How to Close an Abandoned Well

Figure 1. This abandoned well has an open side, which makes it possible for pollutants to enter the aquifer unabated. It is also located in an agricultural area that is void of vegetation that could filter pollutants from stormwater runoff and reduce the amount of pollution entering groundwater resources.

Abandoned wells are often the only structure remaining after an old house, barn, or other structure has long been removed. If left unmanaged in agricultural areas, these abandoned wells can pose a serious threat to water quality and livestock safety. The shaft that forms the well creates a conduit directly into groundwater resources, and if wells are not closed properly, pollutants, including sediment, manure, and pesticides, that are present on the surface can be transported through stormwater runoff into the groundwater through the conduit that the well provides (Figure 1). Abandoned wells also often have large openings on the surface, into which livestock could fall into or be placed as a means of disposal, which also increases the negative impact on water quality (Figure 2).

The goal of this document is to provide information on the proper way to close an unused well in order to prevent pollution from entering subsurface waters, moving along water bearing zones, and possibly impacting drinking water supplies.

Regulations

There are several different types of wells that could be found on agricultural properties, including drilled wells, wells with multiple casings, bored and hand dug wells, driven wells, and flowing artesian wells. All have clear guidelines for closure under the law (401 KAR 6:310 Section 11), and all of the work needs to be accomplished by a Kentucky certified water well

driller.

A Kentucky certified monitoring well driller, may also decommission the well but only after obtaining a water well abandonment variance from the Kentucky Division of Water (DOW). A directory of certified drillers can be found on DOW's website: https://eec.ky.gov/Environmental-Protection/Water/Protection/GW/DrillerCert

Figure 2. This well's large opening could be hazardous for nearby livestock.

Preparation

Measurements

Before closing a well, measurements of the well depth, diameter, and depth to static water level need to be taken and recorded on the Uniform Kentucky well Maintenance and Plugging Record, which the certified driller is required to submit to DOW within 60 days of the closure of the well.

Obstructions

All obstructions must be removed from the well before closure. If the pump or other equipment (e.g. casing, screens, and liners) is stuck in the well and cannot be removed, the certified driller should push the material to the bottom of the well.

Disinfection

Closing out a well requires that it must be disinfected in accordance with administrative regulation (410 KAR 6:310 Section 9(3)). To disinfect a well, determine the correct amount of chlorine or hypochlorite granules to be used, and pour it into the well (Table 1). Circulate the chlorine solution throughout the well for at least 30 minutes, ensuring that the chlorinated water contacts all parts of the well casing, borehole, discharge pipes, and all internal well components. Allow the chlorinated water to stand in the well for at least 30 minutes, and then purge the well of all chlorinated water. Make sure that the chlorinated water is discharged to the ground and not to a drainage ditch, stream, pond, lake, or wetland. .

Table 1. Parameters used to determine the amount of chlorine disinfectant that would provide a minimum chlorine concentration of 100 parts per million in the well

Well Diameter	Chlorine Bleach	Hypochlorite Granules
4 inches	3 cups/150 feet of water	2 ounces/150 feet of water
6 inches	3 cups/75 feet of water	2 ounces/75 feet of water
8 inches	3 cups/50 feet of water	2 ounces/50 feet of water
24 inches	8 cups/10 feet of water	5 ounces/10 feet of water

Well Casing, Screen, and Liner Removal

Well casing, screens, and liners must be removed from the well prior to sealing the well, but they may be removed simultaneously with the introduction of sealing material if necessary to avoid borehole collapse. If the well casing has been grouted in place and the driller is unable to remove the casing, the certified well driller may cut off the casing a minimum of five feet below the ground surface. For wells with multiple casings, the certified well driller should remove the innermost well casing, screen, or liner first and fill the well up to the level of the bottom of the next outer casing before removing the next outer casing.

Sealing Material Placement

The filling of the well is designed to prevent the migration of surface water or contaminants to the subsurface and to prevent migration of contaminants along water bearing zones. Use Table 2 to determine what material should be used to fill any type of well at a certain depth.

If a void exists within the well, the certified well driller should fill the well with sealing materials or other inert materials from the bottom of the well to at least five feet below the void. Then a packer, expansion bridge, or other support should be place at the top of the void, and a permanent bridge of at least 10 feet of sealing materials should be place above the expansion bridge. After dealing with the void, filling can proceed as indicated in Table 2, using the top of the void as the new bottom of the well.

Table 2. Sealing guidelines and materials

Well Type	Bottom - 5 Feet Below Ground Surface		Uppermost 5 Feet
	Bottom - 20 feet below ground surface	20 feet below ground surface - 5 feet below ground surface	
Drilled wells	Sealing materials, inert materials	Sealing materials	Sealing materials, clay, inert materials suitable to proposed land use
Wells with multiple casings	Sealing materials, inert materials	Sealing materials	Sealing materials, clay, inert materials suitable to proposed land use
Bored and hand dug wells	Sealing materials, dense grade aggregate limestone, sand or , native clay		Clay, impermeable materials suitable to proposed land use

Flowing Artesian Wells

Plug flowing artesian wells, or wells in which there is upward movement of water between aquifers, with neat cement grout that is pumped under pressure and mixed with the minimum quantity of water that will permit handling. The driller may restrict artesian flow if necessary. After plugging the well with grout, place a well packer, cast-iron plug, or temporary bridge at the bottom of the confining formation immediately overlying the artesian water-bearing horizon to seal off the flow.

Reporting

Within 60 days of closing a well, the certified well driller must complete and submit a Uniform Kentucky Well Maintenance and Plugging Record to the well owner and to DOW.

References

401 KAR 6:310 Section 11