




Restoring a Flooded Well to Service

 **Warning:** Do not operate any electrical device that was flooded until it has been checked by a competent electrician. There is danger of electrical shock and damage to equipment.

 **Warning:** Disinfect water from a flooded well before using it for drinking or washing, until the well is properly restored. Water with microbes carries a risk of severe illness and even death.

Before a flooded well is returned to service, it should be checked, cleaned, and disinfected. This is for health and safety purposes, as well as to extend equipment life. Procedures to properly disinfect wells are in K-State Research and Extension publications: *Shock Chlorination for Private Water Systems*, MF-911 and *Shock Chlorination Treatment for Irrigation Wells*, MF-2589. In addition to microbial pathogens that cause sickness, flood water carries abrasive sediment, debris that can cause physical damage, and the everpresent risk of other contaminants.

Following the steps outlined here will help minimize damage to the pump and power unit, extend the life of the well, and protect people who use the water. Choosing not to follow these steps may result in illness of people and animals, cause equipment damage, and is more likely to result in increased cost in the end. Thus, it is important to follow the steps described here.

Assess what happened. Check the well and power unit for inundation, damage, and inflow of flood water. Determining what happened helps establish what needs to be done to restore the well after a flood. If possible, establish the maximum height of the flood water from nearby high water marks. If flood water overtopped a well casing, even one that has a good sanitary seal, polluted water likely entered the well and disinfection is essential. When flood water overtops an open well, much water enters, carrying considerable sediment into the well. This sediment must be removed. If flood water covered electrical or mechanical equipment not designed to be submerged, the equipment must be dried, cleaned, and checked before use. Identify and repair all damage to the well casing and components caused by floating debris or shifting materials.

Did water and sediment enter equipment? Most electrical and mechanical components are not designed to be submerged in water. This includes the electric motor, controls, drive shaft, gear box, and internal combustion engine. If the water level was over these components, obtain assistance from competent electrical and mechanical service providers for evaluation and cleanup. Taking shortcuts may result in electrical short circuits that could shock or electrocute people and decrease the life of the mechanical components because of moisture, rust, and lubrication failure. Because submersible pumps are designed to be under water, they should not be affected by a flood, unless damaged by sediment or abrasive material suspended in the water.

Did sediment enter the well? If flood water overtopped an open well, sediment entered. Obtain assistance to remove the pump and clean out the sediment. Well drillers have the equipment, knowledge, and skills to clean sediment from a well. Sediment can reduce the well yield, harbor disease-causing pathogens, increase wear of the pump, and reduce cooling of the pump motor. Removing sediment may involve a process a lot like developing the well after it was initially drilled. When the sediment has been removed and the equipment checked, reinstall the pump and remove water until all traces of sediment are gone and the water is clear.

Repair damage to casing. The well casing must be watertight from the top edge, at least a foot above the ground, to the well screen. It is especially important that it prevent entry of water into the casing because the water would contain contaminants.

Disinfect the well and water system. The next step is to shock chlorinate the well and water system to kill bacteria. The greatest concern is about pathogenic

microbes in drinking water; however, a wide range of bacteria, including iron bacteria, enters all wells. If iron bacteria is not removed, it can reduce the well's capacity and shorten its life. The amount of water and chlorine required to treat flooded irrigation, livestock, and domestic (drinking water) wells is shown in Table 1. Treatment figures are based on providing a chlorine dose of at least 500 mg/L (parts per million, ppm) for domestic and 200 mg/L (ppm) for irrigation or livestock wells.

We recommend shock chlorination following the guidance in *Shock Chlorination for Private Water Systems* as part of regular annual domestic-well maintenance.

A flooded well should not be used for drinking without emergency disinfection (boil for at least three minutes or add eight drops of fresh household bleach per gallon, mix, and wait 30 minutes). Only after cleaning and testing negative for bacteria is water considered safe to drink, free of indicator bacteria.

Irrigation wells can be used after the 24-hour chlorine holding time and the chlorine is flushed. However, we also strongly recommend an end-of-season shock chlorination as part of the regular maintenance program for both irrigation and livestock wells.

Test water for bacteria. Public water suppliers regularly test for total coliform bacteria to show that bacteria are not present and thus the water is safe to drink. The water sample should be collected at least a week after the shock chlorination when the well is used for purposes other than drinking.

Any flooded well should not be used for drinking until the water test result shows no bacteria. To collect a good sample, follow directions supplied by the laboratory or the procedure in Extension publication *Taking a Water Sample*, MF-963. If the test result still contains bacteria, repeat the shock chlorination procedure and test again. Wait for at least three weeks before doing a third or subsequent shock chlorination. Getting all bacteria out of a flooded well may take considerable time, effort, and expense. However, groundwater is not an environment where these bacteria normally thrive so be patient, they will eventually die.

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Table 1. Chlorine Dose and Water Needed to Disinfect Wells after Flooding

	Domestic Well	Livestock Well	Irrigation Well
Casing inside diameter (inches)	5-6	5-6	18
Feet well screen and gravel pack* treated by 1000 gallon of water	11.4 ft screen	11.4 ft screen	8 ft screen
Chlorine** (gallons household bleach) per 1000 gallons water	10 gallons	4 gallons	4 gallons

* This treats the inside of the well casing, the well screen, the gravel pack, and the aquifer formation for a radius of about 3 feet outside of the well screen. The total volume of water needed for treatment is the feet of saturated well screen divided by the feet of treatment using 1000 gallons of solution. The first tank of water can come from the flooded well but additional tanks must come from another clean water source.

** This chlorine mix is based on making a concentration of at least 500 ppm for domestic wells and 200 ppm for irrigation and livestock wells. A stronger dosage is permissible.

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