NebGuide

University of Nebraska–Lincoln Extension, Institute of Agriculture and Natural Resources

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Decommissioning Water Wells to Protect Water Quality and Human Health

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University of Nebraska–Lincoln Extension and the Nebraska Department of Health and Human Services place a high priority on water quality and jointly sponsor this series of educational publications.

This publication discusses decommissioning water wells for proper well abandonment.

At one time, the term "abandoned wells" referred to wells that were not being used and were in a state of disrepair. Today, the term "illegal wells" is used instead, which is the legal term for such wells. Illegal wells represent one of the greatest threats to groundwater in Nebraska.

Groundwater normally is provided with some degree of protection by a natural filter of soil, sand, and gravel in the natural soil profile. All wells are holes in that filter that can potentially allow contaminants to flow into our groundwater supply. Illegal wells, especially those that are in a state of disrepair and/or that do not meet current well construction standards, represent the greatest threat. After contaminants enter the groundwater supply they can move with the natural groundwater flow and may show up in public or private wells used to provide drinking water. In addition, illegal wells are a safety hazard to humans and animals. A child can easily fall into a large diameter illegal well. **To reduce or eliminate these risks, Nebraska regulations require that all illegal wells be decommissioned or brought into compliance with Nebraska Department of Health and Human Services Title 178 Chapter 12 *Regulations Governing Water Well Construction, Pump Installation and Water Well Decommissioning Standards.* Water well decommissioning must be carried out or supervised by an individual with a valid Nebraska Water Well Standards and Contractors' license.** The license may be that of water well contractor, water well drilling supervisor, pump installation contractor, or pump installation supervisor. The only exception is that an individual may decommission a driven sandpoint well if it is on land owned and used by him or her for farming, ranching, or agricultural purposes or is at his or her place of residence. The Nebraska Department of Health and Human Services maintains a list of individuals with a valid license. Information can be obtained at (402) 471-0546 or *http://www.hhs.state.ne.us/*.

Water Well Abandonment Terminology

The 1994 Nebraska Legislature passed LB 981, which established the following definitions in the Water Well Standards and Contractors' Licensing Act. These definitions, which clarify water-well abandonment language used in Nebraska, will be used in this publication.

Abandoned Water Well

Abandoned water well shall mean any water well, the use of which has been accomplished or permanently discontinued, which has been decommissioned as described in the rules and regulations of the Nebraska Department of Health and Human Services Regulation and Licensure, and the owner of which has filed a notice of abandonment with the state Department of Natural Resources if required by Nebraska Statutes.

Active Water Well

Active water well shall mean a well which is in use and which is not an illegal water well.

Decommissioned Water Well

Decommissioned, when used in relation to a water well, shall mean the act of filling, sealing, and plugging a water well in accordance with the rules and regulations of the Nebraska Department of Health and Human Services.

Driven Sandpoint Well

Driven sandpoint well is a well without a casing, with the sandpoint or sandscreen attached directly to the pump suction line.

Illegal Water Well

Illegal water well shall mean any water well which has not been properly decommissioned and which meets any of the following conditions:

1. The water well is in such a condition that it cannot be placed in active or inactive status.
2. Any necessary operating equipment has been removed and the well has not been placed in inactive status.
3. The water well is in such a state of disrepair that continued use for the purpose for which it was constructed is impractical.
4. The water well was constructed after Oct. 1, 1986, but not constructed by a licensed water well contractor or by an individual on land owned by him or her and used by him or her for farming, ranching, or agricultural purposes or at his or her place of abode.
5. The water well poses a health or safety hazard.
6. The water well is an illegal water well in accordance with Nebraska statutes.
7. The water well was constructed after Oct. 1, 1986, and such well is not in compliance with the standards developed under the Water Well Standards and Contractors Licensing Act.

Inactive Water Well

Inactive water well shall mean a water well that is in a good state of repair and for which the owner has provided evidence of intent for future use by maintaining the water well in a manner which meets the following requirements:

1. The water well does not allow impairment of the water quality in the water well or of the groundwater encountered by the water well.
2. The top of the water well or water well casing has a watertight welded or threaded cover or some other water-tight cover with a means to prevent its removal without the use of equipment or tools to prevent unauthorized access, to prevent a safety hazard to humans and animals, and to prevent illegal disposal of wastes into the water well.
3. The water well is marked so as to be easily visible and located and is labeled or otherwise marked so as to be easily identified as a water well, and the area surrounding the water well is kept clear of brush, debris and waste material.

What Threat Do Illegal Water Wells Pose?

Illegal water wells are in all 93 Nebraska counties. They penetrate all principal aquifers and vary considerably in construction and depth. They represent a serious threat to human health and safety and to the overall quality of the state's groundwater resources.

Illegal and improperly constructed water wells provide a direct conduit from the land surface to the water-bearing zones. These water wells can allow surface runoff to flow directly down to the water-bearing zones, often carrying organic wastes, microbiological contaminants, fertilizers, and other chemical residues such as pesticides and petroleum products into the groundwater. Small mammals and reptiles can fall into the water wells, further adding to the bacteriological contamination problem. Once groundwater is contaminated, it is difficult, if not impossible, to clean up, and the process is always expensive. In addition, open water wells are especially hazardous to small children and present a risk to human life that can be prevented.

How Many Illegal Water Wells Are There in Nebraska?

While there has been no attempt to count the number of illegal water wells in Nebraska, decommissioning progress to date and anecdotal evidence suggests there may be thousands threatening our groundwater quality. Early Nebraska settlers found that many areas had relatively abundant groundwater that could be obtained fairly easily. In many situations, it was common to have more than one well on each farmstead because it was easier to construct a well at the point of use rather than develop a central water well and a distribution system. Farm consolidation, rural electrification, and general modernization in Nebraska took many of these old wells out of service. Also, throughout the years when a new well was drilled, the owner often neglected to properly decommission the old well.

Not all out-of-service wells are located on farmsteads or in rural areas. There likely are hundreds, and possibly thousands, located in communities throughout the state. In the early development of communities, most households and businesses had an individual water-supply well. Most of these water wells have since been replaced by community water-supply systems, but in many cases, were not properly decommissioned.

A windmill tower is almost a sure sign that a well exists, but wells can be present at many other locations too. Some signs of an old well include: concrete pads where the legs of a windmill tower once stood; depressions where an old well pit or the walls of a dug well may have collapsed; an old stock tank in an overgrown area; a small area that is fenced off, especially if there also are pipes sticking out of the ground; flat stones, a concrete slab, old boards, metal sheets, or other items that could be covering an old well shaft; and many others. Sometimes there are no signs.

Decommissioning Illegal Water Wells

Illegal water wells are a serious liability. They can contaminate our drinking water supply and present a safety hazard for humans and animals. **The decommissioning of**

all illegal water wells must follow requirements found in Title 178, Chapter 12, *Regulations Governing Water Well Construction, Pump Installation and Water Well Decommissioning Standards* of the Nebraska Department of Health and Human Services.

Decommissioning Steps

Figure 1 illustrates the general procedure of filling and sealing a water well. The general steps are described below.

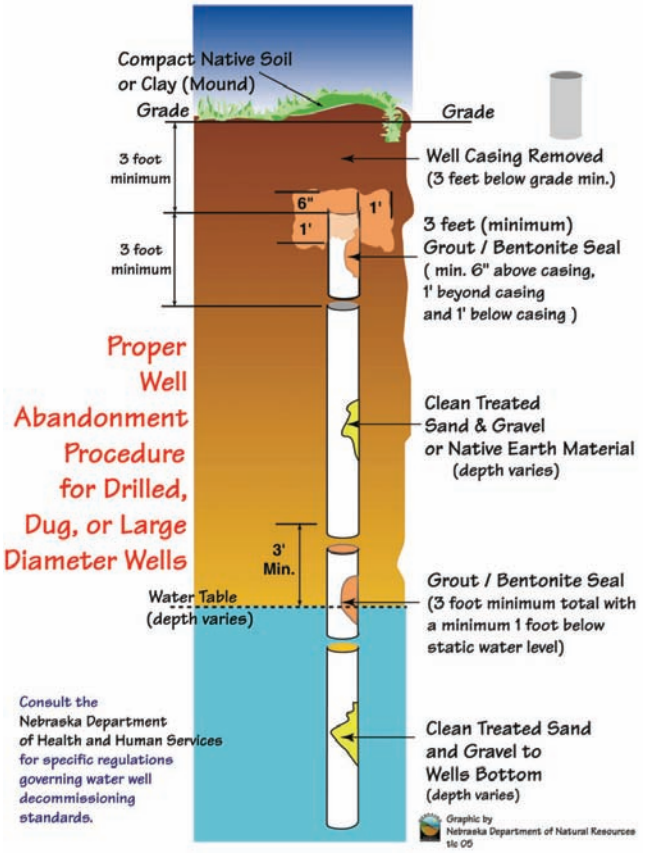

Figure 1. Schematic of water well decommissioning process (courtesy Nebraska Department of Natural Resources).

Removal of Well Equipment

Well equipment (well pump, piping, etc.) and any other obstructions need to be removed. If an obstruction can't be removed, the contractor will need to grout from the bottom of the well to a point above the obstruction, or place a minimum 5-foot grout seal above the obstruction.

Excavation

An area around the well casing is often excavated to a depth of 3 to 4 feet, and the top 3 feet of casing is removed.

Disinfection

The well should be disinfected with a chlorine solution. Fill material placed in the well during the decommissioning process also should be disinfected.

Filling and Sealing

Once the well has been cleared of equipment and disinfected, it is ready to be filled. The well is first filled or grouted from the bottom to a foot below the static water level (top of the water table). A minimum of a 3-foot section of grout/bentonite is then placed at this point. The well casing is further filled with disinfected gravel to within about 3 feet below the top of the cut-off casing.

Capping

After the well has been filled, it needs to be sealed or capped with an upper plug to prevent surface and near-surface contaminants from entering the well casing. Two options are available, either of which can be used if the well records indicate an adequate surface seal, such as a mounded concrete pad sloping away from the well or a watertight cap was installed during construction. Option #1 includes removing the top 3 feet of the casing and installing a 6-inch thick grout seal 1 foot beyond the bore hole and at least 1 foot below the top of the cut-off casing. Option #2 allows leaving the casing in place, installing a 10-foot thick seal and installing a water-tight cover on top of the casing. If a surface seal was not installed during construction or it is not known if a surface seal was installed, only the first option can be used.

Backfilling

The excavated hole around the old casing is then backfilled with native soil,

Reporting

Once a well has been properly decommissioned, it must be reported to the Nebraska Department of Natural Resources on forms provided by DNR so it can be logged as an abandoned well.

Cost of Decommissioning

As outlined above, the decommissioning process includes removal of well equipment, disinfection, filling, sealing, capping, and reporting. The cost will depend on several factors including: well accessibility, construction technique, and materials; depth, diameter, and condition; the cost of materials used for decommissioning which may include sand, gravel, bentonite, concrete, and chlorine; operating costs encountered by the contractor including the cost of fuel; and more. Depending on these factors and others, the cost may range from approximately $300 for a shallow, small-diameter domestic or livestock well to $1,500 or more for a deep, large-diameter well, depending on the scenario encountered.

Because of the importance of protecting water quality, nearly every Nebraska Natural Resources District (NRD) offers an attractive cost-sharing incentive to assist well owners with the cost of decommissioning. Payment rates vary by NRD, but typically these programs will pay for 60 percent to 75 percent of the costs. Thus, out-of-pocket expense to the well owner can be quite low.

To apply for well decommissioning cost-share assistance, well owners must first contact the appropriate NRD for an information and application packet that gives program guidelines, forms, and instructions. No cost-share payments can be made unless all procedures are followed. (See NRD contact information below.)

Additional Information

This publication provides an overview of well decommissioning. Additional information on proper well abandonment is available from:

Nebraska Department of Health and Human Services
Tom Christopherson, Manager, Water Well Standards Program
301 Centennial Mall South
P.O. Box 95026
Lincoln, NE 68509-5026
(402) 471-0598
http://www.hhs.state.ne.us/

Nebraska Department of Natural Resources
301 Centennial Mall South
P.O. Box 94676
Lincoln, NE 68509-4676
(402) 471-2363
http://www.dnr.state.ne.us/

Information on NRD financial resources to help defray the cost of well decommissioning is available from:

Nebraska Association of Resources Districts
601 So. 12th St., Suite 201
Lincoln, NE 68508
(402) 471-7670
http://www.nrdnet.org/

Individual NRDs

Table 1. Individual Nebraska NRDs.

NRD Name	*City*	*Phone*
Central Platte	Grand Island	(308) 385-6282
Lewis and Clark	Hartington	(402) 254-6758
Little Blue	Davenport	(402) 364-2145
Lower Big Blue	Beatrice	(402) 228-3402
Lower Elkhorn	Norfolk	(402) 371-7313
Lower Loup	Ord	(308) 728-3221
Lower Niobrara	Butte	(402) 775-2343
Lower Platte North	Wahoo	(402) 443-4675
Lower Platte South	Lincoln	(402) 476-2729
Lower Republican	Alma	(308) 928-2182
Middle Niobrara	Valentine	(402) 376-3241
Middle Republican	Curtis	(308) 367-4281
Nemaha	Tecumseh	(402) 335-3325
North Platte	Gering/Scottsbluff	(308) 632-2749
Papio-Missouri River	Omaha	(402) 444-6222
South Platte	Sidney	(308) 254-2377
Tri-Basin	Holdrege	(308) 995-6688
Twin Platte	North Platte	(308) 535-8080
Upper Big Blue	York	(402) 362-6601
Upper Elkhorn	O'Neill	(402) 336-3867
Upper Loup	Thedford	(308) 645-2250
Upper Niobrara-White	Chadron	(308) 432-6190
Upper Republican	Imperial	(308) 882-5173

Summary

While illegal water wells in Nebraska have not been accurately counted, they exist in every county on farmsteads, acreages, and in communities. Illegal water wells can contaminate groundwater, including drinking water supplies. In addition, they present a safety hazard to humans and animals. All illegal water wells must be decommissioned following requirements found in Nebraska Department of Health and Human Services Title 178, Chapter 12, *Regulations Governing Water Well Construction, Pump Installation and Water Well Decommissioning Standards*. With only one exception, water well decommissioning must be carried out or supervised by an individual holding a valid Nebraska Water Well Standards and Contractors' license. Cost-share assistance is available to help property owners with well decommissioning costs.

Acknowledgments

Information in this NebGuide is adapted from Miscellaneous Publication No. 37, *Guidelines for Decommissioning Water Wells: How To Plug Water Wells,* Duane A. Eversoll, Conservation and Survey Division; DeLynn Hay, Biological Systems Engineering, Institute of Agriculture and Natural Resources; Rod J. Temblay, Nebraska Department of Health; with additional information from Water Well Standards and Contractors' Licensing Act, Nebraska Department of Health and Human Services; and Regulations Governing Water Well Construction, Pump Installation and Water Well Decommissioning Standards, Nebraska Department of Health and Human Services.

This publication has been peer-reviewed.

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