Assessing your **Water Well Condition and Maintenance**

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IOWA FARM BUREAU

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What is Iowa Farm A Syst?

Iowa Farm*A*Syst is a farmstead assessment system developed to assist rural residents in protecting their water resources, particularly their drinking water. Individuals can tailor the Iowa Farm*A*Syst program to meet their needs by choosing specific topics that fit their farmstead or acreage. The Iowa Farm*A*Syst program is based on a series of 11 units. Each unit provides information on the subject area and an assessment worksheet to evaluate on-farm practices affecting water quality. Also included in the units are references to Iowa environmental laws and technical assistance contact information.

How will I know which unit will help me?

You will be able to identify the most useful Iowa Farm*A*Syst units by asking yourself the following questions.

Do you…	Review/print this Iowa Farm*A*Syst unit
Get your drinking water from a private well?	Water Well Condition & maintenance
Have any unused or abandoned wells on the farm?	Water Well Condition & maintenance
Have a private system to dispose of bathroom and kitchen wastewater?	Household Wastewater Management
Have feedlots or barnyards?	Open Feedlot Manure Management
Raise livestock in confinement?	Confinement Livestock Manure Management
Dispose of dead animals on your farm?	Dead Animal Management
Use or store pesticides?	Pesticide Storage & Management
Use or store fertilizer?	Fertilizer Storage & Management
Use or store petroleum products?	Petroleum Storage & Management
Use or store hazardous materials such as chemicals, batteries, or petroleum products?	Hazardous Materials Storage & Management
Have a manure storage unit?	Assessing Your Emergency Response Planning for Manure Spills

How do I start assessing my farmstead?

The 11 Iowa Farm*A*Syst units are each designed to be stand-alone units. However, the first step to assessing your farmstead should be to draw a map of the area and label any potential sources of contamination. Every farmstead is unique. You need to evaluate your farmstead's site characteristics to determine the potential for groundwater and surface water contamination. This unit can help you get started. After you have mapped your farmstead, consider what management decisions may be affecting the quality of your water resources. This process will help you to prioritize which of the other Iowa Farm*A*Syst assessments you may want to complete.

For more information or to download additional Iowa Farm*A*Syst units, visit www.iowafarmasyst. com or Contact **Rick Robinson**, Iowa Farm Bureau (515) 225-5432

Water Well Condition and Maintenance

Putting in a new well is much the same as putting in a new window. When installing a window, a hole is cut into the house. The goal is to seal the window tightly to ensure nothing enters the house.

When installing a well, a hole is drilled into the ground to tap into an aquifer (water bearing zone) for drinking water. The well must be placed in the proper location and sealed correctly. A good well seal prevents surface contaminants, such as disease-causing microbes, pesticides, fertilizers and petroleum products from entering the well and groundwater source.

To ensure a window is sealed properly, you feel for a draft and look to see whether anything is entering the house. To ensure your drinking water is safe and contaminants are not entering the well, you need to regularly inspect and test your well and water distribution system.

Even if your drinking water is supplied by a rural water source, you may still have a well on your property that needs regular inspection and maintenance. If you have a well that is not used, please refer to the section "Abandoned Wells" found in this publication to determine whether it needs to be plugged.

Ask Yourself These Questions Do You...

- Have a well with a casing that is damaged or does not extend above the ground surface?
- Test your well water less frequently than once per year?
- Mix or store pesticides or other chemicals within 100 feet of your well?
- Have a septic tank or wastewater treatment system within 100 feet of your well?
- House livestock or accumulate manure within 200 feet of your well?
- Have a well in an area that is prone to standing water or flooding?

If you answered "YES" to any of these questions, you may be at high risk for contaminating ground and surface water, jeopardizing the health of your family or violating Iowa law. Read on to learn how you can minimize these risks.

"What kind of a well do I have?"

Types of Wells

Documentation is important for understanding how your well was constructed. If you lack documentation on an older well, contact the person or company who constructed it. Your county sanitarian may be a source for well documentation. The Iowa Geological Survey also may have the well log information on your well.
If you cannot locate information about your well, look at the diameter of the casing. A driven or sand point well is usually 2 inches or less in diameter, a drilled well is usually less than 8 inches, and a bored well is usually more than 18 inches in diameter.

Understanding the basics about wells helps you understand how problems are prevented or fixed. Basic well types include the following:

- **Drilled well.** These wells are commonly constructed with 4 or 6 inch diameter steel or plastic casing. Used throughout Iowa, these wells range from 40 to 3,000 feet deep. These wells draw water from sand and gravel deposits or from bedrock aquifers. Little water is stored in the casing, so the pumping rate is limited by how quickly the water enters in the well.

- **Bored or augured well.** Primarily found in western, southern, and central Iowa, these wells draw water from seepage through glacial deposits, sand deposits or from areas where wind-blown soils meet glacial deposits. Bored wells are commonly constructed using a 30 - 48 inch diameter concrete or clay casing. Bored wells are usually less than 100 feet deep and generally draw from water-bearing zones that yield

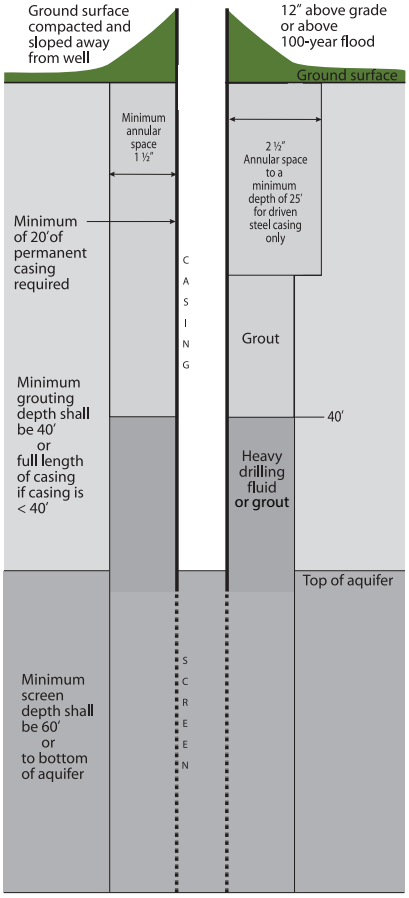
2 gallons of water per minute or less. The large-diameter casing serves as an underground reservoir, storing approximately 50 gallons of water in each foot of filled casing. During peak use, water is pumped from storage. During the times the well is idle, seepage fills the well. Because of their shallow depth and the manner in which the casings are joined together, bored wells are considered to be more prone to contamination than drilled wells.

- **Buried slab bored well.** The buried slab well is a bored well where the large concrete-tile casing is capped with an underground, pre-cast concrete slab. The slab is placed at least 10 feet below the ground surface. Steel or plastic casing, about 6 inches in diameter, is attached to the slab and extended to at least one foot above the ground surface. The well is sealed using a 1 foot layer of bentonite placed on top of the concrete slab. The seal ensures that the top 10 feet of the casing is watertight, thereby preventing surface water infiltration into the well. Thoroughly compacted backfill is placed around the upper, watertight section of casing. All new bored wells shall be constructed in this manner.

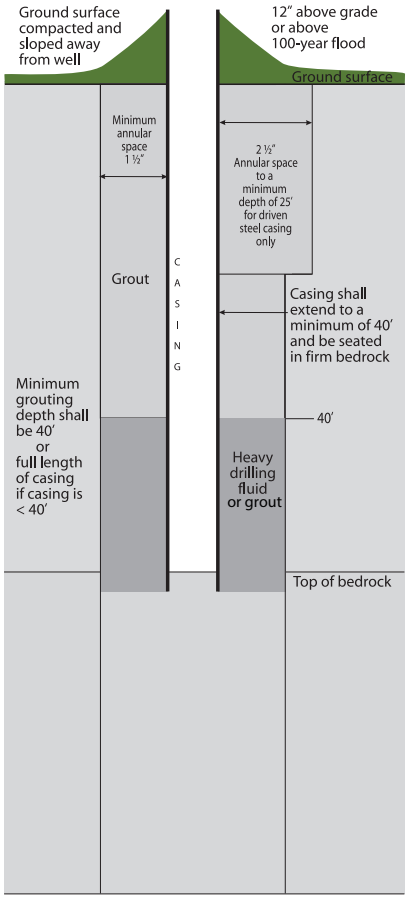
- **Sand point.** This type of drinking water well has a small diameter steel casing with a pointed screen at the bottom that is driven into shallow sand aquifers. Sand point wells utilize very shallow groundwater and because of this, they are poorly protected from surface water contamination and are not recommended for drinking water.

- **Dug well.** These wells were dug by hand and are typically very old. They are usually 36 inches or more in diameter and cased with stone, brick, wood or other materials. Dug wells are usually in poor condi-tion and highly susceptible to contamination and should not be used for drinking water. They also are a safety hazard due to their large diameter and poor condition.

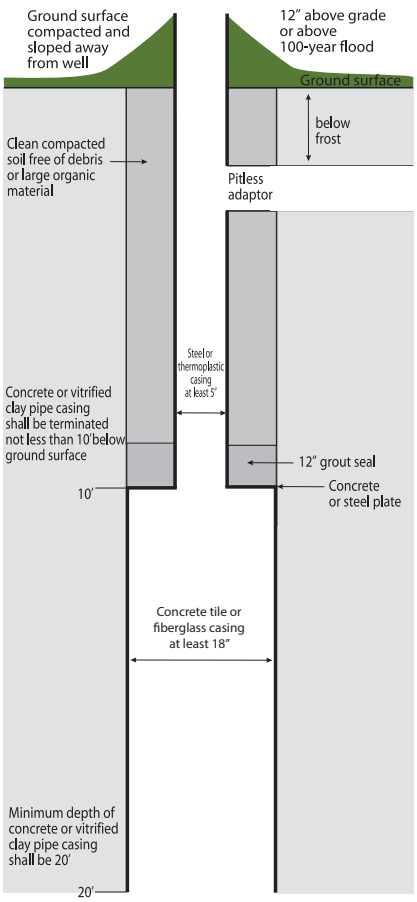
Drilled wells in unconsolidated materials
(Iowa Administrative Code 567-49)



Drilled wells in consolidated materials
(Iowa Administrative Code 567-49)



Bored and augered wells in unconsolidated materials
(Iowa Administrative Code 567-49)



Well Depth
The actual depth of the well cavity does not tell you whether you have a deep or a shallow well. A shallow well does not have 5 feet of continuous low-permeability soil or rock (shale, for example) located at least 25 feet below the ground surface and above the aquifer (water bearing zone). A deep well has a minimum of 5 feet of continuous low-permeability soil or rock (located at least 25 feet below the ground surface and above the aquifer. Locate the well driller's log or talk to your certified well contractor to find out if you have a deep or shallow well.

"My water tastes fine. I don't have to test it, right?"

Testing Your Drinking Water

Seventy-five percent of Iowans rely on groundwater for their drinking water. A water test tells you whether the groundwater from your well is safe to drink. Containers for sample collection may be obtained from county sanitarians, some ISU County Extension offices, certified drinking water laboratories or the State Hygienic Laboratory at the University of Iowa. Follow the instructions and return the sample to the laboratory for testing.

Have your well water tested for free or at a nominal charge! Call your county sanitarian today and ask whether your county participates in the Grants-to-Counties program that provides cost-sharing for well remediation, well plugging and/or water testing.

Tips for Testing Water:

1) **Test your well water annually.** Late spring is the best time for testing your drinking water. The potential for groundwater contamination is highest because of snowmelt and spring rains. Environmental conditions change, so it is best to test a well every year. If you notice something unusual, test your water more frequently.

2) **Reasons for testing water more often than annually include:**

- Plumbing changes or any work done on the well or pumping or distribution systems.
- Unexplained diarrhea illnesses in the family.
- A sudden change in water taste, odor, color or clarity.
- Pregnant women and/or infants are drinking the water.
- Noticeable changes in livestock performance.

Definition

Bore hole. The hole that is drilled for the well. Casing is installed in the bore hole to prevent the hole from collapsing. The bore hole provides access to groundwater. It creates a direct pathway where contaminants from the land surface may enter groundwater. Proper well design and construction features, like placing the casing deeper in the ground and using full depth well casing grouting, will block this contamination pathway.

- **Casing.** Maintains the well opening and is generally steel or PVC in drilled wells. Bored wells use concrete, tile or fiberglass casing. All wells should have permanent casing at least 20 feet deep. Well casing should extend to at least 1 foot above ground or above the highest known flood level.
- **Grout.** The slurry of cement or bentonite clay that is used to seal the space between the outside of the well casing and inside of the bore hole to prevent surface contaminants from reaching groundwater.
- **Well seal or well cap.** A tightly fitting seal or cap at the top of the casing that prevents dirt, rodents, rain water and other foreign material from entering the well. Commercially manufactured caps or seals designed for drilled wells are best. They also can be used for bored wells that use a buried slab design.
- **Vent.** A downward-facing, small diameter opening in the well cap, covered with fine wire mesh, which allows air to enter the well when the pump is running.
- **Screen.** A section of the well that has narrow slots, which prevents sand from entering, but allows water to pass through.

- Your neighbors find a contaminant in their well.
- Flood or standing waters near or over the well head. (After flood waters have receded, hire an Iowa DNR certified well contractor to make sure your water system is safe to operate and then have the water tested to make sure it is "safe to drink."

Shock chlorinating is not a cure-all for water contamination problems. If the well has structural problems or is finished in an aquifer that is closely connected to surface water, you will continue to experience water quality problems. Contact your county sanitarian for further assistance.

3) **At a minimum, have your well water tested for coliform bacteria and nitrate.** These tests are inexpensive and should be done from a clean drinking faucet in the house. Coliform bacteria, nitrates and arsenic are the primary health concerns. Consideration also should be given to testing for arsenic and fluoride. Although not a health concern, drinking water also can be evaluated for hardness, iron, iron bacteria and other factors.

4) **Reasons to test for a particular chemical or contaminant.** Test your drinking water immediately if you suspect that there is a specific contaminant in your drinking water because of an unusual situation. State Hygienic Laboratory at the University of Iowa or another certified drinking water laboratory can perform specialized tests. These unusual situations may include:

- Fuel or oil spill near the well or on your farmstead.
- A chemical spill or backsiphoning incident at or near your well or on your farmstead.
- Application of chemicals or manure within 200 feet of your well.
- If you live in an area where groundwater may contain arsenic.

5) **Caution must be taken to avoid improper sample collection and poor sampling locations.** Either one could result in a false-positive bacterial result.

"Test results indicate my water has coliform bacteria and too much nitrate or too much arsenic. What does that mean?"

Coliform bacteria do not cause disease. However, their presence may indicate the presence of disease-causing micro-organisms, manmade chemicals or other contaminants.

Unsafe Coliform Bacteria and Nitrate

When test results indicate your drinking water is contaminated with coliform bacteria or nitrate, you need to search for the pathway of contamination. If your well is contaminated because of a defect in your well or drinking water supply system, the defect must be repaired. If coliform bacteria are present, the well should be shock-chlorinated after repairs are made and then retested. The retest will tell you whether the water is safe to drink and whether repairs were successful.

Coliform Bacteria

Pathways of contamination may include:

- Distribution problems, from an improperly functioning water softener, water filters, pressure tank, etc.
- depth, inadequate grouting, flooded well pit.
- Well construction pathways of contamination may include:defects - such as brick wells, cracked casing, improper well cap, inadequate casing depth, inadequate grouting, flooded well pit.
- Contaminated cistern.
- Cross-connections with nondrinking water sources.
- Backflow from hose into hydrant, faucet or well.
- Nearby abandoned well that has not been properly plugged.
- Nearby septic tank or lateral field lines.
- Nearby drainage tiles.
- Well or distribution repairs completed without disinfecting (shock chlorinating) afterward.

Arsenic
The drinking water standard is 10 micrograms per liter (ug/L) or parts per billion (ppb). Exposures to arsenic over the standard should be avoided. At higher levels, some people who consume the water over many years may experience skin damage or have problems with their circulatory system. They can also have an increased risk for certain cancers.

Increased levels of arsenic do not always indicate that there is a problem with the construction of your well. This is because arsenic can occur naturally in Iowa's geologic settings and become part of the water supplied by the aquifers.

In some cases, special well construction standards can be used to target a specific water source and reduce the level of arsenic in your water supply. In nearly all cases you should be able to treat your drinking water so that it is safe to consume.

If you find that you have high arsenic in your water supply, you should consult with a professional well contractor and your water treatment professional to determine the best route for you to limit your exposure.

Your county sanitarian can help you search for the contamination pathway by performing a sanitary survey. The sanitarian can offer suggestions for remedies and inform you of available grant money. A certified water well contractor also may be able to pinpoint the problem.

Additional testing for coliform bacteria at strategic locations (well or distribution system; before or after softeners or filters) can help pinpoint the problem area.

Nitrate
The drinking water standard is 10 milligrams per liter (mg/l), or parts per million (ppm). At levels greater than the standard, infants under 6 months of age may be at risk to methemoglobinemia, commonly called blue-baby syndrome. However, the Iowa Department of Public Health reports that methemoglobinemia is no longer considered a reportable disease in Iowa. Elevated levels of nitrates are associated with the development of certain kinds of cancers in otherwise healthy adults in some studies.

*** Nitrate vs. Nitrate-Nitrogen**
The maximum acceptable level of nitrate in your drinking water may be reported in two ways:

- 10 ppm nitrate measured as nitrate-nitrogen (NO_3-N)
- 45 ppm of nitrate measured as nitrate (NO_3)

Nitrate-nitrogen levels below 100 ppm do not cause problems for mature livestock. However, if nitrate-nitrogen levels exceed 100 ppm, some animals may be affected.

Many people believe that boiling drinking water can cure all possible water problems. However, boiling water that is high in nitrate actually concentrates the nitrate, making the problem worse.

Boiling your water is NOT a quick fix! Boiling water does not solve all your water quality problems. In fact, boiling water concentrates nitrate, making the problem worse!

Nitrate concentrations exceeding the drinking water standard of 10 ppm nitrate-nitrogen are generally an indication of contamination from major nitrogen sources such as a sewage disposal system, animal manure or nitrogen fertilizer.

Nitrate contamination is more likely to occur in shallow wells and in wells that are poorly located, constructed or maintained.

"Now I know my drinking water isn't safe. What can I do to fix the problem?"

Options for Unsafe Drinking Water

When you have repeated poor water tests, you have several options that vary with the source of the problem. Possible solutions include the following:

1) **Well remediation (fix or rehabilitate your well).** Many county health departments have Grants-to-Counties funding available to help pay for well remediation if the defect is easily correctable and remediation will improve groundwater quality and protection.

2) **Install a new well.** Well installation is expensive, but is an option as long as there is not widespread groundwater contamination. You must properly plug the old well when a new well is installed.

3) **Water treatment.** No treatment system removes all contaminants. Treatment units also need maintenance and periodic testing to make sure that they continue to properly treat the water.

A publication from the State Hygienic Laboratory at the University of Iowa, *Well Water Quality and Home Treatment Systems,* addresses this issue.

4) **Purchase drinking water (bottled or rural water).** Drinking water can be purchased, but it is expensive and must always be on hand. Rural water connections are available in some areas.

However, buying bottled water, installing a water treatment unit or connecting to rural water does not prevent the continued contamination of groundwater by a poorly constructed or poorly maintained well.

"If the test results indicate that my water is safe to drink, I don't have anything to worry about, right?"

Preventing Contamination

Even if water tests are negative for contaminants, preventing future contamination is important. Keep the well area clean and accessible. Have a certified water well contractor check the well and water distribution system if you suspect problems not indicated by a water test.

To help prevent contamination, minimum distances between wells and potential sources of contamination must be maintained. These minimum separation distances are:

- 100 feet from a preparation or storage area for commercial fertilizers or chemicals.
- 100 feet from oil or petroleum storage and transfer locations.
- 50 feet from septic tanks, sewers or tightly jointed tiles.
- 100 feet from soil absorption field or other secondary wastewater treatment for household sewage.
- 200 feet from unformed earthen manure storage basins or lagoons that meet DNR construction standards
- 400 feet from unformed earthen manure storage basins or lagoons that meet DNR construction standards.
- 1,000 feet from sanitary landfills and older, unpermitted earthen manure storage basins or lagoons.
- 100 feet from older wells and unused wells that have not been properly plugged.
- 1000 feet from ag drainage wells.

Never store or handle contaminants, such as oils or pesticides, near a well. Once a chemical enters the groundwater, it can take years for contamination to disappear. If you have other wells on your farm, such as livestock wells, make sure they are in good condition so contaminants do not enter groundwater through them.

Keep in mind that activities off the farm can affect groundwater. Chemical spills, changes in land use and the presence of landfills may increase the chance of pollutants getting into the groundwater.

Changing the location of a well in relation to contamination sources may protect your drinking water supply, but not the groundwater itself. Any possible source of groundwater contamination should be eliminated or minimized, even if your well is far away. **Whether or not your drinking water is affected, contaminating groundwater violates Iowa law.** Groundwater contamination may not only pollute your drinking water, but it may also pollute your neighbors' drinking water.

"I've decided to drill a new well. Is there anything important I should know?"

Constructing a New Well

If a new well is needed, proper design and construction are critical. Regardless of whether a well meets all the minimum separation distances, your drinking water is still at risk if the well is poorly constructed. Important considerations for installing a new well include the following:

- Contact your local health department or county sanitarian for assistance in choosing the proper location for your well and to obtain the construction permit required by Iowa law.

- The Iowa Geological Survey can provide you with a free well forecast upon request. A well forecast provides information specific to a particular location on: available groundwater sources; amount of water a well in this location can be expected to provide; the quality of the water supply; sequence of geologic materials to be encountered in drilling; appropriate advisories on well construction and potential contamination problems.

- Only an Iowa DNR certified water well contractor may construct wells in Iowa. The certified contractor is a good resource for information on well construction. The law also requires that the well contractor provides a consumer information booklet on water well construction to the landowner.

- When constructing a new well, Iowa law requires a well contractor to keep a detailed well log, which must be filed with the Iowa Geological Survey. Make sure you receive a copy of the log, which includes depth, geological formations penetrated, length of casing, and type and amount of casing grout, subsurface changes in casing diameter, type and length of well screen, and depth to water.

- The certified well contractor must disinfect a new well after it has been constructed.

- Once the well is complete, Iowa law requires that the well owner must take a water sample and have it analyzed for total coliform bacteria and nitrate levels. The well water sample should be collected between 10 days and 30 days after a well is put in service.

"I have an old, unused well on the back of my farmstead. It's not bothering anyone, so I can just leave it there, right?"

Abandoned Wells

In the earlier days of Iowa farming, water wells were valued assets. In addition to a well that served the farmstead, farmers typically placed wells near livestock. As farms consolidated and changed ownership, or as farmsteads disappeared, wells were abandoned and locations were forgotten.

Remember the little girl in Texas who fell into an abandoned well? That well was only 8 inches in diameter!

Abandoned wells are wells that are no longer in use or are in a state of disrepair. The Iowa Department of Natural Resources estimates that up to 125,000 abandoned wells remain in the state. Nearly 1,800 wells are plugged each year. Abandoned wells are a health and safety hazard. If not properly closed, abandoned wells can be a trap for unsuspecting children, hunters, farmers and their equipment and animals. **All abandoned wells are a direct route for surface water carrying contaminants to groundwater.**

Abandoned Well Plugging

According to Iowa law, all abandoned wells need to be located and properly plugged within 90 days of abandonment. Iowa DNR requires that a certified well contractor performs the well plugging unless the well owner does the work themselves. Well owners who plug their own wells may not hire any labor for filling and sealing the well, or for modifying the well casing. The well owner must always certify with the county sanitarian that well plugging was done according to state requirements by submitting the Iowa DNR form 542-1226, *"Abandoned Water Well Plugging Record"*.

Some abandoned wells are easy to find because they are located under old windmills or pump houses. Others aren't so easy to find. Abandoned wells can be located in:

- Low-lying areas near rivers, streams and waterways.
- Under clumps of grass, brush or collapsed buildings.
- Under an unusual depression in the ground.

Many times abandoned wells have simply been pushed in and covered with dirt. A depression in the ground may signal such a well. Wells filled with dirt are not properly plugged and they can cave in when stepped on or driven over.

You may be eligible for Grants-to-Counties financial assistance for plugging abandoned wells on your farm. Contact your county sanitarian.

Your county sanitarian can provide information on how to properly plug your well. Abandoned wells should be plugged with watertight sealing material, usually bentonite or neat cement. For detailed information on well plugging refer to the DNR website and search for "well plugging" or contact your county sanitarian or the Iowa DNR.

Threats to groundwater and safety hazards are minimized once a well is properly plugged. The ground covering a properly plugged well is then available for other purposes, such as farming.

For More Information

County Sanitarian (County Environmental Health Official)
If the listing in this publication is not current, contact your county courthouse or board of supervisors for contact information.

- Issues permits for private drinking water wells.
- Approves locations for new wells.
- Assistance in plugging abandoned wells.
- Tests water.
- Provides grant money for water testing and well plugging.
- Archives well documentation.

State Hygienic Laboratory at the University of Iowa
Phone: 319-335-4500 or toll free 800-421-IOWA (4692) Web: *www.shl.uiowa.edu*

- Provides water testing sample kits and analysis.
- Provides information and publications about drinking water, well, and water treatment.

Iowa State University Extension
Contact your county extension office. The county director or area ag engineer can answer your questions or direct you to other extension specialists.

- Provides water testing kits.
- Distributes publications on a variety of topics. Publications are available at ISU Extension county offices or from the Extension Distribution Center, Ames, IA, 515-294-5247. Many of the publications are available online at *www.extension.iastate.edu/store/*

Iowa Water Well Association
Phone: 515 243-1558 Web: *www.iwwa.org*

- Assists with locating certified well contractors in your area.

Iowa Department of Natural Resources
Des Moines - Iowa DNR Private Well Program - Phone: 515-725-0462 Web: *www.iowadnr.gov*

- Maintains the statewide rules for private well construction.
- Assists with understanding the Iowa law and DNR rule requirements for private wells.
- Provides a statewide listing of certified well contractors.

DNR Environmental Protection Division Field Offices
Phone: Atlantic - 712-243-1934 , Des Moines - 515-725-0268, Manchester - 563-927-2640, Mason City - 641-424-4073, Spencer - 712-262-4177, Washington - 319-653-2135

- Assists with understanding Iowa law and DNR rule requirements.
- Provides guidance and field enforcement of DNR program rules.

Iowa Geological Survey, IIHR - Hydroscience & Engineering, The University of Iowa
Phone: 319-335-1575 Web: *www.iihr.uiowa.edu/igs*

- Provides well forecast and location assistance.
- Maintains well logs on the GEOSAM database, which can be accessed through the Iowa Geological and Water Survey web site (see above).
- Assists homeowners with well problems.

Iowa Department of Public Health
Division of Environmental Health - Phone: 515-281-7462 *Web: www.idph.state.ia.us*

- Provides information on health effects of water contamination.
- Offers water testing assistance.
- Manages the Grants to Counties Well Program, which helps pay for water testing, well renovation and well plugging for qualified private wells.

Assessment: Water Well Condition and Maintenance

Evaluate your potential risk for having unsafe drinking water as a result of the condition and maintenance of your water well. The evaluation areas are in the shaded "Risk" column. Choose the risk category that best fits your situation. Note how likely you are to have drinking water problems, as indicated by "low risk," "moderate risk" and "high risk."

Take special note of the critical evaluation points. If you fail to meet these standards, your drinking water supply is in immediate danger.

Those situations that violate Iowa law are indicated by '**!**' and printed in bold text.

Risk	Low Risk	Moderate Risk	High Risk
Well Construction			
Well type	Drilled or buried slab well.	Sand point or bored well.	Dug well.
Well age	Constructed after 1988.	Constructed between 1940 and 1987.	Constructed before 1940.
Condition of well cap (seal)	Cap has no holes or cracks **AND** Cap is tightly secured **AND** Air vent is screened.	Air vent screen is damaged or missing **OR** Cap is loose or in poor condition.	
Casing	Detailed well construction information available **AND** Records show that well casing was installed according to state standards by a certified contractor.	Limited well construction information available **AND** Visual assessment indicates casing is in fair to good condition.	Old brick casing **OR** Casing is cracked, collapsed **OR** No portion of casing is visible above ground **OR** Water is cloudy or off-color.
Casing height above ground surface	Casing is more than 12 inches above ground surface **AND** Above the 100 year flood level.	Casing is above ground surface by less than 12 inches **OR** Casing is below flood level.	Casing is below ground surface, in pit or basement.
Grouting	Available well construction information shows well casing was properly grouted.	No well construction information available **AND** Visual inspection does not indicate whether casing was grouted.	No well construction information available **AND** Visual inspection reveals cracks or gaps exist between well casing and surrounding soil where water can infiltrate.
Water testing			
Testing frequency and results	Drinking water tested every spring **AND** Results are consistent and meet drinking water standards.		Water not tested annually **OR** Test results do not meet minimum standards.

Risk	Low Risk	Moderate Risk	High Risk
Well Construction			
Surface water flow	Well located on high ground **AND** Soil is mounded around well **AND** Surface water flows away from well **AND** Surface water does not pond near well.	Well located in low area **OR** Soil is not mounded around well **AND** No pollution sources can reach well.	Surface water and runoff from potential pollution sources (feedlots, fuel storage, fertilizer/pesticide storage) can reach well.
Separation distances between well and farmstead contamination sources	Meets or exceeds all state minimum required separation distances: 100 feet from fertilizer and pesticide preparation and storage areas* **AND** 100 feet from petroleum storage **AND** 50 feet from septic tanks, sewers or tightly jointed tiles **AND** 100 feet from lateral fields (secondary treatment for household sewage and wastewater) **AND** For deep wells, 100 feet from livestock areas/manure accumulation **AND** For shallow wells, 200 feet from livestock areas/manure accumulation **AND** 400 feet from unformed earthen manure storage basins or lagoons that meet DNR standards **AND** 1,000 feet from sanitary landfills and older, unpermitted earthen manure basins or lagoons **AND** 100 feet from unused wells that have not been properly plugged.		**Does not meet one or more of the minimum separation distances.**

* Iowa law governing private water wells sets a 100 feet minimum separation distance from fertilizer and pesticide preparation and storage areas. Conversely, according to Iowa law governing pesticide and fertilizer storage, the minimum separation distance from private water wells is 150 feet.

Risk	Low Risk	Moderate Risk	High Risk
Well Construction			
Soil and/or subsurface potential to protect groundwater	Soils near well are tight and do not drain well.	Soils near well are moderately well drained.	Soils near wells are sandy and well drained.
Flood level	Well located outside of floodplain or low-lying area.	Well located in flood plain or low-lying area AND Soil mounded around well AND Well casing extends above the 100 year flood level or the highest known water level at the well location - whichever is greater.	Well located in flood plain or low-lying area OR Well casing and cap are inadequately sealed to prevent flood waters from entering well.
Backsiphon prevention	No contaminated water source exists on your farmstead **OR** Anti-backflow devices are installed on all faucets and hydrants with hose connections **AND** Check valve is present as part of, or immediately above, submersible pump.	Contaminated water source exists but is not physically connected to drinking water system. (For example, old well not connected to rural water or new well piping) **OR** No anti-backflow devices are installed on hydrants.	Contaminated water source directly connected to drinking water source. (For example, a contaminated well and clean well are piped together.)
Well repair and service			
Repairs and service on well, pumping system, piping or distribution system	Only an Iowa DNR certified well contractor performs all well repairs and well services.		**A non-certified contractor works on any part of the well OR** The well owner works on the well.
Abandoned well plugging			
Abandoned and unused wells	No abandoned wells on farmstead **OR** All unused wells are properly plugged.	Unused well has been maintained in good condition.	**Abandoned well present and has not been properly plugged.**

Environmental Health Sanitarians County Contact List

COUNTY	CONTACT NAME	PHONE #
Adair	Steve Patterson	641/747-8320
Adams	Carl Goodson	641/322-3410
Allamakee	Laurie Moody	563/568-4104
Appanoose	Steve Prevo	641/724-3511
Audubon	Steve Patterson	641/747-8320
Benton	Marc Greenlee	319/472-3119
Black Hawk	Jon McNamee	319/291-2413
Boone	John Roosa	515/433-0591
Bremer	Randy McKenzie	319/352-0332
Buchanan	Chad Beatty	319/334-2873
Buena Vista	Kim Johnson	712/749-2555
Butler	Misty Kroeze	319/267-2964
Calhoun	Shelly Schossow	712/297/8323
Carroll	Carey Kersey	712/792-9532
Cass	Steve Patterson	641/747-8320
Cedar	Phil LaRue	563/886-2248
Cerro Gordo	Brian Hanft	641/421-9340
Cherokee	Justin Pritts	712/225-6721
Chickasaw	Ken Rasing	641/394-2406
Clarke	Allan Mathias	641/342-6654
Clay	Tammy McKeever	712/262-8165
Clayton	Janet Ott	563/245-2451
Clinton	Shane McClintock	563/659-8148
Crawford	Carey Kersey	712/792-9532
Dallas	Ted Trewin	515/993-5803
Davis	Steve Prevo	641/724-3511
Decatur	Allan Mathias	641/342-6654
Delaware	Dennis Lyons	563/927-5925
Des Moines	Jim Holley	319/753-8217
Dickinson	David Kohlhaase	712/336-2770
Dubuque	Bonnie Brimeyer	563/557-7396
Emmett	Amiee Devereaux	712/362-5702
Emmett	Joe Neary	712/852-3058
Fayette	Catherine Miller	563/422-3767
Floyd	Jeff Sherman	641/257-6145
Franklin	Earl Kalkwarf	515/532-3461
Fremont	John Travis	712/374-3355
Greene	Tim Healy	515/386-8343
Grundy	Carie Sager	319/824-1212
Guthrie	Steve Patterson	641/747-8320
Hamilton	Al Haberman	515/832-9510
Hancock	Steve Anderson	515/295-3813
Hardin	Nancy Bunt	641/939-8444
Harrison	Matt Pitt	712/644-2302
Henry	Jodi Sutter	319/385-6724
Howard	LaCinda Altman	563/547-9209
Humboldt	Dave Stull	712/335-4142
Ida	Don McLain	712/364-3498
Iowa	Cheryl Andresen	319/828-4401
Jackson	Richard Heller	563/652-5658
Jasper	Frank Frieberg	641/792-7603
Jefferson	Kevin Luetters	641/472-2561
	Dan Miller	
Johnson	James Lacina	319/356-6040
Jones	Paula Hart	319/462-4715
Keokuk	Eric Dursky	641-660-3419
Kossuth	Steve Anderson	515/295-3813
Lee	Rose Hankedahl	319/372-5225
Linn	Heidi Peck	319/892-6000
Louisa	Andrew Beaver	319/523-3981
Lucas	Sherry Lutz	641/724-3511
Lyon	Joel Moser	712/472-8230
Madison	Elton Root	515/462-2636
Mahaska	Eric Dursky	641-660-3419
Marion	Cory Frank	641/828-2243
Marshall	John Kunc	641/754-6370
Mills	Mike Sukup	712/527-9699
Mitchell	Mark Ross	641/832-3943
Monona	Sandy Bubke	712/423-3400
Monroe	Sherry Lutz	641/724-3511
Montgomery	Bev McAlpin	712/623-4753
Muscatine	Jim Schaapveld	563/263-0482
O'Brien	Jonathon Hintz	712/757-0105
Osceola	Steve Van Kley	712/754-3765
Page	Benjamin Roed	712/542-3864
Palo Alto	Joe Neary	712/852-3058
Plymouth	Noel Ahmann	712/546-7516
Pocahontas	Dave Stall	712/335-4142
Polk	David Williamson	515/286-3726
Pottawattamie	Kay Mocha	712/328-5792
Poweshiek	J.D. Griffith	641/623-3762
Ringgold	Allan Mathias	641/342-6654
Sac	Sherrie Wilson	712/662-7929
Scott	Eric Bradley	563/326-8618
Shelby	Terri Daringer	712/755-2609
Sioux	Ken Oldenkamp	712/737-2248
Story	Margaret Jaynes	515/382-7240
Tama	Todd Apfel	641/484-4788
Taylor	Angela Green	712/523-2556
Union	Amanda Husband	641/782-7803
Van Buren	Gerald Hannam	319/293-3431
Wapello	Ross Glosser	641/684-5425
Warren	Curt Coghlan	515/961-1062
Washington	Jennine Wolf	319/653-7782
Wayne	Dave Rhodes	641/872-1903
Webster	Kari Prescott	515/573-4107
Winnebago	Ron Kvale	641/903-9214
Winneshiek	Doug Groux	563/387-4120
Woodbury	Ron Brandt	712/279-6119
Worth	Chris Maier	641/845-2200
Wright	Sandy McGrath	515/532-3461

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