Water Quality in Georgia

Wellhead Protection for Farm Wells

Cooperative Extension Service • The University Georgia College of Agricultural and Environmental Sciences • Athens

Ground water in Georgia is generally of very high quality and, for the most part, is free of man-made contamination. Where wells have been tested and found to be contaminated, the source of contamination is usually at or very near the well site. For this reason, it is very important to do all you can to protect your well and the surrounding area from all potential sources of contamination which may be present on your farm.

A good supply of fresh water is essential to all farming operations. We use fresh water for watering livestock, irrigating crops, mixing pesticides, cleaning equipment and human consumption. In Georgia, 90 to 95 percent of farmers obtain at least part of their water supply from farm wells. If they are not properly protected, these wells are at risk of being contaminated from several sources. Potential sources of ground water contamination on the farm include:

- livestock waste and waste lagoons
- pesticides
- fertilizers
- fuel storage tanks
- septic tanks

There are several important steps that you as a farmer should do to ensure that you do not contaminate your own well and, in the process, possibly contaminate other wells in your area. The six principles of wellhead protection are as follows:

SIX PRINCIPLES OF WELLHEAD PROTECTION

1. Proper well siting
2. Proper well construction
3. Keeping contaminants away from well
4. Backflow prevention
5. Sealing abandoned wells
6. Testing well water

1. Proper Well Siting

Proper well location can go a long way toward preventing contamination of a well. Unfortunately, many landowners place a higher priority on convenience and cost when deciding where to drill a well.

In general, the well should be located a safe distance away from all present or future sources of potential pollutants (See Principle 3). Where known sources of contaminants exist, the well should be located in a direction opposite the ground water flow (if known) and as far removed as the general layout of the premises and surroundings permits.

If possible, you should avoid locating a well in areas which are subject to flooding. If this is not possible, the well casing should extend at least two feet above the level of the highest known flood of record. Avoid low-lying areas and depressions where standing water is likely to accumulate around the well. Install the well in a location where surface water can be diverted away from the wellhead.

2. Proper Well Construction

When contamination occurs at a well site, it is usually the result of a pollutant entering the well either down the inside of the casing or around the outside of the casing. A well which is improperly constructed creates a direct conduit between the ground surface and the underground water supply.

In 1985, the Georgia legislature passed the "Water Well Standards Act of 1985." Among other things, this law provides standards for the construction, operation, maintenance and abandonment of wells and bore holes. It also requires that all well drillers have a license issued by the state.

The following is a list of some of the well construction requirements for a private well which should be of interest to anyone who is having a well drilled:

"Water bearing formations that are likely to be polluted shall be sealed off;"

"All drilled cuttings and other materials shall be removed from the entire depth of the well and the well *shall* be *disinfected*;"

"The upper terminal of the well shall be protected by a sanitary seal or cover to prevent entrance of

pollutants to the well;"

"The drilling contractor shall maintain in his office and shall furnish the owner a copy of the well construction data within 30 days of the well completion."

"A well having an open annular space between the casing and the bore hole *shall* be *grouted* and shall be filled with neat or sand cement grout or other impervious materials to prevent the entrance of pollutants or contaminants to the well." The minimum depth of seal for individual wells is 10 feet. It is preferred, however, that the well grout extend all the way from the ground surface to the water-bearing formation.

"All individual and nonpublic wells shall be curbed at the surface by the owner with a watertight curbing of concrete at least four inches thick and extending at least two feet in all directions from the well casing and sloping away from the casing;"

The requirements most frequently violated which pose a threat to ground water include lack of adequate grouting, lack of a proper seal at the top of the casing, lack of a concrete slab around the well casing and failure to disinfect the well after construction or well service. Figure 1 illustrates most of the requirements for a properly constructed well.

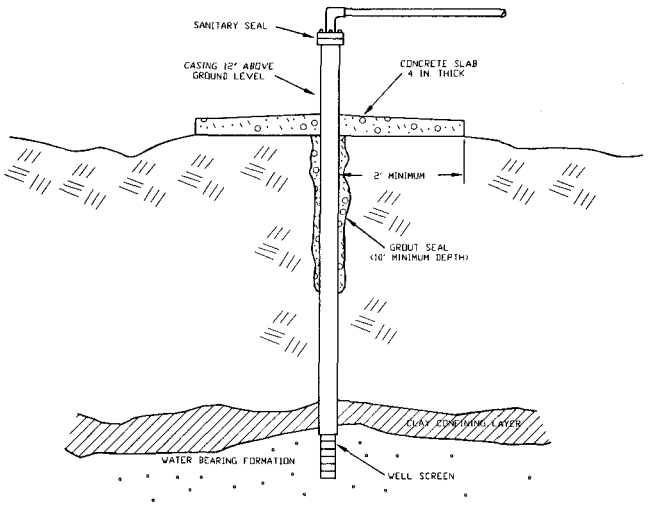

Figure 1. Typical Well Showing Proper Construction to Prevent Contamination

3. Keeping Contaminants Away from Well

In order to reduce the chances of an accidental spill in the vicinity of a well, or contamination of soil around a well, you should maintain certain minimum horizontal distances between the well and sources of contamination. The following are recommended minimum distances from potential pollution sources on the farm:

septic tank - 50 feet
septic tank absorption field - 100 feet
waste lagoon - 150 feet
dead animal burial pits - 150 feet
animal or fowl enclosure - 100 feet
pesticide storage, mixing and loading facilities - 100 feet
fertilizer storage - 100 feet
petroleum storage - 100 feet

Never mix pesticides or discard empty pesticide containers adjacent to a well. All such activities should be kept at least 100 feet from the well. The safest way to mix pesticides is to fill a nurse tank with water from the well and carry the water to the field where you can you fill the sprayer and mix chemicals a safe distance away from any water source. Empty containers should be pressure rinsed or triple rinsed, punctured and properly disposed of.

4. Backflow Prevention

One hazardous situation which can occur on the farm results when chemicals are accidently back-siphoned into a well. This can occur as a result of improperly filling spray tanks or when chemicals are injected into irrigation systems without proper safety devices.

As mentioned previously, filling spray tanks directly from a well is not recommended, especially after the chemical has already been added to the tank. However, if you do fill a spray tank in this manner, you should never submerge the end of the hose into the chemical/water mixture. If you do, and the well shuts off for some reason (power failure, etc.), the contents of the tank can be siphoned into the well. Always maintain an air gap between the hose and the spray tank so that back-siphoning cannot occur. (Figure 2) Also, the operator should always be present when filling spray tanks to prevent any such mishaps from occurring.

Some farmers who use irrigation routinely inject fertilizers or pesticides into the irrigation water as an effective means of applying them to the field. This method is commonly known as chemigation. Chemigation is a safe means of applying fertilizers and chemicals as long as certain safety precautions are observed. If certain backflow prevention devices are not installed properly, there is a chance that chemicals could back-siphon into the well. Figure 3 illustrates certain devices and interlocks which are required to prevent backflow of chemicals into a well. Before injecting any chemical into an irrigation system, be sure to check the label to verify that it is labelled for this use and observe all safety precautions on the label.

5. Sealing Abandoned Wells

Many farms in Georgia have old abandoned wells which are no longer in use. These wells represent a

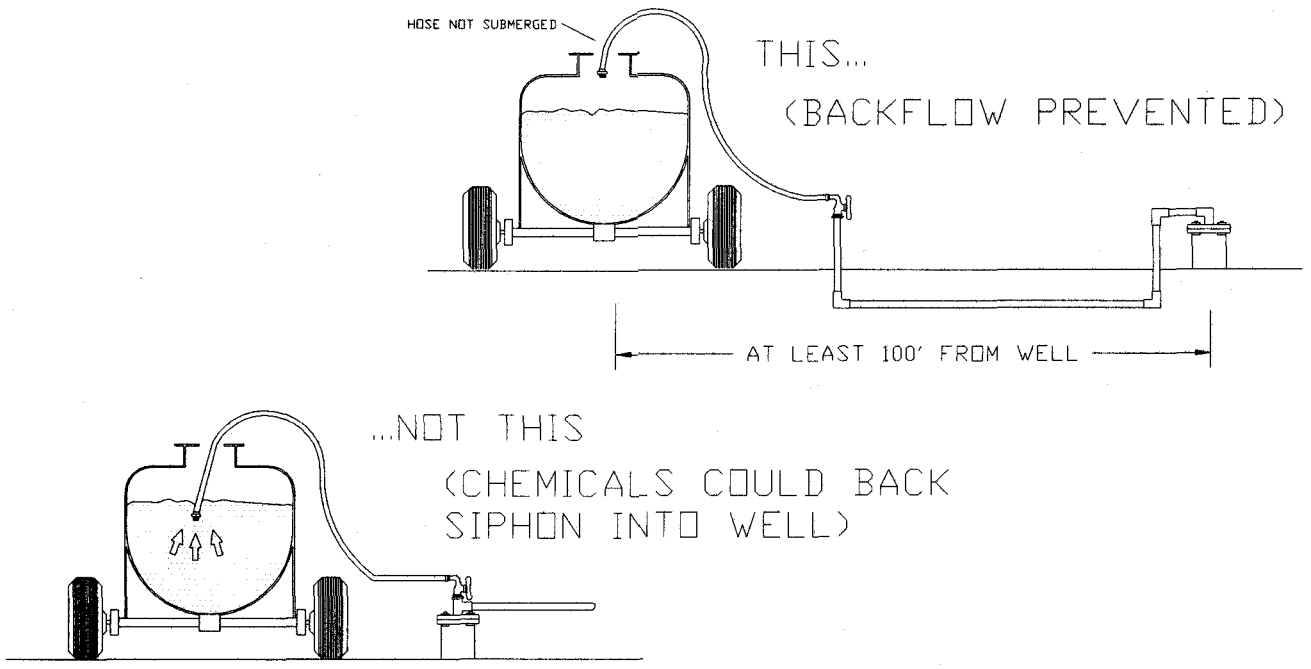

Figure 2. All pesticide mixing and handling should be done at least 100 feet from well. Never submerge hose in tank containing chemicals. Whenever possible fill a nurse tank from well and confine chemical mixing and loading to the field.

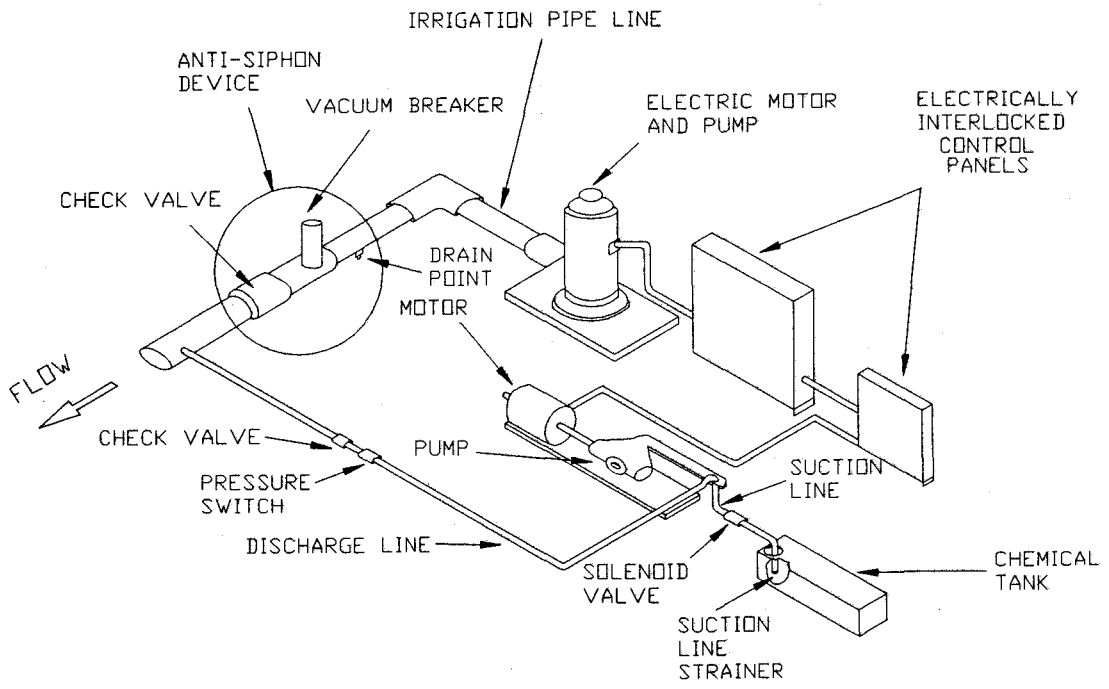

Figure 3: Recommended devices and arrangement of equipment to prevent backflow when applying chemicals through an irrigation systems.

potential threat to other operating wells in the area because they can serve as a conduit for contaminants at the surface to enter the aquifer. *Never* use an abandoned well to dispose of garbage or any other material which could contaminate ground water.

The "Water Well Standards Act of 1985" requires that all abandoned wells in the state must be "filled, sealed and plugged." In order to legally seal an abandoned well, the work must be performed by a licensed water well contractor or by a county or municipal government. Some counties in Georgia will fill abandoned wells if the well is reported to them by

the landowner.

6. Testing Well Water

All private wells in Georgia (farm, residential or otherwise) should be tested routinely to ensure that no contamination has occurred. Farm wells should at least be tested for bacteria and nitrates. Shallow wells drawing from water table aquifers should be tested at least once a year. Deeper wells tapping confined aquifers should be checked at least every three years. A complete mineral analysis should be done on all wells every three years. This test should include copper, lead and other heavy metals and may include iron, manganese, hardness and other minerals which can cause tastes or staining problems.

A test for pesticides, petroleum products or other volatile organic chemicals is usually not needed on a routine basis. If you suspect contamination from any of these sources, however, these tests are available. It helps if you can specify which particular chemicals you suspect. Otherwise, the cost can be very high.

Municipal water supplies are regulated and routinely monitored by state and federal agencies. There are no monitoring regulations, however, for private wells and, therefore, it is the responsibility of the well owner to insure the safety of his/her water.

In order to have your water tested, you may contact your local county extension agent for mineral analysis, nitrates, pesticides or volatile organic chemicals. The health department in most counties will perform a coliform bacteria test. There are also several private labs in the state who offer these services.

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