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# Assessing the Risk of Surface and Ground Water Contamination From Drinking Water Well Condition

Utah State University Extension

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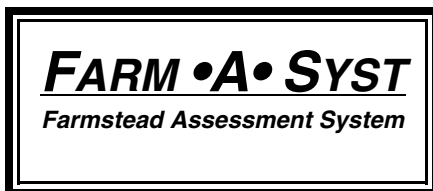
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## ***Assessing the Risk of Ground Water Contamination from Drinking Water Well Condition***

Utah Farm •A•Syst Worksheet #1

November 1999

### ***Why should I be concerned?***

Nearly 100 percent of Utah's rural residents use ground water (wells and springs) to supply their drinking water and farmstead needs. Wells are designed to provide clean water. If improperly constructed and maintained, however, they can allow oil, fuel, fertilizer, pesticides, bacteria and other contaminants to pollute ground water. 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 along with its location in relation to sources of contamination 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 near the well could result in the contamination of your family's drinking water supply. Feedlots, animal yards, septic systems, fertilizer storage, and waste storage areas could release large amounts of nitrate which may contaminate your well.

Preventing well water contamination is very important. Once the ground water supplying your wells 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 others.

**The goal of Farm •A•Syst is to help you protect the ground water 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 ground water that provides your drinking water supplies.
- It will provide you with easy-to-understand rankings that will help you estimate the risk posed by 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.

*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.*

UTAH STATE UNIVERSITY EXTENSION • UTAH DEPARTMENT OF AGRICULTURE AND FOOD • UTAH DEPARTMENT OF ENVIRONMENTAL QUALITY • UTAH FARM BUREAU • UTAH ASSOCIATION OF CONSERVATION DISTRICTS • NATURAL RESOURCES CONSERVATION SERVICE

## ***How do I complete the worksheet?***

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Follow the directions at the top of the chart on the next page. It should take you about 12-20 minutes to complete this worksheet and determine your ranking. If you have more than one drinking water well, fill out a worksheet for each one.

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## **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:** A well that has been permanently taken out of use. To be **permanently abandoned**, a well must be sealed according to Utah State Engineer's rules.

**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:** An underground layer or geologic formation in which ground water saturates the pores between the rocks or soil particles.

**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.

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

**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 1 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.

**Unused well:** A well which is currently not in use, but may be used in the future.

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

**Well-cap:** A device used to cover the top of a well casing pipe.

# Utah Farm•A•Syst Worksheet #1

## **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 circles 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.

	<b>LOW RISK (rank 4)</b>	<b>LOW-MOD RISK (rank 3)</b>	<b>MOD-HIGH RISK (rank 2)</b>	<b>HIGH RISK (rank 1)</b>	<b>YOUR RANK</b>
<b>LOCATION</b>					
<b>Slope of land near drinking water well. Well position in relation to pollution sources.</b>	Well is upslope from all pollution sources. All surface water runoff is diverted so that it drains away from the well.	Well is at grade with pollution sources, but surface water runoff does not drain from pollution sources. No water stands near the well after precipitation.	Well is downslope from a pollution source. Surface water runoff is not diverted and may reach the well.	Settling or depression near casing. Well is located downslope from more than one pollution source. Surface water runoff stands near well.	_____
<b>Separation distances between farmstead pollution sources and drinking water well.</b>	All legal separation distances are met (cesspools, drainfields, sewer lines, septic tanks). Other sources are 100 feet (more at high risk sites).		Legal separation distances are met, but are inadequate due to other factors (well is used heavily, coarse soil, shallow ground water, etc.).	<i>One or more sources closer than legally required separation distance.*</i> Other sources not covered by law are less than 100 feet from well.	_____
<b>Position of drinking water well related to flooding.</b>	Well is outside of a flood plain. No flood water ever reaches well.	Well is inside flood plain at an elevation above highest flood level on record. Water has not reached well.	Well is inside flood plain at an elevation below highest flood level on record. Flood water may reach well.	Well is located inside flood plain and near stream. Flood water stands around well casing some years.	_____
<b>WELL CONSTRUCTION**</b>					
<b>Well Age</b>	Less than 20 years since construction.	20 to 50 years since construction.	50 to 70 years since construction.	Over 70 years since construction.	_____
<b>Casing height above land surface or highest flood level.</b>	18 inches or more above grade or 3 feet above the highest recorded flood level.	18 inches above grade, <i>but less than 3 feet above the highest flood level.</i>	<i>Less than 18 inches above grade or the highest recorded flood level.</i>	<i>At or below grade or highest flood level. In a pit or in a basement. More than 70 years old.</i>	_____

	<b>LOW RISK (rank 4)</b>	<b>LOW-MOD RISK (rank 3)</b>	<b>MOD-HIGH RISK (rank 2)</b>	<b>HIGH RISK (rank 1)</b>	<b>YOUR RANK</b>
<b>Well type.</b>	Well drilled according to Utah Codes.	Driven well or sand point.	Drilled well constructed by unlicensed driller.	Dug well.	_____
<b>Well seal.</b>	Steel casing in good condition is sealed with 3 inches total grouting to at least 18 feet deep. Well is securely capped.		Extent of grouting is unknown. Well cap is loose. Condition of casing is unknown. <b>Plastic casing within 18 feet of surface.</b>	<b>Casing is uncapped</b> , corroded, punctured, cracked, or grouting is loose (casing moves by hand). <b>Less than 3 inches grouting.</b>	_____
<b>Casing depth and depth of screened intake.</b>	Approved solid casing is installed to bottom of bore hole (at least 18 feet). Screened intake.		<b>Casing does not reach water table or aquifer. Casing is perforated above water table</b> (water drips into well).	<b>No casing (or lining in dug wells). Screened intake is less than 18 feet below the surface.</b>	_____
<b>Backflow prevention.</b>	Anti-backflow devices on all faucets with hose connections. No plumbing connections like drinking water and other water supplies.	Anti-backflow devices not on all faucets with hose connections, but air gap is maintained. No plumbing cross-connections exist.	Drinking water and other water supplies have plumbing cross-connections. Air gap may be maintained. No anti-backflow devices.	No anti-backflow devices are installed. An air gap is not maintained. Plumbing cross-connections link water supplies	_____
<b>WELL MANAGEMENT</b>					
<b>Unused wells.</b>	No unused, unsealed wells are in or near farmstead.	All unused wells are capped and protected.	An unused, unsealed well is in or near the farmstead.	Unsealed well in farmstead in same aquifer as drinking water well.	_____
<b>Water Testing.</b>	Consistent satisfactory water quality. All tests meet standards.	Last tests were satisfactory, but are more than 1 year old.	Water has not been tested.	Water tests do not meet standards. A change in odor, taste, clarity, or color occurs.	_____
<b>Well disinfection.</b>	Well is disinfected as bacteria tests indicate.	Well is disinfected annually.	Well has never been disinfected.	High bacteria counts, but not disinfected.	_____
<b>TOTAL SCORE</b>					_____

This worksheet is designed for assessing water table wells. Some categories are inappropriate for artesian wells. See Fact Sheet #1 for more information.

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

\* Illegal for new well construction. Existing wells must meet separation requirements in effect at time of construction. See Fact Sheet #1 for separation distances.

\*\*Contact the Utah Division of Water Rights for copies of water well logs which should provide information about these factors associated with well construction.