



Worksheet #1

Assessing the Risk of Groundwater Contamination from Drinking Water Well Condition

Why should I be concerned?

About 95 percent of this country's rural residents use groundwater to supply their drinking water and farmstead needs. Wells are designed to provide clean water. If improperly constructed and maintained, however, they can allow bacteria, pesticides, fertilizer or oil products to contaminate groundwater. These contaminants can put family and livestock health at risk.

There are documented cases of well contamination from farmstead activities near drinking water wells. The condition of your well and its proximity to contamination sources determine the risk it poses to the water you drink. For example, a cracked well casing allows bacteria, nitrates, oil and pesticides to enter the well more easily. A spill of pesticides being mixed and loaded right near the well could result in the contamination of your family's drinking water supply. Feedlots, animal yards, septic systems, fertilizer applications and waste storage areas could release large amounts of nitrate, contaminating your well.

Preventing well water contamination is very important. Once the groundwater supplying your well is contaminated, it is very difficult to clean up. The only options may be to treat the water, drill a new well, or obtain water from another source. A contaminated well can also affect your neighbors' wells, posing a serious health threat to your family and neighbors.

The goal of Farm•A•Syst is to help you protect the groundwater that supplies your drinking water.

How will this worksheet help me protect my drinking water?

- It will take you step by step through your drinking water well condition and management practices.
- It will rank your activities according to how they might affect the groundwater that provides your drinking water supplies.
- It will provide you with easy-to-understand rankings that will help you analyze the "risk level" of your drinking water well condition and management practices.
- It will help you determine which of your practices are reasonably safe and effective, and which practices might require modification to better protect your drinking water.

How do I complete the worksheet?

Follow the directions at the top of the chart on the next page. It should take you about 15-30 minutes to complete this worksheet and figure out your ranking.

Focus on the well that provides drinking water for your home or farm. If you have more than one drinking water well on your farmstead, fill out a worksheet for each one.

Information derived from Farm•A•Syst worksheets is intended only to provide general information and recommendations to farmers regarding their own farmstead practices. It is not the intent of this educational program to keep records of individual results.

Glossary

Drinking Water Well Condition

These terms may help you make more accurate assessments when completing Worksheet #1. They may also help clarify some of the terms used in Fact Sheet #1.

Abandoned well: An unused well that has been permanently closed according to Wisconsin regulations.

Air gap: An air space (open space) between the hose or faucet and water level, representing one way to prevent backflow of liquids into a well or water supply.

Anti-backflow (anti-backsiphoning) device: A check valve or other mechanical device to prevent unwanted reverse flow of liquids back down a water supply pipe into a well.

Aquifer: Zone in which readily extractable water saturates the pores of the geologic formations.

Backflow: The unwanted reverse flow of liquids in a piping system.

Backsiphonage: Backflow caused by formation of a vacuum in a water supply pipe.

Casing: Steel or plastic pipe installed while drilling a well, to prevent collapse of the well bore hole and entrance of contaminants, and to allow placement of a pump or pumping equipment.

Cross-connection: A link or channel between pipes, wells, fixtures or tanks carrying contaminated water and those carrying potable (safe for drinking) water. Contaminated water, if at higher pressure, enters the potable water system.

Drilled wells: Wells not dug or driven, including those constructed by a combination of jetting or driving. These wells are normally 4 to 8 inches in diameter.

Driven-point (sand point) wells: Wells constructed by driving assembled lengths of pipe into the ground with percussion equipment or by hand. These wells are usually smaller in diameter (2 inches or less), less than 50 feet deep, and can be installed in areas of relatively loose soils, such as sand.

Dug wells: Large-diameter wells often constructed by hand.

Groundwater: Subsurface water in a zone of saturation.

Grout: Slurry of cement or clay used to seal the space between the outside of the well casing and the bore hole, or to seal an abandoned well.

Milligrams per liter (mg/l): The weight of a substance measured in milligrams contained in one liter. It is equivalent to 1 part per million in water measure.

Parts per million (ppm): A measurement of concentration of one unit of material dispersed in one million units of another.

Water table: The upper level of groundwater in a zone of saturation. Fluctuates with climatic conditions on land surface, and with aquifer discharge and recharge rates.

Well cap (seal): A device used to cover the top of a well casing pipe.

Drinking Water Well Condition: Assessing Drinking Water Contamination Risk

1. Use a pencil. You may want to make changes.
2. For each category listed on the left that is appropriate to your farmstead, read across to the right and circle the statement that **best** describes conditions on your farmstead. (Skip and leave blank any categories that don't apply to your farmstead.)
3. Then look above the description you circled to find your "rank number" (4, 3, 2 or 1) and enter that number in the blank under "your rank."
4. Directions on overall scoring appear at the end of the worksheet.
5. Allow about 15-30 minutes to complete the worksheet and figure out your risk ranking for well management practices.

	LOW RISK (rank 4)	LOW-MOD RISK (rank 3)	MOD-HIGH RISK (rank 2)	HIGH RISK (rank 1)	YOUR RANK
LOCATION					
Position of drinking water well in relation to pollution sources	Upslope from all pollution sources. No surface water runoff reaches well. Surface water diverted from well.	Upslope from or at grade with pollution sources. No surface water runoff reaches well.	Downslope from most pollution sources. Some surface water runoff may reach well.	Settling or depression near casing. Surface water runoff from livestock yard, pesticide and fertilizer mixing area, fuel storage or farm dump reaches well.	_____
Separation distances between well and farmstead contamination sources*	Meets or exceeds all state minimum required separation distances.	Meets most minimum separation distances.	Meets minimum separation distances only for sources required to be at least 100 feet from well.	<i>Does not meet all minimum separation distances for sources required to be at least 100 feet from well.**</i>	_____
Soil and/or sub-surface potential to protect groundwater	Fine-textured soils (clay loams, silty clay). Water table or fractured bedrock deeper than 20 feet.	Medium-textured soils (silt loam, loam). Water table or fractured bedrock deeper than 20 feet.	Medium- or coarse-textured soils. Water table or fractured bedrock deeper than 20 feet.	Coarse-textured soils (sands, sandy loam). Water table or fractured bedrock shallower than 20 feet.	_____
CONDITION***					
Condition of casing and well cap (seal)	No holes or cracks. Cap tightly secured. Screened vent.	No defects visible. Well vented but not screened.	No holes or cracks visible. Cap loose.	Holes or cracks visible. Cap loose or missing. Can hear water running.	_____
Casing depth	Cased more than 100 feet below water level in your well.	Cased 31–100 feet below water level in your well.	Cased 10–30 feet below water level in your well.	Cased less than 10 feet below water level in your well. No casing.	_____

Boldface type: Besides representing a higher-risk choice, this practice also violates Wisconsin law.

*See page 2 of Fact Sheet #1, *Improving Drinking Water Well Condition*.

**Illegal for new well construction. Existing wells must meet separation requirements in effect at time of construction.

***See page 4 of Fact Sheet #1 for minimum construction requirements of ND 112.

	LOW RISK (rank 4)	LOW-MOD RISK (rank 3)	MOD-HIGH RISK (rank 2)	HIGH RISK (rank 1)	YOUR RANK
Casing height above land surface	More than 12 inches above grade.	8–12 inches above grade.	At grade or up to 8 inches above.	Below grade or in pit or basement.	_____
Well age	Less than 20 years old.	21–50 years old.	51–70 years old.	More than 70 years old.	_____
Well type	_____	Drilled	Driven-point (sand point)	Dug well	_____
MANAGEMENT					
Backflow prevention	Anti-backflow devices (such as check valves) installed on all faucets with hose connections. No cross-connections between water supplies.	Anti-backflow devices installed on some faucets with hose connections.	No anti-backflow devices. Air gap maintained.	No anti-backflow devices. Air gap not maintained. Cross-connections between water supplies.	_____
Unused well	No unused, unsealed wells.	Unused wells capped and protected.	Unused, unsealed well in field. Not capped or protected.	Unused, unsealed well in farmstead. Not capped or protected.	_____
Water testing	Consistent satisfactory water quality. Bacteria, nitrate and other tests meet standards.	Occasional deviation from standards with bacteria, nitrate and other tests.	Bacteria, nitrate and other tests mostly do not meet standards.	No water tests done. Water discolored after rainstorms or during spring melt. Noticeable changes in color, clarity, odor or taste.	_____

TOTAL

Use this total to calculate risk ranking on back page of worksheet.

Notes

What do I do with these rankings?

Step 1: Begin by determining your overall well management risk ranking. Total the rankings for the categories you completed and divide by the number of categories you ranked:

$$\frac{\text{total of rankings}}{\text{\# of categories ranked}} \text{ divided by } \frac{\text{total of rankings}}{\text{\# of categories ranked}} \text{ equals } \boxed{\text{risk ranking}}^*$$

*Carry your answer out to one decimal place.

3.6–4=low risk 2.6–3.5=low to moderate risk 1.6–2.5=moderate to high risk 1–1.5=high risk

This ranking gives you an idea of how your well management practices **as a whole** might be affecting your drinking water. This ranking should serve only as a **very general guide, not a precise diagnosis**. Because it represents an **averaging** of many individual rankings, it can mask any **individual** rankings (such as 1's or 2's) that should be of concern. (See Step 2.)

Enter your boxed well management risk ranking on page 1 of Worksheet #12. Later you will compare this risk ranking with other farmstead management rankings. Worksheet #11 will help you identify your farmstead's site conditions (soil type, soil depth and bedrock characteristics), and Worksheet #12 will show you how these site conditions affect your risk rankings.

Step 2: Look over your rankings for individual activities:

- Low-risk** practices (4's): ideal; should be your goal despite cost and effort
- Low-to-moderate-risk** practices (3's): provide reasonable groundwater protection
- Moderate-to-high-risk** practices (2's): inadequate protection in many circumstances
- High-risk** practices (1's): inadequate; pose a high risk of polluting groundwater

Regardless of your overall risk ranking, any individual rankings of "1" require immediate attention. Some concerns you can take care of right away; others could be major—or costly—projects, requiring planning and prioritizing before you take action.

Find any activities that you identified as 1's and list them under "High-Risk Activities" on pages 6-7 of Worksheet #12.

Step 3: Read Fact Sheet #1, *Improving Drinking Water Well Condition*, and consider how you might modify your farmstead practices to better protect your drinking water.



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