Ensuring **SAFE PRIVATE WELL WATER** for household use **AFTER A FLOOD**

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The quality of drinking water from wells may be compromised during a flood. Flooding around the well increases the risk of drinking water becoming contaminated with bacteria or any other contaminants, rendering it unsafe to drink and for washing food items. Furthermore, entry of foreign objects into the well could damage various components of the well system and create a personal injury risk.

This circular describes what you should do if your well has been contaminated by a flood.

In this publication, "flood" describes water from heavy rain, storms, or hurricanes that spills or seeps into a household drinking water well.

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INSPECT THE WELL

Determine if one or more of the following unwanted situations have occurred:

- Large debris carried by moving floodwater struck the well head. This could loosen well hardware, displace well construction materials, and/or damage the casing.
- Sediment and/or flood water entered an improperly sealed well.
- Flood waters compromised the well structure by washing material from under the well pad. This could cause the well to collapse.

Note that shallow wells (less than 50 feet deep) and wells more than 10 years old are likely to have been contaminated despite the absence of visible damage. These wells are more likely to be under the influence of surface water, which can contain bacteria and other contaminants.

CAUTION:
DO NOT DRINK FROM, OR WASH FOOD ITEMS WITH, FLOOD-AFFECTED WELL WATER.
This can make you very sick.

INSPECT THE ELECTRICAL SYSTEM

If the electrical system was flooded:

- Make sure the breaker from main power supply is in the "OFF" position.
- If you do not have a breaker, make sure that the electricity is disconnected from the pump control box, if you can do so safely.
- Before power is restored, inspect the pump's electrical box for visible moisture or water.
- Have the wiring system checked by a qualified electrician, well contractor, or pump installer. Get their assistance turning the pump on.

Note: If the pump's control box was submerged during the flood, make sure that all electrical components are dry before restoring electrical service.

CAUTION:
Do not turn on the pump without making sure that all electrical components are dry and checked by a licensed electrician, licensed water well contractor, or certified pump installer to avoid damage to your well system or pump. Check using the steps above to avoid ELECTRICAL SHOCK, PERSONAL INJURY, or EVEN DEATH.

INSPECT THE WELL PUMP

- Sediment and/or flood water can damage the pump and its electrical components. The pump, including the valves and gears, may need to be cleaned of sediment.
- Seek assistance from a licensed water well contractor or certified pump installer for cleaning and repairing the pump.

CAUTION:
The well pump can burn out if it is not properly cleaned and lubricated.

DECONTAMINATE THE WELL

When flooding occurs around a well, it is likely that the water will be contaminated with bacteria and other microorganisms in addition to inorganic contaminants carried by the flood water. A thorough decontamination of the well is very important to ensure that drinking water is clean and safe.

When the pump is back to normal operations, decontaminate the well using the following steps:

1. REMOVE FLOOD WATER FROM THE WELL.

- **Very important:** Discard water from an outside faucet, not from an inside faucet.
- Discarding water from an outside faucet will bypass most of the internal plumbing, thus preventing the spread of contamination.
- Do not let the contaminated water go into the septic tank since the additional water would have to be pumped through the house plumbing system and the extra water could hydraulically overload the septic tank.

2. DETERMINE THE DEPTH OF WATER IN YOUR WELL, which is the distance from the bottom of the well to the water level. To find this information, first measure the distance from the ground level to the water level (distance "b" in Figure 1).

- Subtract "b" from the well depth "a" to find the total depth of the water:
- a - b = c (total depth of water).
- If you do not know the depth of your well, but you know the well drilling company who constructed it, contact that company.

Well drillers often keep records of all of the wells they drill. If you can't find any records about your well, contact a licensed well driller to assist you in taking the appropriate measurements.

Below is an alternative method of determining the depth of water in the well:

- If you can see the water in the well, lower a heavy object tied to a string down the well and measure the length of string until you see the object touch the water.
- In a deep well, lower the heavy object tied to a string until you hear the object hit the water and measure the length of string.
- If you cannot hear the object hit the water, another (less accurate) way to determine depth is to drop a small stone into the well and either count or time the seconds it takes for the stone to hit the water. You will have to listen closely for this. Multiply the number of seconds by 32.2 and that will give you an estimated depth.

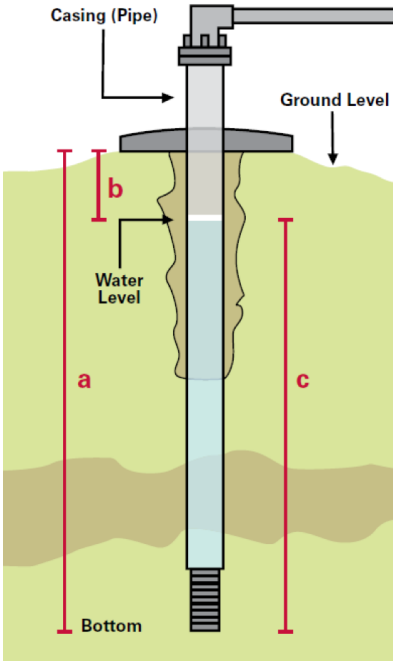


Figure 1. A diagram showing various distances ("a," "b," and "c") to be used to calculate the depth of water in a well.

Note: Once you know the depth of the well and the depth from the surface, subtract the two to get the depth of water in the well required for getting the storage per foot depth of water (gal/ft) in the well from the Table 1 below.

Table 1. Storage capacity of wells per foot of water.

DRILLED WELL/PIPE		BORED WELL	
Diameter (inches)	Storage per foot depth of water (gal/ft) in the well	Diameter (inches)	Storage per foot depth of water (gal/ft) in the well
4"	0.653	12"	5.88
5"	1.02	16"	10.5
6"	1.47	20"	16.3
7"	2.00	24"	23.5
8"	2.61	28"	32.0
9"	3.30	32"	41.8
10"	4.08	36"	52.9

If your well diameter is not listed in the above table, contact your local University of Georgia Cooperative Extension office for more information.

3. CALCULATE THE VOLUME OF WATER IN THE WELL by multiplying the total depth of water "c (ft)" times the storage per foot of water (gal/ft). For example, if the well diameter is 6 inches, then the storage per foot of water is 1.47 gallons (Table 1). If we assume that the depth of water is 204 feet, then 204 × 1.47 = 300 gallons will be the "one well volume" of water in your well. Two well volumes is 600 gallons (2 × 300 gal.), three well volumes is 900 gallons, and so on.

4. TO DISCARD TWO TO THREE TIMES THE WELL VOLUME OF WATER, run your pump long enough to pump the calculated amount of water (obtained in step 3) out of the well. For this purpose, run water through a hose and count the time (in minutes) it takes to fill a 5-gallon bucket. Divide five by the minutes counted to determine the capacity of the pump in gallons per minute (gpm). Divide two to three times the well volume of water (gallons) by the capacity (gpm) of the pump to determine required run-time for the pump. Below is an example:

Three times the well volume of water (V)
= 900 gallons

Time required to fill a 5-gallon bucket (t)
= 0 minutes 45 seconds
or 0.75 minutes

So, the capacity of the pump (C) = 5 ÷ 0.75
= 6.67 gpm

Required run-time for the pump (T) = V ÷ C
= 900 ÷ 6.67 = 134.9 or 135 minutes

Notes:

- *If you have difficulty calculating the well volume of water, run the pump for at least 30 minutes for a 4-inch diameter drilled well.*
- *Run the pump for an hour if you have a large-diameter bored well.*
- *If your pump will not maintain a flow for an hour continuously, allow the well to recharge, and turn the pump on again until you pump for the targeted time.*

5. AFTER PUMPING OUT TWO TO THREE TIMES THE WELL VOLUME OF WATER as described in steps 2, 3 and 4, the well should be shock chlorinated following the protocol outlined in the UGA Extension Circular 858-4, "Disinfecting Your Well Water: Shock Chlorination," available at http://extension.uga.edu/publications/detail.html?number=C858-4.

It is very important to allow the chlorine to stay in the well for 12 to 24 hours. DO NOT allow anyone to drink or use the water during this time and until the system has been purged.

6. TEST WATER FOR COLIFORM BACTERIA after all added chlorine (during shock chlorination) is dissipated by pumping out another three to four times the well volume out of the well, or at least as much water as was pumped in steps 2, 3 and 4. You should pump water from each faucet until the water is clear and you can no longer smell chlorine. Again, most of the water pumped after the shock chlorination should be discarded from an outside faucet. *This highly chlorinated water, if discharged to the septic tank, could cause problems with the beneficial bacterial colonies in the septic tank.* If a large volume of water is dumped into the septic tank, the homeowner may consider using some septic additive initially after normal operations continues.

HOW WOULD YOU KNOW IF YOUR WATER IS SAFE TO DRINK AGAIN?

- All wells and water systems that have been influenced by flood waters should be considered unsafe.
- Even if a well has been shock chlorinated, do not drink or consume the water until you submit a water sample to a Georgia Department of Natural Resources (DNR) certified laboratory and the laboratory analysis report states that the well water is safe to drink.
- Contact your local UGA Extension office (http://extension.uga.edu/county-offices.html) or your local health department (https://dph.georgia.gov/public-health-districts) for more information.
- Remember that just because the water looks clean and clear doesn't mean that it's safe to drink or consume indirectly, such as when used for washing food.

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