University of Nebraska Cooperative Extension EC 98-765-S

Farm•A•Syst

FACTSHEET 3

Nebraska's System for Assessing Water Contamination Risk

Improving Drinking Water Well Condition

Groundwater protection is an important aspect of farm, ranch and rural homesite management today. Nearly all rural families rely on groundwater for their drinking water. Safeguarding the drinking water depends on where the well is placed on the site, how the well was constructed, how the well is maintained, the siting of new wells, and managing wells no longer in use.

Wells can become a direct conduit for pollutants to enter the groundwater. Cases of groundwater pollution have become increasingly common. Pollution of the groundwater not only affects you and your family, but the health of your neighbors, pets and livestock as well. Careful management of the drinking water well, and all other wells on your site, will help keep the groundwater safe.

1. Well location

Whether a well taps water just below the ground or hundreds of feet deep, its surface location is a crucial safety factor. Locating a well in a safe place takes careful planning and consideration of such factors as where the well is in relation to surface drainage and groundwater flow. A well downhill from a livestock yard, leaking fuel tank, or failing septic system runs a greater risk of contamination than a well on the uphill side of these pollution sources.

Surface slope does not always indicate the direction a pollutant might move once it gets into groundwater. In shallow aquifers, groundwater flow is often in the same direction as surface water flow. If the aquifer supplying water to your well is deep below the surface, though, its slope may be different than that of the land surface. Finding out about groundwater movement on your site might require special monitoring equipment, but many contacts in Nebraska may be able to tell you about groundwater flow if you can supply an accurate legal location (see *Contacts and References*).

Separation distances

Good well location is encouraged by requiring minimum separation distances from sources of potential pollution, thus using the natural protection provided by soil. However, state well regulations do not list every activity and structure. For example, in Nebraska, private well regulations (Nebraska Title 178 Chapter 12—Regulations Governing Water Well Construction, Pump Installation and Water Well Abandonment Standards) do not deal with petroleum product storage or silage. When no distances are specified for a possible source of pollution, provide as much separation as possible between your well and any potential contamination source—especially if your site is on highly permeable soils of river valleys or wet meadows, or if the contamination source or activity presents a high risk of contamination.

Both soil and slope can make siting a well a tricky

Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture.
Elbert C. Dickey, Interim Director of Cooperative Extension, University of Nebraska, Institute of Agriculture and Natural Resources.

University of Nebraska Cooperative Extension educational programs abide with the non-discrimination policies of the University of Nebraska-Lincoln and the United States Department of Agriculture.

business. *Table 1* lists required minimum separation distances from specific pollution sources for new well installation. *Table 2* provides recommended minimum separation distances for pollution sources not listed in the well construction regulations. You may want to choose greater separation distances in some cases, depending on factors at your site. This will help provide reasonable assurance that your well will not be polluted by on-site activities in the future. Also consider contamination sources on adjacent properties. Existing wells are required by law only to meet separation requirements in effect at the time of well construction. Make every effort, however, to exceed "old requirements," and strive to meet current regulations whenever possible.

Changing the location of your well in relation to contamination sources may protect your water supply, but not the groundwater itself. Any condition likely to cause groundwater contamination should be evaluated, even if your well is far away from the potential source. Whether or not drinking water is affected, contamination of groundwater is a violation of Nebraska law.

Simply separating your well from a contamination source may reduce the chance of pollution, but it does not guarantee that the well will be safe. Storm water and shallow groundwater can carry bacteria, oil products, and

Table 1. Required minimum separation distances between well and potential source of contamination for new well installation. Source: Title 178 Chapter 12—Regulations Governing Water Well Construction, Pump Installation, and Water Abandonment Standards (Nebraska Health and Human Services System Regulations and Licensure).

Minimum required distances from well to protect from seepage:

10 feet	depressions that could retain stagnant water pump pits and tank pits sewer lines frost-proof hydrants
10-50 feet	sewer lines within this distance must be watertight when subjected to pressure equivalent of a column of water 10 feet high
50 feet	septic tank
100 feet	cesspool or seepage pit privy any other subsurface disposal system any known or suspected source of contamination or pollution

Table 2. Recommended minimum distances between well and potential source of contamination for new well installation for pollution sources not listed in the well construction regulations. (For sources not addressed, provide as much separation as possible from well.)

Recommended **minimum** separation distances between well and potential sources of contamination:

10 feet	cistern
25 feet	animal barn pen with concrete floor
50 feet	sewage holding tank animal shelter or yard feed storage facility, glass-lined manure hopper or reception tank, liquid-tight silo with pit silo without pit, but with concrete floor and drain filter strip
100 feet	gasoline and other liquid petroleum products underground surface (more than 1,500 gallons) fuel oil tanks underground surface (more than 1,500 gallons) manure storage structure, fabricated, liquid-tight pesticide or fertilizer storage tanks pesticide or fertilizer transfer or loadout facility
250 feet	liquid waste disposal system manure stack silage storage, earthen trench, or pit manure storage structure, earthen or excavated

pesticides from one place to another. Wells located in the path of polluted water run a risk of contamination from overland flow washing into an improperly constructed and sealed well. Some wells become contaminated through polluted recharge at great distances, depending on the depth of the aquifer and that of the well screen.

2. Well construction

Poor well design can allow groundwater contamination by allowing rain or melted snow to reach the water table without filtering through soil. Wells located in pits, or without surface grouting or a cap, can allow surface water to carry bacteria, pesticides, fertilizer, or oil products into your drinking water supply. Proper well design reduces the risk of pollution by sealing the well from anything that might enter it from the surface. *Figure 1* illustrates the typical well installation to meet construction regulations. Many lending agencies now require that the well must meet Nebraska Health and Human Services System Regulation and Licensure's construction standards before the lending agency will approve a loan.

The way in which a well was constructed, even if the design is sound, affects its ability to keep out contaminants. Several things that should be checked are described in the following sections. Well construction information may be available from the person who originally drilled your well, from the previous owner, or from the well registration filed with the Department of Water Resources (primarily large capacity irrigation and municipal wells before September 1993, and all wells since September 1993) or University of Nebraska Conservation and Survey Division.

Casing, grouting, and well cap

The water well contractor installs a steel or plastic pipe (casing) during construction to prevent collapse of the borehole. The space between the casing and the sides of the hole (annular space) is a direct channel for surface water and pollutants to reach the water table. To seal off that channel, the driller fills the space with grout (cement, concrete, or a special type of clay called bentonite, depending on the geologic materials encountered). Both grout and casing prevent pollutants from seeping into the well.

The Nebraska Health and Human Services System Regulation and Licensure's regulations require that the annular space of all wells producing

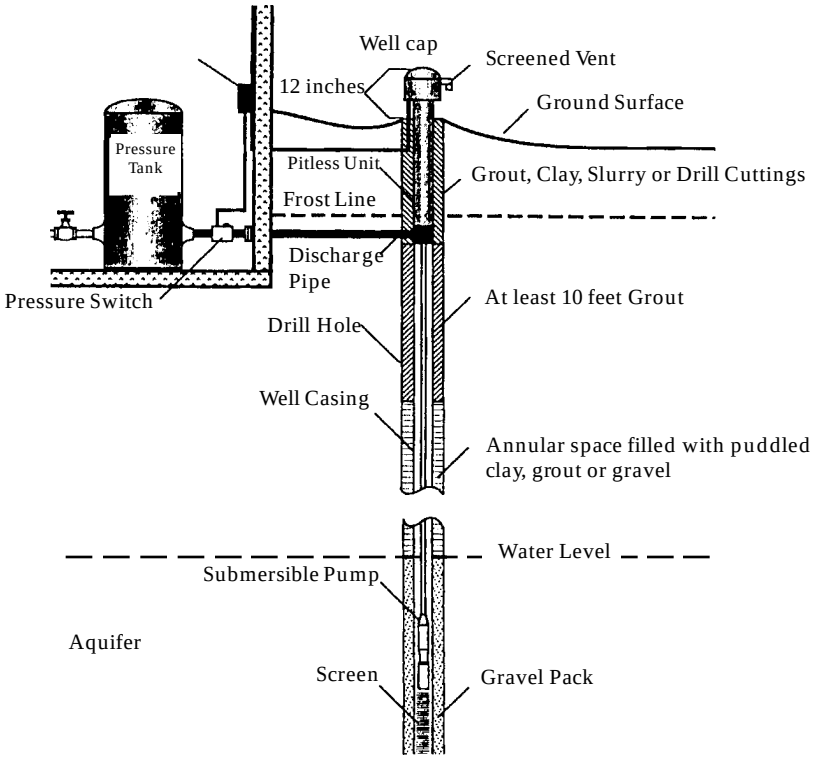

Figure 1. Typical installation of a submersible pump and a pitless unit with the pressure tank in a basement or tank pit. A tank pit should be at least 10 feet away from the well, and preferably at least 30 feet away. A buried pressure tank can also be used in this type of installation. For more information, contact a Nebraska licensed water well contractor or pump installation contractor. A Department of Health and Human Services System Regulation and Licensure water supply specialist can help interpret construction requirements of the private well code (Title 178 Chapter 12).

water for human consumption be grouted from a depth of at least 10 feet below ground surface or the static water level, whichever is less, to the bottom of the pitless adaptor, or to the top of the required ground surface if an underground connection is not used. The annular space from the grout to the surface should be filled with grout or a mixture of drilling fluid and gravel, top soil, or clay.

You can visually inspect the condition of your well casing for holes or cracks at the surface or down the inside of the casing with a light. If you can move the casing around by pushing against it, there is no seal in the annular space to keep out contaminants. One way to check on the condition of your well casing is by listening for water running down into the well. (Pump should not be running.) If you do hear water, there could be a crack or hole in the casing at a shallow depth that is allowing seepage to enter the well above the water level.

To prevent contaminants from flowing down inside of the well casing, the driller installs a watertight, sanitary well cap to prevent easy removal by children, and entry by insects or surface water. The cap should be firmly installed, with a screened vent incorporated into it so that air can enter the well. Check the well cap to see that it is in place and tightly secured. Wiring should be in conduit. If your well has a vent, be sure that it faces the ground, is tightly connected to the well cap or seal, and is properly screened. The well code requires a sanitary well cap or seal for all private wells. (Not all wells have caps. Some may have pumping equipment attached at the surface.)

Casing depth and height

The current regulations require that all wells must be cased. Suggested minimum recommendtions for unconsolidated formation wells (sand and gravel) are that casing should extend to a depth of 25 feet, or 10 feet below the static water level (water level in the well), whichever is deeper. Casing should extend to at least 30 feet for sandstone wells and at least 40 feet for all other bedrock-type wells.

When an open hole well is constructed, the casing should extend into the rock formation. The Nebraska Health and Human Services System Regulation and Licensure water supply specialists can advise you on these minimum requirements. Meeting well code minimums does not, however, guarantee a safe water supply; you may want to exceed minimum casing depth.

Wells cased below the water level in the well can afford greater protection from contamination. Well casing extending at least 30 feet below the water level in your well can ensure that surface water is filtered through soil and geologic materials before entering the well. Deeper-cased wells can provide greater sanitary protection but may also result in aesthetic water problems caused by dissolved solids, such as hardness and iron. Typically, the casing extends 1 to 2 feet above surrounding land, preventing surface water from running down the casing or on top of the cap and into the well. The private well regulations require that at least 12 inches of casing pipe extend above the final grade of the land.

Well age

Well age is an important factor in predicting the likelihood of high nitrate concentrations. A well constructed during the early development of an existing farm is likely to be at the center of the farm; it may be a shallower well and is probably surrounded by many potential contamination sources. Older well pumps are more likely to leak lubricating oils, which can get into the well. Older wells are also more likely to have thinner casing that is corroded. Even wells with modern casing that are 30 to 40 years old are subject to corrosion and perforation. In 1965 the Nebraska Well Drillers Association and the University of Nebraska Conservation and Survey Division developed minimum standards for private water well construction. These standards were revised with the Nebraska Department of Health in 1972 and again in 1981. In 1988 the state of Nebraska adopted regulations

to implement the *Water Well Standards and Contractors' Licensing Act* to regulate the installation of water wells. If you have an older well, you may want to have it inspected by an NRD water resource specialist, Nebraska Health and Human Services System Regulation and Licensure water supply specialist, or a Nebraska licensed water well contractor.

Well type

Dug wells pose the highest risk of allowing drinking water supply contamination because they are shallow and often poorly protected from surface water. A dug well is a large-diameter hole (usually more than 2 feet), which is often constructed by hand. Dug wells are generally cased with brick, tile, or stone materials that do not form a watertight barrier.

Driven-point (sand point) wells, which pose a moderate to high risk, are constructed by driving assembled lengths of pipe into the ground. These wells are normally smaller in diameter (2 inches or less) and less than 50 feet deep. They can only be installed in areas of relatively loose soils, such as sand. The construction of driven-point wells is prohibited under Nebraska well regulations.

The most common form of well is a drilled well. This is constructed using a rotary drilling machine. Drilled wells for domestic water supply use are commonly 6-10 inches in diameter.

Well depth

Shallow wells draw from the groundwater nearest the land surface, which may be directly affected by your activities. Rain and surface water soak into the soil and may carry pollutants with it. Local geologic conditions determine how long it may take for potential pollutants to reach the groundwater. In some places, this process happens quickly, in weeks, days, or even hours. Areas with sand and gravel aquifers are particularly vulnerable. On the other hand, thick clay or silt soils drastically retard contaminants seeping toward the water table. They may prevent contamination or delay the day when a well "turns bad." If you have a deep well (with the water table depth greater than 100 feet), the groundwater supplying your well may be older than the earliest human-caused contamination, making the well's water safer than that of a shallower well.

3. Managing and maintaining existing wells

Just as you wouldn't let a car or tractor run too long without an oil change, your well deserves good maintenance. This means testing the water every year, keeping the well area clean and accessible, keeping pollutants as far away as possible, and periodically having a qualified Nebraska licensed water well contractor or pump installation contractor check the well mechanics.

Better management of your existing well

Existing wells were most likely located according to traditional practice or regulations in place at the time of construction. While these wells are still legal, you may want to consider how well yours conforms to current standards, which incorporate new knowledge about groundwater contamination and well water. These standards can be found in the state private well regulations (Title 178 Chapter 12).

You might want to move such activities as pesticide mixing, tank rinsing, or gasoline storage farther from your well. You might want to rework wells, get rid of well pits, install caps, extend casings, or regrout open annular spaces.

Changing the location of other practices may prove expensive. (You can't move a livestock yard or a silo overnight.) Until you can meet minimum separation distance requirements or suggestions, change the way you manage such structures to control contaminants.

- If your silo is too close to your well, for example, you may want to install a system for collecting any juices draining from freshly ensiled forage. You could install concrete curbs to direct livestock yard runoff away from the well.

- Short term manure stacks are another example. They pose a risk of well contamination by bacteria or nitrates. Locate them on clay soil or, better yet, a concrete slab to reduce the chance of polluting your drinking water. Also, protect them from rain.
- Other management changes you may want to consider include moving traffic areas and chemical or gasoline storage areas away from the well, and upgrading or better management of your septic system.

Backflow prevention

Backflow or backsiphoning from pesticide mixing tanks can allow chemicals to flow back into the well through the hose. Use an anti-backflow device when filling pesticide sprayer tanks to prevent the chemical mixture from flowing back into the well and contaminating groundwater. Inexpensive anti-backflow devices for hoses used to fill sprayers may be available from irrigation or spray equipment suppliers. If you don't have such a device, keep the hose out of the tank (maintain an air gap) when filling the pesticide sprayer.

In farm situations, consider purchasing an inexpensive plastic nurse tank. A nurse tank is filled with water at the well and then used to fill the sprayer away from the farmstead—and away from the well. (For more information about preventing well contamination from pesticide mixing and loading practices, see NebGuide G93-1182, *Best Management Practices for Agricultural Pesticides to Protect Water Resources*).

You should also consider placing anti-backflow devices on all faucets with hose connections or maintaining air gaps between hoses or faucets and the water level. Otherwise, you risk having contaminated water in laundry tubs, sinks, washing machines, pressure washers, outside hydrants, and swimming pools flow back through plumbing to contaminate your water supply. Water supplies that have cross-connections between them (connections between two otherwise separate pipe systems, such as potable and non-potable) also put your drinking water at risk.

All spill and backsiphoning events must be reported to the Nebraska Department of Environmental Quality, Nebraska Highway Patrol, and Local Emergency Planning Coordinator.

Water testing

Keep an eye on water quality in existing wells by testing them annually. Although you cannot have your water tested for every conceivable pollutant, some basic tests can indicate whether or not other problems exist. Testing is not required by any current regulations except in special cases where state licensing may be required for a specific activity. Many lending agencies require private wells to meet Nebraska Health and Human Services System Regulation and Licensure standards prior to making real estate loans. To meet the standards, the water must be analyzed for nitrate and bacterial contamination and must not exceed the maximum contaminant levels.

At a minimum, test your water annually for bacterial and nitrate contamination. Testing for other contaminants may be important if some specific problems exist. A good initial set of tests for a private well also includes total dissolved solids, hardness, pH, and conductivity.

In addition, you may choose to obtain a broad scan of your water quality for a number of contaminants. Many laboratories offer these scans or screening for metals, inorganic chemicals, volatile organic chemicals, and pesticides. The cost range for these scans will typically be in the range of $40 to $350.

The results may not include contaminants that could be near your site—the most commonly used pesticides in your area, for example. Test for contaminants that are most likely at your site. Test for lead if you have lead pipes or soldered copper joints. Test for volatile organic chemicals (VOCs) if there has been a nearby use or spill of oil, petroleum, or solvent. Testing for pesticides can be very expensive and varies from compound to compound and lab to lab. The expense may be justified if:

- your well has nitrate levels over 10 ppm or 10 mg/l (reported as nitrate-nitrogen, NO_3-N)
- a pesticide spill has occurred near the well or back-siphonage has occurred
- your well is shallow, has less than 15 feet of casing below the water table, or is located in sandy soil and downslope from irrigated croplands where pesticides are used
- your well is close to a field area where a pesticide has consistently been used for many years (e.g. atrazine)

You can seek further advice on appropriate tests to run from your local extension office or health department, your NRD water resource specialist, or the Department of Health and Human Services System Regulation and Licensure.

You should test your water more frequently if:

- there are unexplained illnesses in the family
- there are pregnancies in the family
- there are noticeable changes in livestock or poultry performance
- your neighbors find a particular contaminant in their water
- you note a change in water taste, odor, color, or clarity
- you have a spill or back-siphonage of chemicals or petroleum products near your well
- chemicals, manure, or other waste products are applied within 100 feet of your well

You can have your water tested by either a public or private laboratory. Many Nebraska laboratories offer testing services that include water analyses. Some of these laboratories are operated by government agencies and others are private commercial laboratories. Some NRD offices also may have limited water testing capabilities. The Nebraska Health and Human Services System Regulation and Licensure Laboratory can tell you if a laboratory is certified to perform a given test.

Follow the lab's instructions for water sampling to assure accuracy of results. Use only the container provided, and return samples promptly. Bacteria sample bottles are sterile and must be returned within specified time limits.

Because many materials, including nitrate-nitrogen, are naturally present in minor amounts in groundwater or can vary seasonally, you may want to contact a specialist for help in interpreting test results.

Bacteria and nitrates are two important indicators. At excessive levels, they can cause health problems themselves and also may suggest problems with the well's location or construction. Hardness and pH indicate how corrosive the water may be to your plumbing system.

Keep in mind that activities off your site can affect your groundwater. Chemical spills, changes in land use, and the presence of landfills can increase the chance of pollutants getting into your water. If your water has a high nitrate or bacteria level, you may want to talk with a specialist about the need for additional testing.

It is also important to record test results and to note changes in water quality over time. In addition to water analysis test results, you should keep records of a few other things to tell what is happening with your water system. These include well construction details, and dates and results of maintenance intervals for the well and pump.

Well maintenance

Well equipment doesn't last forever. Every 10 to 20 years, your well may require mechanical attention from a qualified Nebraska licensed water well contractor or pump installation contractor. Follow these additional maintenance practices:

- Do not use gasoline or lawn and agricultural chemicals near your well.
- Do not mix pesticides, rinse sprayer equipment, or discard empty pesticide containers near your well.
- Protect wells from household wastewater treatment systems that may back up in the basement or waterlog in the yard.

4. New wells

New wells are expensive—but they are a good investment for the future. Getting the most

from such an investment means locating the well away from contamination sources and working to maintain the quality of the well. Some simple principles to follow are:

- Follow the state recommended minimum separation distances. The Nebraska Health and Human Services System Regulation and Licensure regulations (Nebraska Title 178 Chapter 12) contain these separation distances and other requirements for drinking water wells (see *Table 1*).
- Locate your well on ground higher than such surrounding pollution sources as fuel tanks, livestock yards, septic systems, or pesticide mixing areas. Where practical, locate the well as far as possible from pollution sources, but no closer than the minimum separation distances in Title 178 Chapter 12.
- If necessary, build soil up around the well so that all surface water drains away from it.
- Avoid areas that are prone to flooding.
- Groundwater flow generally follows large scale surface drainage patterns. Unless you know the exact direction of groundwater flow on your property, locate the well so that pollution sources are between the well and the nearest creek, river, or lake. Groundwater generally flows from upland areas and discharges in a surface water body. In all cases, locate your well on ground higher than surrounding pollution sources such as fuel tanks, livestock yards, or pesticide mixing areas.
- Make the well easily accessible for pump repair, cleaning, testing, and inspection.
- Hire a competent Nebraska licensed water well contractor and pump installation contractor. Make sure the driller disinfects the well with chlorine after construction and tests the water for bacteria after drilling, and provides you with detailed information about the well's depth and construction.

5. Unused wells

Many sites have unused wells. Old homesites or shallow wells once pumped by windmills are common. No one knows how many of these wells there are in Nebraska, although the Nebraska Well Drillers Association estimates that there might be as many as 150,000. If the inactive water well is in a poor state of repair then the well would be considered an illegal water well. The full definition of an illegal water well is given in the glossary with *Worksheet 3*.

If not properly filled and sealed, illegal water wells can provide a direct route to groundwater from surface water carrying contaminants such as sediment, bacteria and chemicals, or allow contaminant movement from one aquifer to another. Runoff carrying pesticides, fertilizer, livestock waste, or other contaminants may enter an unused, unplugged water well. In addition to these wells being a threat to groundwater, large open wells pose safety hazards for small children and animals.

Locating unused wells

Pipes sticking out of the ground, under an old windmill, or in an area where a farmstead or homesite used to be, are the most obvious places for finding unused wells. You may not know the history of your property, however, and unused well locations may not be obvious. A depression in the ground may indicate an old well. Also, wells were often located in basements of houses, under front steps, or near old cisterns.

Decommissioning water wells

Once an unused water well has been located and it has been decided to decommission the well, an investigation of the details of the construction of the well should be made. The Department of Water Resources may be able to provide copies of the original well registration. However, domestic wells were not required to be registered until after September 1993.

A Nebraska licensed water well contractor or pump installation contractor should be

hired to close these wells, since effective well plugging calls for experience with well construction materials and methods, as well as a working knowledge of the geology of the well site. You may do your own well decommissioning (a license is not required) but you must meet the minimum Title 178 requirements when you plug a well, and the expense of decommissioning may not be eligible for NRD cost-sharing if the work is not done by a Nebraska licensed water well contractor.

Special equipment is often required to remove old pumps and piping and to properly install sealing material inside the well. Use of inappropriate materials and methods can lead to well settling, collapse, and continued groundwater contamination. If plugging materials are improperly installed in a well, patching up defective work is nearly impossible.

The primary steps for properly decommissioning a water well are:

1. Determine well construction and geologic setting.
2. Remove any obstructions from the well.
3. Disinfect the water in the well.
4. Place fill material in the water bearing zone.
5. Place sealing material above the aquifer, in the well casing, and in any open annular space.
6. Place fill materials (if needed) in the non-water bearing zone.
7. Place a top seal (bentonite or concrete) from 3 to 8 feet below the land surface, in the well casing, and in any open annular space.

Option I

8. Remove the top 3 feet of casing.
9. Cap the top of the casing with grout or concrete. For gravel-packed wells the cap should extend 1 foot beyond the original drill hole.
10. Backfill to the land surface.

Option II (for wells that have an adequate annular space and grout seal)

8. Fill in the top 3 feet of casing with concrete or cement grout.
9. Install permanent, watertight cover on top of the casing.

The entire well should be sealed to prevent surface water from entering the groundwater, and to prevent contamination movement from one aquifer to another. The goal of proper sealing is to restore as closely as possible the geologic conditions that existed before the well was constructed. For specific requirements and technical details, consult “Guidelines for Decommissioning Water Wells,” MP No. 37, UNL Conservation and Survey Division, (see *Contacts and References*) or the well code.

Proper decommissioning takes time and money. Costs will vary with the well depth, diameter, and geology of the area. Spending a few hundred dollars plugging an unused well near your home may prevent contamination of your drinking water. Cost-sharing is available through NRD offices. Check with your local office for information and qualifications.

For more information on well plugging, contact the Nebraska Health and Human Services System Regulation and Licensure, county health department, Natural Resources District, local University of Nebraska Cooperative Extension office, or a Nebraska licensed water well contractor or pump installation contractor.

Once the well has been successfully decommissioned, the well is then considered an abandoned well. The Nebraska Health and Human Services System Regulation and Licensure requires that a record be maintained of the type and quantity of materials used, where the materials are placed, and the mix specification of grouts used. Registered wells that are abandoned must be reported to the Director of the Department of Water Resources within 60 days following the decommissioning. Contact your NRD water resource specialist for additional information and well closure report forms.

CONTACTS AND REFERENCES

Who to call about...

Certified well water testing laboratories:

A listing is available from the Nebraska Health and Human Services System Regulation and Licensure Laboratory at (402) 471-2122.

Atrazine testing:

Testing is available directly through the Nebraska Health and Human Services System Regulation and Licensure Laboratories, P.O. 95007, Lincoln, NE 68509-5007, (402) 471-2122, or contact a commercial testing laboratory.

Interpreting well water test results:

Your local University of Nebraska Cooperative Extension Educators or Nebraska Health and Human Services System Regulation and Licensure water supply specialist at:

Grand Island	(308) 385-5175
Imperial	(308) 882-4311
Kearney	(308) 234-8097
Lincoln	(402) 471-2541
Norfolk	(402) 370-3114
North Platte	(308) 535-8134
Omaha	(402) 595-1233
Scottsbluff	(308) 632-1299

Drinking water quality standards:

U.S. Environmental Protection Agency's Safe Drinking Water Hotline, (800) 426-4791 8:30 - 5:00 p.m. EST.

Nebraska Department of Environmental Quality, Ground Water Section, (402) 471-0096.

Nebraska Health and Human Services System Regulation and Licensure, (402) 471-2541.

Locating possible sources of contamination and obtaining well construction regulations:

Nebraska Health and Human Services System Regulation and Licensure, (402) 471-2541, qualified plumbers, licensed well drillers, licensed pump installers, NRD water resources specialists, or county health departments. Besides locating contamination sources, they can also recommend improvements.

Well construction or inspection:

Nebraska Health and Human Services System Regulation and Licensure, licensed well drillers, or licensed pump installers.

A copy of your well registration:

If a report was filed with the state, contact the Nebraska Department of Water Resources, P.O. Box 94676, Lincoln, NE 68509-4676, (402) 471-0576. Be prepared to provide the legal description (county, township, range, section, and quarter section) of the well's location. (If your farm or ranch covers more than one section, make a note of that in case well drillers reported the wrong section.) If known, provide the year the well was installed and the owner's name at the time. Drinking water wells constructed before September 1993 were not required to be registered. Most well drillers maintain a record of well construction details.

Well decommissioning:

Contact your local Cooperative Extension Educator, your local NRD water resources specialist, the Department of Health and Human Services System Regulation and Licensure, or a licensed well driller or pump installer.

Reporting well decommissioning:

Department of Water Resources, 301 Centennial Mall South, Lincoln, NE 68509, (402) 471-2363.

Cost-sharing of well decommissioning:

NRDs offer cost-sharing programs of varying amounts.

Agencies available for consultation include:

Conservation and Survey Division, IANR, University of Nebraska-Lincoln, (402) 472-3471

Nebraska Department of Water Resources, Lincoln, (402) 471-2363

Nebraska Department of Environmental Quality, Lincoln, (402) 471-2186

Nebraska Health and Human Services System Regulation and Licensure, (402) 471-2541

Cooperative Extension, IANR, University of Nebraska-Lincoln, (402) 472-2966

Health Departments in:
Grand Island—Hall County, (308) 385-5175
Hastings, (402) 461-2301
Kearney, (308) 233-3237
Lincoln—Lancaster County, (402) 441-8000
Norfolk, (402) 644-8739
North Platte, Department of Public Health (308) 535-8134
Omaha—Douglas County, (402) 444-7476
Scottsbluff County, (308) 436-6636
U.S. Geological Survey, Lincoln, (402) 437-5082

What to read about...

Publications are available from sources listed at the end of the reference section. (Refer to number in parentheses after each publication.)

Groundwater, groundwater flow:

Understanding Groundwater. 1993. NebGuide G93-1128. (2)

Ground Water Atlas of Nebraska. 1986. Resource Atlas No. 4. (1)

Fundamentals of Ground Water Contamination. 1994. Educational Circular No. 11. (1)

Ground Water Quality Atlas of Nebraska. 1978. Resource Atlas No. 3. (1)

Glossary of Water-Related Terms. 1993. NebGuide G93-1191. (2)

Wells, private water systems:

Nebraska Health and Human Services System Regulation and Licensure, Regulations Governing Water Well Construction, Pump Installation and Water Well Abandonment Standards, Title 178, Chapter 12, Section 3, 4, and 11. (3)

The Impact of Nitrogen and Irrigation Management and Vadose Zone Conditions on Ground Water Contamination by Nitrate-Nitrogen. 1991. Extension Circular EC 91-735. (2)

Shock Chlorination of Domestic Water Supplies. NebGuide G95-1225. (2)

Drinking Water: Hard Water. NebGuide G96-1274. (2)

Drinking Water: Sulfates and Hydrogen Sulfide. NebGuide G96-1275. (2)

Drinking Water: Nitrate-Nitrogen. NebGuide G96-1279. (2)

Drinking Water: Iron and Manganese. NebGuide G96-1280. (2)

Drinking Water: Man-made Chemicals. NebGuide G96-1282.

Drinking Water: Bacteria. NebGuide G90-989. (2)

Drinking Water: Lead. NebGuide G97-1333. (2)

Drinking Water: Copper. NebGuide G98-1360. (2)

Drinking Water: Fluoride. NebGuide G98-1376. (2)

Drinking Water: Nitrate and Methemoglobinemia ("Blue Baby" Symdrome). NebGuide G98-1369. (2)

Contamination, testing, and interpretation:

Ground Water Contamination and Well Construction in Southeast Nebraska. 1985. Reprint #46. (1)

Testing for Drinking Water Quality. (Revised 1998) NebGuide G89-907. (2)

Effects of Agricultural Runoff on Nebraska Water Quality. NebGuide G82-586. (2)

Well abandonment (decommissioning):

Department of Health and Human Services System Regulation and Licensure, Title 178, Chapter 12 Section 12. (3)

Guidelines for Decommissioning Water Wells - How To Plug Wells, Miscellaneous Publication No. 37. (1)

Publications available from...

1. Conservation and Survey Division, University of Nebraska-Lincoln, Lincoln, NE 68588-0517, (402) 472-3471.

2. Your local extension office or directly from Publications Distribution, IANR Communications and Information Technology, University of Nebraska-Lincoln, P.O. Box 830917, Lincoln, NE 68583-0917, (402) 472-9712.

3. Nebraska Health and Human Services System Regulation and Licensure, P.O. Box 95007, Lincoln, NE 68509-5007, (402) 471-2541.

Partial funding for materials, adaptation, and development was provided by the U.S. EPA, Region VII (Pollution Prevention Incentives for States and Nonpoint Source Programs) and USDA (Central Blue Valley Water Quality HUA). This project was coordinated at the Department of Biological Systems Engineering, Cooperative Extension Division, Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln.

Nebraska Farm*A*Syst team members included: Robert Grisso, Extension Engineer, Ag Machinery; DeLynn Hay, Extension Specialist, Water Resources and Irrigation; Paul Jasa, Extension Engineer; Richard Koelsch, Livestock Bioenvironmental Engineer; Sharon Skipton, Extension Educator; and Wayne Woldt, Extension Bioenvironmental Engineer.

This unit was modified by DeLynn Hay. Editorial assistance was provided by Bob Midland, Nick Partsch, and Sharon Skipton.

Technical reviews were provided by: Al Ackerman and Rod Tremblay, Nebraska Health and Human Services System, Department of Environmental Health; Rod DeBuhr, Nebraska Upper Big Blue Natural Resources District; Bruce Hanson, Nebraska Department of Environmental Quality; Lee Orton, Nebraska Well Drillers Association; Les Tyrell, Nebraska Real Estate Commission; and Don Wrightsman, Wrightsman Plumbing.The views expressed in this publication are those of the author and do not necessarily reflect the views of either the technical reviewers or the agencies they represent.

Adapted for Nebraska from material prepared for the Wisconsin and Minnesota Farm*A*Syst programs, written by Susan Jones, U.S. Environmental Protection Agency, Region V.

Printed on recycled paper.

NOTES