NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

WELL DECOMMISSIONING

(No.)

CODE 351

DEFINITION

The sealing and permanent closure of a water well no longer in use.

PURPOSES

This practice serves to:

- Prevent entry of vermin, debris, or other foreign substances into the well or well bore hole.
- Eliminate the physical hazard of an open hole to people, animals, and farm machinery.
- Prevent entry of contaminated surface water into well and migration of contaminants into the unsaturated (vadose) zone or saturated zone.
- Prevent the commingling of chemically or physically different ground waters between separate water bearing zones.
- Eliminate the possibility of well being used for any other purpose.
- Conserve yield and hydrostatic head of aquifers.
- Restore, as far as feasible, hydrogeologic conditions that existed before the well was constructed.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to any drilled, dug, driven, bored, or otherwise constructed vertical water well determined to have no further beneficial use.

This practice does not apply to water wells that were used for waste disposal.

CRITERIA AND SPECIFICATION GUIDE

General Criteria Applicable to All Purposes

Laws, rules, and regulations. This practice shall conform to all federal, state, and local laws, rules, and regulations. Laws, rules, and regulations of particular concern include those involving water rights, land use, pollution control, property easements, wetlands, preservation of cultural resources, and endangered species.

Well preparation. All pumping equipment and debris shall be removed from the well before sealing begins.

Measurement. Measure the depth and diameter of the well and the depth to the static water level.

Disinfection. Before sealing, the entire column of well water shall be treated with sufficient chlorine to produce at least a 100 ppm concentration within the well bore. Household chlorine bleach at 5 percent concentration of chlorine can be used in the ratio of 1 gallon bleach per 500 gallons of water. Table 1 may be used to determine well volumes for various hole diameters.

Conservation practice standards are reviewed periodically and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service.

Table 1 - Well volumes

Hole Diameter (inches)	Volume per Foot of Depth (gallons/foot)	(cubic foot/foot)
4	0.7	0.1
6	1.5	0.2
8	2.6	0.3
10	4.1	0.5
12	5.9	0.8
14	8.0	1.1
16	10.5	1.4
20	16.4	2.2
24	23.6	3.1
36	53.0	7.1
48	94.2	12.6
60	146.9	19.6
72	211.5	28.3
96	376.0	50.3

Abandoned well in an unconfined aquifer. Use the following procedure to install the plugging materials:

1. Excavate and cut off the well casing to a depth of 3 feet below the ground surface.
2. Fill the well with clean sand and gravel up to the static water level.
3. From the static water level to 6 feet below the ground surface, the well may be filled with either compacted clay soils or an approved grout.
4. A 3-foot thick grout plug shall then be placed from 6 feet to 3 feet below the ground surface.
5. From 3 feet below the ground surface to the ground surface, the plugged well shall be covered with compacted silt or clay soils.
6. In lieu of the above steps, fill the well completely from the bottom of the well to 3 feet below the ground surface with cement or bentonite grout and then backfill the well with surface soils from 3 feet to the ground surface.

Abandoned well in a confined aquifer or a well that penetrates more than one aquifer. Use the following procedure to install the plugging materials:

1. Excavate 3 feet below the ground surface and cut off casing 3 feet below the ground surface.
2. Using a conductor pipe, fill the well with at least 20 feet of grouting material extending from the bottom of the well to at least 10 feet above the bottom of the well casing.
3. Using an appropriate method to prevent bridging, fill the well with clean sand or gravel from the grout plug to the bottom of the confining formation.
4. From the bottom of the confining formation, place a 10-foot thickness of grouting material within the well bore thereby forming a grout plug to prevent migration of water from the confined aquifer.
5. From the top of the grout plug in the preceding step, place clean sand or gravel to the bottom of the next confining layer or to the static water level, whichever comes first. However, the sand or gravel fill must not extend higher than 13 feet below the ground surface. If the static water level is greater than 13 feet below the ground surface, compacted clay soil may be used to fill the well from the static water level to the 13-foot depth.
6. A grout plug at least 10 feet in length shall then be placed from at least 13 feet below the ground surface to the top of the cut off casing.
7. From 3 feet below the ground surface to the ground surface, the plugged well shall be covered with compacted silt or clay soils.
8. In lieu of the above steps, fill the well completely with cement or bentonite grout from the bottom of the well to 3 feet below the ground surface, then backfill the well with surface soils from 3 feet to the ground surface.

For a large diameter dug well. Use the following procedure to install the plugging materials:

1. Knock down the top 5 feet of the well lining material and let it fall into the well.
2. Fill the well with clean sand or gravel up to the static water level.
3. Fill the remaining space from the static water level up to within 5 feet of the ground surface with compacted clay soils.
4. Using a cement or bentonite grouting material, place a minimum 0.5-foot thick plug above the clay soil backfill.
5. Fill the remainder of the well to the ground surface with compacted surface soils.

Record of plugging the well. A record must be filed with the Kansas Department of Health and Environment (KDHE) office in Topeka, Kansas, within 30 days following the completion of the above plugging procedures. In accordance with Kansas Statutes Annotated (K.S.A). 82a-1212, Form WWC-5 is to be used to record this information.

DEFINITION OF TERMS

Aquifer. An underground formation that contains and is capable of transmitting ground water.

Unconfined aquifer. An aquifer containing ground water at atmospheric pressure. The upper surface of the ground water in an unconfined aquifer is the water table.

Confined aquifer. An aquifer which is overlain and underlain by impermeable materials. Ground water in a confined aquifer is under pressure greater than atmospheric pressure and will rise in a well above the level at which it is first encountered. This may also be called an artesian aquifer.

Static water level. The highest point above or below ground level which the ground water in the well reaches naturally.

Cement grout. A mixture consisting of one 94-pound bag of Portland cement to an equal volume of sand (diameter of particles shall be no larger than 0.08 inch) to 5 to 6 gallons of clean water.

Bentonite grout. A mixture consisting of water and sodium bentonite clay containing high solids. The mixture shall be in accordance with the manufacturer's recommendations to achieve a weight of not less than 9.4 pounds per gallon of mix. Sodium bentonite pellets, tablets, or granules may be used provided that, when hydrated, they create a permanent and impervious material as specified in Kansas Administrative Regulations (K.A.R.) 28-30-2.

Conductor pipe. A metal or plastic pipe used to transmit well plugging materials from the ground surface to the desired depth of application. The diameter of the pipe shall be at least 3 times the diameter of the largest particle size of the plugging material. The conductor pipe, also known as a tremie pipe, will prevent segregation and possible bridging of the plugging materials as they are transmitted into the well bore.

CONSIDERATIONS

This practice may be part of a ground water protection system that includes water and chemical management practices.

To the extent practicable, an abandoned well should be decommissioned in a manner that restores the original hydrogeologic conditions of the well site and does not preclude the use of the site from future land management practices.

All decommissioning procedures and fill and sealing materials need to be selected with due consideration of the site-specific geological, biological, physical, and climatic conditions; the chemical composition of the surrounding soil, rock, and ground water at the well site; and the well's construction practices.

Consider the proximity of abandoned water wells to other planned and existing water wells.

The effects of this practice on air and plant resources should be minimal.

PLANS AND SPECIFICATIONS

Plans and specifications shall be prepared for specific well sites using the design criteria contained in this standard.

An artesian well, whether flowing or not, shall be treated as an abandoned well in a confined aquifer.

Construction and material specifications shall be developed which conform to Article 30, Water Well Construction and Abandonment, Kansas Department of Health and Environment.

Refer to KDHE's website at http://www.kdhe.state.ks.us for access to Article 30, K.S.A.'s, and K.A.R.'s.

Type I Portland cement shall normally be used when using cement grout as a plugging material; however, Type II cement shall be used in the presence of high sulfate conditions.

OPERATION AND MAINTENANCE

A properly plugged well should require little or no operation and maintenance; however, if a general subsidence of the area overlying the plugged well were to occur, sufficient soil materials shall be added to the subsided area to maintain a positive slope away from the abandoned well.