleach to a clean pail with about 3 gallons of water. This is generally sufficient to disinfect a 4-inch diameter well 100 feet deep or less. For wells greater than 100 feet, increase the amount of bleach proportionately. Or, to determine the amount of water in the well, multiply the gallons of water per feet by the number of feet of water in the well using the following table:

Diameter of well (X)	Gallons per foot
4 inches	.65
5 inches	1.00
6 inches	1.50
8 inches	2.60
10 inches	4.10
12 inches	6.00

For each 100 gallons of water in the well use the amount of compound listed below.

Laundry Bleach	Hypochlorite Granules
5.25% Chlorine	70% Chlorine
3 cups	2 ounces (2 tablespoons)
(24) ounces	

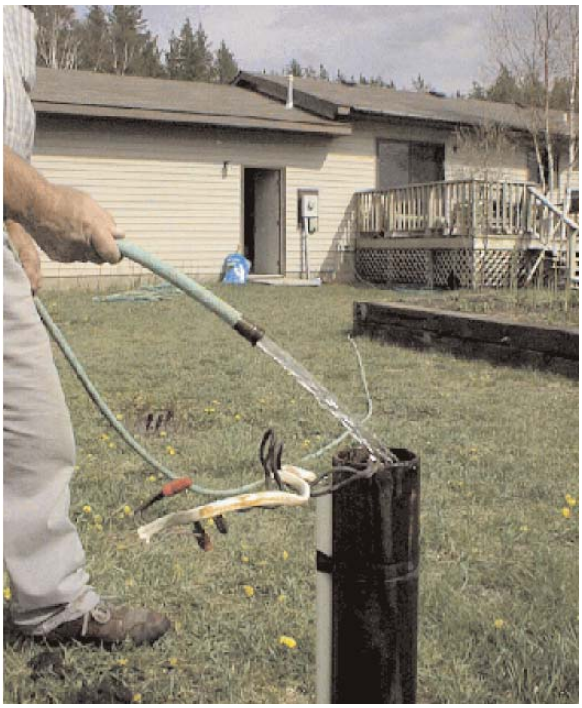
STEP 5 – Adding chlorine to the well

Pour the mixture into the well.

STEP 6 – Recirculating chlorinated water

Recirculation of chlorinated water helps to wash down the sidewalls of the well casing, mix the water column thoroughly and distribute the chlorine.

- Place garden hose into well casing.
- Turn on pump power.
- Run garden hose from the water system and put it back into the casing to recirculate water.



Recirculate for about 2 hours from the time you smell chlorine from the garden hose.

- You may notice that the water coming from the garden hose turns reddish for a brief period. This is due to the chlorine precipitating iron in the water. If the water appears excessively red and cloudy from this reaction, discharge the hose outside of the casing until the water runs clear.

STEP 7 – Bringing chlorine to each faucet

While water is circulating, turn on each faucet* one at a time until you smell bleach (or use chlorine test papers), then close the faucet. Do this for each faucet, including:

- Hot water taps;
- Toilets and shower/bath fixtures; and
- Any outside faucets or yard hydrants

*Faucet aerators may need to be removed if clogging occurs from precipitated iron.

(Chlorine test papers, such as those commonly used in restaurants to check chemical sanitizing dishwashers, are not necessary but provide a visual indication that chlorine is present.)

dissipated before submitting a water sample for coliform analysis. This will ensure a valid test result.

STEP 8 – Removing the chlorinated water

Let system set overnight with chlorine in the water lines. In the morning, run a garden hose to flush out the system.

- Since chlorine will kill vegetation, direct the water to an area where it won't matter if plants are harmed.
- Do not run the water into your septic system as the amount of water required to flush the system may hydraulically overload the septic system.
- TOTAL chlorine must be absent prior to taking water samples for coliform analysis. While this test isn't necessary for the homeowner, be aware that any amount of chlorine left in the system may erroneously result in a negative coliform test.
- When a chlorine test kit is unavailable, wait a few days after the last trace of chlorine odor has

Disinfection Issues

Expectations and Concerns

It may take as little as 1/2 hour or as much as 4 days to completely remove the chlorine odor from the water system. This is dependent upon many factors including the height of the water column in the casing, well drawdown and pump capacity. To facilitate faster removal of the chlorine in stubborn cases, a hose splitter may be attached and one hose run back into the casing and the other hose pumped to remove waste.

Water heaters take a long time to flush out once chlorine has been introduced into them. **Do not shower/bathe with water containing high levels of chlorine due to the possibility of damaging your eyes.** If you elect to drain down the water heater to remove the chlorine, be sure to turn off the electricity or gas to the heater, otherwise the heater will be damaged when the water recedes from the heating elements or burner.

It is not unusual to require 2, 3, 4 or more disinfections to clear water systems of coliform bacteria that have been growing in the system for a period of time. If the well refuses to clear, a licensed well driller should be enlisted to utilize special techniques and equipment to flush the well. It is essential that any water system defects that could allow surface water to enter the well be corrected.

Plumbing grit and precipitated minerals may form when the chlorine is added to the system. This grit can cause clogging with faucet aerators, flush valves, water solenoids and equipment using filters.

Softener Disinfection

Water softeners may be damaged by excessive amounts of chlorine, but the softener itself should be chlorinated when there are bacteria problems. Follow the manufacturers instructions for disinfecting the particular unit you have or use this procedure:

- During the disinfection process, turn softener to "Bypass" once chlorine is first smelled in a softened water tap.
- Keep unit on bypass until chlorine is flushed out of the system.
- To disinfect the softener, add 1/2 cup bleach to the brine tank and regenerate the unit.

Follow-Up

Frequently, coliform bacteria will regrow in the water system after about a month. For this reason, it is important to retest approximately 30 days after disinfection. If coliform is again detected, disinfect the well using the same procedure.

Source: Well Disinfection, Disinfection Handout, Indiana Department of Environmental Management, August 4, 1999.

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