Private Well Maintenance and Protection

Recent surveys of private wells have shown that on average only 40 percent meet safe drinking water standards used for public systems. Less than 20 percent of dug wells meet these standards. The primary reasons for this poor condition of water quality from private wells are the following factors:

- well down slope or near contamination sources
- well not constructed to present standards
- inadequate well maintenance and service
- well not protected from activities that risk contamination

Well Maintenance Needs

Maintenance is required to assure that private wells with good location and construction continue to be safe. A well that is not maintained can not be expected to reliably produce safe water. Conversely, wells that receive regular maintenance are more likely to produce safe water.

Annual well maintenance is recommended to include: check of the well casing for cracks or leaks, check of the well cap for water tightness, ground surface sloped away from the well for 15 feet in all directions, shock chlorination of the well and water system, and test of water for coliform bacteria, nitrate, pH and total dissolved solids. See Table 1 for a private well checklist of actions.

Every well needs a wellhead protection plan to assure protection of water quality especially wells being used for human consumption. The plan must then be implemented to have any benefit. The wellhead protection plan indicates site vulnerability to groundwater contamination and rates the risk of activities within 500 feet of the well. With so many problems of poor well water quality, it is in the owners' interest to take steps to protect their own wells so they can have safe water.

The first concern is that the location meets recommended separation distances between the well and sources of contamination as shown in Table 2. Well location with respect to potential contamination sources is the most important factor for protection of water quality. Without a plan to protect the well from contamination, some high risk activities will very likely occur near the well. In time, there is increased risk of groundwater contamination and well water quality deterioration, which may be permanent.

A good wellhead protection plan involves careful planning and may include a primary and secondary protection area as shown in Figure 1. In the primary protection area all high risk situations and activities are avoided and moderate risk activities are managed carefully. The radius for the primary protection area should be 100 feet minimum and up to 300 feet or more is preferred.

In the secondary protection area, high risk situations and activities employ additions or management to shift them to low or moderate risks. The radius for the secondary protection area should be a minimum of 200 feet and 400 feet or more is preferred. Guidelines for high, moderate, and low risk are shown in Table 3.

Table 1. Private Well 12-Point Check

Do at least once a year:

- Check to see that 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.*
- Check that the sanitary seal is secure and watertight and is a KDHE-approved type.*
- Make sure the ground slopes away from the well for at least 15 feet in all directions.*
- Shock chlorinate the well and water system.*
- Test water and file the results with other records and information about the well.*

Always do:

- 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. 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 down slope.
- Properly plug all abandoned wells and other holes not used in last 2 years and plug all unused cesspools and septic tanks*
- Prevent backflow and back-siphonage by maintaining an air gap above the container you are filling, or by using an adequate backflow prevention device.
- Shock chlorinate the well after any service work on the pump, well or water system*

* see Extension bulletins for additional information

The Farm•A•Syst or Farmstead Assessment System, K-State Research and Extension publication EP33-48, is designed to help the landowner to assess potential contamination sources and develop a wellhead protection plan.

Operation needs

Each year many wells are threatened or damaged by accidents that occur near the well. Examples include: fuel tank springs a leak, fertilizer nurse tank loses its contents, or parked sprayer is hit, and spills pesticide. These are all things that happen. The impact of these activities can be eliminated or minimized with diligent management decisions. By simply moving these activities far away from the well, the impact to the well is delayed and may even miss the well completely.

Anticipating possible accidents and taking precautions takes a small amount of time and expense compared to cost of cleanup or environmental damage. An ample supply of good quality water is an absolute necessary for living and operating the land. Permanent contamination of groundwater ultimately means loss of property value and may involve liability. Replacing the hose on the fuel tank when it is deteriorated and providing secondary containment are management actions that add protection inexpensively.

Liquids that would contaminate water should be managed carefully to avoid possible damaging accidents. Plan all storage locations including temporary ones away from at least the primary protection area and perhaps the secondary area also. State law requires any spills or accidental releases to be reported to Kansas Department of Health and Environment, (KDHE) 785-296-1678.

Backflow of contamination into the water system or well can easily result from a loss in pressure due to pump failure, line break, or power interruption. These accidents can be hazardous or fatal to people and animals. The most common backflow hazard results from a hose placed into a tank or container. This hazard is most inexpensively and reliably eliminated by maintaining an air gap above the lip of the receptacle. Instead of putting the hose into the tank, use a holder to support it above the container lip. Backflow prevention devices (backflow preventers) should be installed to protect from backflow or back siphonage whenever maintaining an air gap is not possible.

Important Well Records

A well is an important long-term investment to a homesite or farmstead. All information regarding its construction, modification, maintenance and water testing should be kept in a safe, accessible place. The following paragraphs briefly describe the important records. Extension bulletin, *Private Water Well Owner/ Operator Manual,* S-116 is a file folder designed to keep these records together.

Well Record. Since 1975, well drillers have been 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

Table 2. Minimum Separation Distance from Private Wells

This table gives the minimum separation distance required by regulation, K.A.R. 28-30-8, and recommended distances from the well site to sources of contamination. Greater separation distances should be provided where possible.

Potential Source of Pollution	Separation Distances (in feet) Minimum Required	Recommended
Sealed sewer line (cast iron, tight line, etc.)	10	50
Unsealed sewer lines	50	>400
Septic tanks (water tight)	50	>100
Wastewater absorption field (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, fertilizer and fuel storage (above or below ground)	50	>400
Seepage pits (or rat holes) prohibited after May, 1996	50	>400
All other wastewater systems	50	>100
Property line	25	> 50
Public water supply sources (i.e., wells)[1]	100	>100
Building/structure (termite treatment)[2]	50	>100
Pesticide storage, mixing and disposal areas or areas of repeated pesticide use	50	>400

* These distances do not necessarily assure that no contamination will reach the well.

[1] Required by Policies, General Consideration and Design Requirements for Public Water Supply Systems in Kansas [K.S.A. 65-162a(b)].

[2] Not required by K.A.R. 28-30-8(a) but is required when injecting liquid pesticides into the soil.

screen, grouting, water depth and well yield. A copy of the well log, construction cost and other information pertinent to the well should be kept together. The pump papers including cost, model and serial numbers, and warranty information also should be kept.

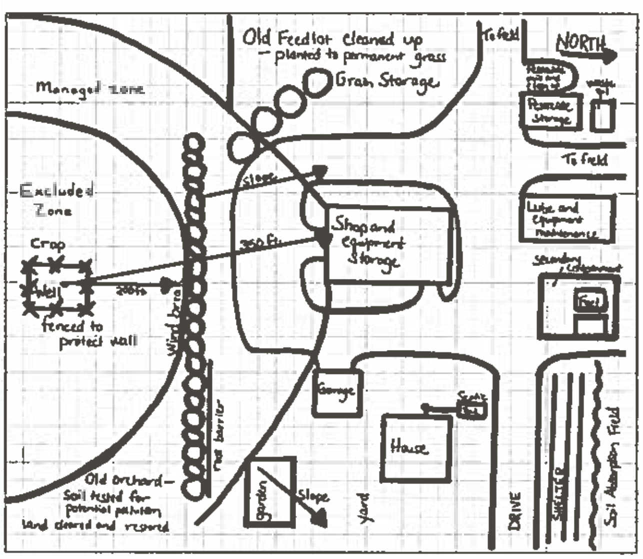
Well Service. Like other equipment, a well needs maintenance. A record of well service, repairs and improvements, together with details about what was done, who did the work, and the cost should be kept with well records. A convenient record keeping log is provided on the back of Private Water Well Owner/Operator Manual. This record of well service is a convenient way to chart a record of well maintenance and service.

Well Tests. Retain all water tests and compare results with previous and subsequent tests. Charting a graph makes it easy to observe when report values change significantly. Does the record show a trend that suggests a specific source of impact to water quality? Does the record fluctuate with the time of year, suggesting a seasonal effect? The more testing data available, the greater the confidence in the record. When water test results change a lot over a short or long time, a contributing source for the change may be nearby or the well may be in the path of a pollutant plume.

Figure 1. Well Site and Wellhead Protection Plan

Date __October 1996__ Modified __January 1998__

__Dean and Jane Doe__ Well Site Plan and Wellhead Protection Plan
(name)



Scale: 1" = 50' 1" = 100' other ________

☐ Excluded Zone—200 foot radius	☐ Managed Zone—350 foot radius

Protection Principles (Excluded Zone)
- ☐ No liquid storage
- ☐ Dry material storage discouraged; if used has secondary containment
- ☐ No buildings
- ☐ Potential contamination sources to be carefully managed

Other protection action
- ☐ Backflow prevention for tank fill

Protection Principles (Managed Zone)
- ☐ Liquid storage is protected by secondary containment
- ☐ Dry material is managed carefully (any spill is carefully cleaned up)
- ☐ No new buildings
- ☐ No new potential polluting activities
- ☐ Existing potential polluting activities are carefully managed

Table 3. Relative Risks for Home or Farmstead Activities.

Group A: High Risk

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

Moderate Risk

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

Low Risk.

- Pasture rangeland, woodland, low intensity (low or no chemical) cropland,
- Nonpowered machine storage,
- Windbreak,
- Low use buildings,
- Organic garden, organic 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

For More Information:
- Plugging Abandoned Wells. MF-935
- Plugging Cisterns, Cesspools, Septic Tanks and Other Holes. MF-2246
- Private Water Well Owner/Operator Manual
- Private Well Location and Construction, MF-970
- Shock Chlorination for Private Water Systems, MF-911
- Recommended Water Tests for Private Wells, MF-871
- Testing To Help Ensure Safe Drinking Water. MF-951

For Assistance :
- Local Health or Environmental office
- County or District Extension office
- K-State Research and Extension, Bio. & Ag. Engineering, 237 Seaton Hall, Manhattan, KS 66506 (785-532-5813)
- KDHE, Division of Environment, Nonpoint Source Section, Building 283, Forbes Field, Topeka, KS 66620 (785-296-4195)
- Kansas Geological Survey, 305 Moore, Lawrence, KS 66049 (785-864-3965)

Date ________________ Modifications ________, ________, ________

______________________ Well Site Plan and Wellhead Protection Plan
(name)

Scale: 1" = 50' 1" = 100' other __________

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