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Private Well Maintenance and Protection

An adequate supply of quality water is a necessity for rural living and farming. Water sources from municipal or rural water district systems are not available at most rural sites. Private wells are the main water source for rural living and farming. Municipal and rural water systems must maintain water quality standards specified by local, state, or federal requirements; however, owners of private wells are responsible for the water quality of their wells. Permanent contamination of groundwater can decrease property values, affect human and animal health, and involve legal liability.

Testing water from private wells has shown that some wells do not meet the safe drinking water standards used for public water systems. The primary reasons for this reduction in water quality from private wells include:

- contamination sources upslope or near the well;
- failure to construct the well in accordance with current standards;
- inadequate well maintenance and service; and
- lack of protection from activities that risk contamination.

Well Maintenance

When private wells are appropriately sited and constructed, routine maintenance is required to ensure wells continue to be safe. Wells that do not receive regular maintenance are more likely to produce unsafe water. See Table 1 for a private well checklist of actions.

Annual well maintenance should include:

- checking the well casing, well cap, pitless adapter, and electrical service for watertightness;
- ensuring the ground surface slopes away from the well for 15 feet in all directions;
- testing for coliform bacteria, nitrate, pH, and total dissolved solids; and
- cleaning and treating the well system as specified by the results of the water test.

Table 1. *Private Well 12-Point Checklist.*

At least once a year

- Check well casing is free of cracks or other leaks from water table to at least 1 foot above the ground surface or highest flood level.
- Verify the top sanitary seal, pitless adapter in the side of the casing, and electrical service are secure and watertight.
- Make sure the ground slopes away from the well for at least 15 feet in all directions.
- If test results indicate a need, shock chlorinate the well and water.
- Test water and file the results with other records and information about the well.

Plan to

- Have a licensed well driller or knowledgeable landowner do all work on well or well casing and be sure well meets all current construction standards.
- Find and fix the cause of any change in water color, taste, or odor and shock chlorinate the well.
- Maintain 50 feet (100 preferred) of open space between the well and any buildings, waste system, parked vehicle, equipment, compost, or other contamination source.
- Store chemicals such as fertilizer, pesticides, oil, fuel, or paint at least 100 feet downslope from well.
- Properly plug all abandoned wells and other holes not used in last two years and plug all unused cesspools and septic tanks
- Prevent backflow by maintaining an air gap above the container you are filling, or by using a backflow prevention device.
- Shock chlorinate the well after any service work on the pump, well, or water system.

Table 2. *Separation Distances (feet) of Contamination Sources from Wells.*

Potential Source of Pollution	Separation Distances[1]	
	Minimum (ft)	Desired (ft)
Sealed sewer lines (cast iron, tight line, etc.)	10	50
Unsealed sewer lines	50	>400
Septic tanks (watertight)	50	>100
Wastewater absorption fields (septic lateral lines)	50	>400
Pit privies	50	>400
Stables, livestock pens, lagoons, and manure piles	50	>400
Streams, lakes, and ponds	50	>100
Silage pits, and fertilizer and fuel storage locations (above or below ground)	50	>400
All other wastewater systems	50	>100
Property lines	25	> 50
Public wells[2]	100	>100
Buildings/structures (termite treatment)[3]	50	>100
Pesticide storage, mixing and disposal areas or areas of repeated pesticide use	50	>400

[1] These distances do not necessarily assure that no contamination will reach the well.
[2] Required by Policies, General Consideration and Design Requirements for Public Water Supply Systems in Kansas [K.S.A. 65-162a(b)].
[3] Not required by K.A.R. 28-30-8(a) but is required when injecting liquid pesticides into the soil.

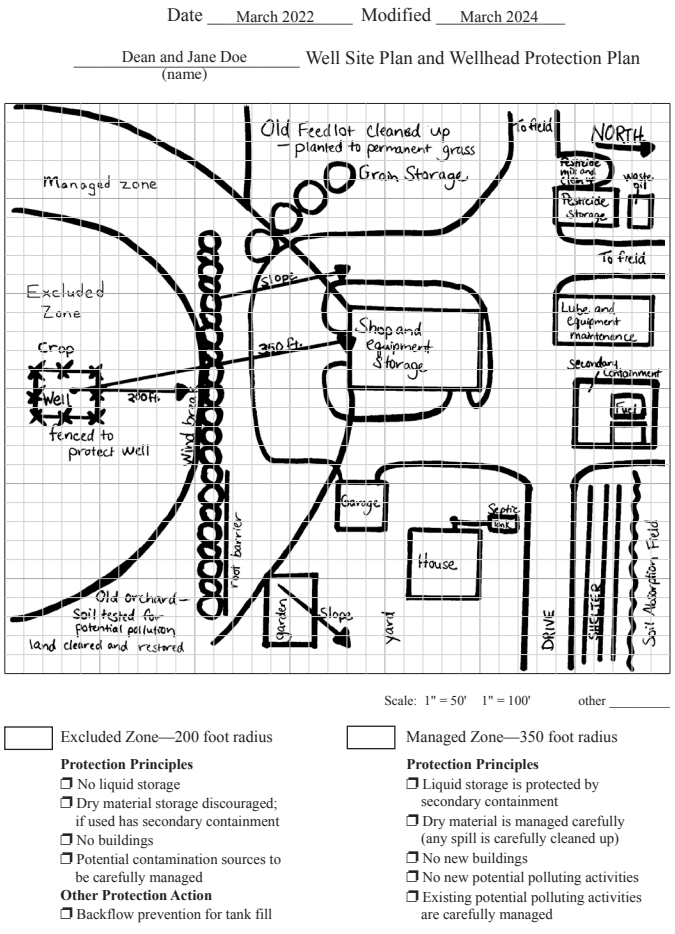

Figure 1. *Example Well Site and Wellhead Protection Plan.*

Wellhead Protection Plan

Every well needs a wellhead protection plan to ensure water quality protection, especially wells with site vulnerability to groundwater contamination within 500 feet of the well. To protect their wells, private well owners should develop a wellhead-protection plan, follow the plan, and record the results (see Figure 1).

Well location is the most important factor for protection of water quality. The well location should meet recommended separation distances between the well and potential contamination sources as shown in Table 2. Without a plan to protect the well from contamination and strict enforcement of the plan, high-risk activities may occur near the well and increase future groundwater contamination and well water quality deterioration.

A wellhead protection plan involves an excluded zone and a managed zone as shown in Figure 1. In the excluded zone, all high-risk situations and activities are avoided, and moderate-risk activities are managed carefully. The radius for the excluded zone area should be a minimum of 100 feet, although 200 feet or more is preferred.

In the managed zone, any high-risk situations should be addressed to lower the risk of those activities. The radius for the managed zone should be a minimum of 200 feet, although 400 feet or more is preferred. Guidelines for high-, moderate-, and low-risk are shown in Table 3.

Table 3. *Relative Risks for Home or Farmstead Activities.*

High Risk

- Polluting liquids without secondary containment such as fuel, solvent, chemicals (fertilizer, pesticide, etc.)
- Liquid/solid waste (home sewage, lagoons, farm trash)
- Water-soluble materials, fertilizer, pesticides
- Buildings and areas where the above materials are used, transferred, mixed, stored or cleaned up (shop or sprayer fill/clean up area)
- Livestock lots — abandoned or used, lagoons, liquid or solid manure storage
- No backflow prevention for the water system

Moderate Risk

- Intensive cropland, gardens, and yards, where chemicals (fertilizer or pesticide) are applied, especially when irrigated
- Powered equipment storage (tractors, truck, auto, etc.)
- Garage, grain storage, silo
- Livestock buildings with minimum liquids
- Backflow prevention used for water systems

Low Risk

- Pasture rangeland, woodland, cropland with low or no chemical usage
- Nonpowered equipment and machine storage
- Windbreak
- Buildings with no agricultural chemical or fuel/lubricant usage
- Organic garden or cropland
- Liquid storage with full secondary containment and careful management
- Water soluble materials with full spill protection, cleanup, and careful management
- Air gap maintained for all filling operations and backflow prevention is used throughout the water system

Accidents or Spills Near Wells

Wells can be threatened or damaged by chemical accidents that occur near or away from the well, depending on the size of the well's aquifer. Examples include fuel tank and fertilizer/pesticide tank leaks. The effect of these mishaps can be minimized with diligent management decisions. By moving these activities away from the well or an aquifer source, the effect to the well or aquifer is delayed or eliminated. Anticipating possible accidents and taking precautions takes little time and expense compared to the cost of environmental damage cleanup. Regardless of the well location, efforts should be made to mitigate these risks. Chemical accidents could have long-term implications for soil and water quality, and the underground water aquifers regardless of location.

Replacing a deteriorated hose on a fuel tank and providing secondary containment are inexpensive management actions. Farm liquids that could contaminate the well water supply should be managed carefully to avoid possible well-damaging accidents. Plan all temporary and long-term liquid storage locations away from the primary protection area and the secondary area depending on size of containment. State law requires any spills or accidental releases to be reported to Kansas Department of Health and Environment, (KDHE) 785-291-3333.

Backflow of contamination into the farm water system can result from a loss of delivery pressure due to pump failure, line break, or power interruption. These accidents can be hazardous or fatal to people and animals. A backflow prevention device should be installed in the water supply system to protect backflow issues.

A common backflow hazard exists when a water fill hose is inserted under a agricultural spray tank's water level, creating the opportunity for the tank's contents to drain backward by gravity through the hose. This hazard can be eliminated by maintaining an air gap above the top of the liquid in the tank/container. Instead of putting the hose into the tank, attach the fill hose's end above the top of the tank. Another hazard is livestock water tanks with the water level control valve below the tank's water surface, creating a backflow concern. A backflow prevention device would help avoid both hazards.

Important Well Records

A well is an important long-term investment in a homesite or farmstead. All information regarding its construction, modification, maintenance, and water testing should be kept in a safe, accessible place. The following describes the records needed.

Well Record. Well drillers are required to file a well log with KDHE. The well log gives important information about well construction including well depth, geologic layers penetrated, well casing, well screen, grouting, water depth, and well yield. A copy of the well log, construction cost, and other information pertinent to the well should be filed together. The pump information including system design, cost, model, serial numbers, and warranty information should be filed for future reference.

Well Service. Like other equipment, a well needs maintenance. Keep all records of well service, repair, and improvement together with details about completed services, costs, and service providers. Compiled records are a convenient way to chart well maintenance and service. Well service information and telephone numbers should be available to several farm employees in case of water system failures.

Well Tests. It is recommended that private wells be tested annually at a minimum. Retain all water test reports and compare results with previous and subsequent tests. Creating a graph will show when report values change significantly and could answer the following questions.

- Does the well test record show a trend that suggests a specific source of contaminants to water quality?
- Does the well test record fluctuate with the time of year, suggesting a seasonal effect?

Having comprehensive, long-term testing data creates greater confidence in the well service record. When water test results change greatly over time, a contributing source for the change may be nearby or the well may be in the path of a pollutant plume.

Additional Information

K-State Research and Extension offices — *www.ksre.k-state.edu/about/statewide-locations/*

Local health departments — *www.kdhe.ks.gov/2085/Directories-Maps*

Local environmental offices or county sanitarian — *www.kdhe.ks.gov/BusinessDirectoryII.aspx?lngBusinessCategoryID=49*

Sources

Groundwater Foundation — *groundwater.org/what-is-groundwater*

Environmental Protection Agency — *www.epa.gov/privatewells*

Well Owner Resources — *wellowner.org*

K-State Research and Extension Bookstore — *www.bookstore.ksre.ksu.edu*

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