NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE GENERAL SPECIFICATIONS
Texas

WELL DECOMMISSIONING
SEALING AND PERMANENT CLOSURE OF A WATER WELL
(No.)
Code 351

1. *SCOPE*

The work shall consist of recording well data; preparing the well site for sealing and permanent closure including the removal of pumping equipment, piping, removable casing and screens, and obstructing materials; disinfecting the well; providing and installing well sealing materials; and shaping the well area.

This specification does not cover the capping of a non-deteriorated well. A non-deteriorated well contains casing in good condition and is beneficial to the landowner.

2. *PUBLIC AND PRIVATE UTILITIES*

Utilities are defined to be overhead and underground power or communication lines, and pipelines. All utilities discovered to be in the work area are shown on the drawings or sketches. However, the absence of indicators on the drawings or sketches does not assure the nonexistence of utilities in the work area. The contractor should conduct their own search and discovery for utilities in order to lessen or avoid potential damages. The owner/operator shall complete TX-ENG-80, UTILITIES INVENTORY prior to any ground disturbance and return it to a USDA-NRCS representative.

3. *REGULATIONS*

Water well drillers and pump installers must be licensed by the Texas Department of Licensing and Regulation (TDLR) to plug wells in the State of Texas. Well drillers, pump installers, and landowners must also comply with all federal, state, and local laws and regulations. It is the responsibility of the landowner to obtain all necessary permits from applicable federal, state, and local agencies including local groundwater conservation districts.

Abandoned and/or deteriorated wells shall be sealed and closed in accordance with rules and regulations contained in the Texas Administrative Code (TAC); Title 16 Economic Regulation; Part 4 Texas Department of Licensing and Regulation (TDLR); Chapter 76 Water Well Drillers and Water Well Pump Installers Administrative Rules, http://www.license.state.tx.us/wwd/wwdrules.htm.

If in existence, the local groundwater conservation district rules and regulations shall also be followed. A map of the state's groundwater conservation districts can be found at http://www.tceq.state.tx.us/permitting/water_supply/groundwater/mapgcd.html.

4. *SITE PREPARATION*

All well pumping equipment and piping, removable casing and screens, obstructing materials, trash, debris, and existing surface materials shall be removed from the well and immediate area, and disposed of in an appropriate manner before disinfection or sealing procedures begin.

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5. *DISINFECTION*

If the well contains standing water, the well shall be brought to a minimum 100-ppm chlorine concentration to kill existing microorganisms within the well water before sealing (**see Table 1**). When practical, the chemical solution shall be agitated within the well column. The chemical solution shall be left for no less than 24-hours to assure complete disinfection. The disinfection process shall also comply with all state and local groundwater conservation district requirements.

Table 1: Well Volumes and Approximate Disinfection Quantities

Well or Bore Hole Diameter Inches	Volume of Water (Per Linear Foot) Cubic Feet / Foot	Volume of Water (Per Linear Foot) Gallons / Foot	Liquid Chlorine Bleach Needed (Per Linear Foot) [1] Fluid Ounces / Foot
2	0.022	0.163	0.042
3	0.049	0.367	0.094
4	0.087	0.653	0.167
5	0.136	1.020	0.261
6	0.196	1.469	0.376
7	0.267	1.999	0.512
8	0.349	2.611	0.669
9	0.442	3.305	0.846
10	0.545	4.080	1.045
12	0.785	5.876	1.504
14	1.069	7.997	2.047
16	1.396	10.445	2.674
18	1.767	13.220	3.384
20	2.182	16.321	4.178
24	3.142	23.502	6.017
36	7.069	52.880	13.537
40	8.727	65.284	16.713
44	10.559	78.994	20.222
48	12.566	94.009	24.066
60	19.635	146.889	37.604
72	28.274	211.520	54.149
96	50.265	376.036	96.265

NOTES:

1. One (1) gallon of 5% liquid chlorine bleach for every five hundred (500) gallons of standing water will produce an equivalent concentration of 100 parts per million of chlorine.

Disinfection Example: If the measured depth of the well is 100-feet, the measured static water level is 45-feet, and the well or hole diameter is 12-inches, then;

(100 - 45) feet x (1.504) ounces of chlorine product per foot, from Table 1 =
(82.72) fluid ounces of chlorine product needed / 128 fluid ounces per gallon = 0.65-gallons of liquid chlorine bleach needed to disinfect the well.

6. *CASING*

All removable casing shall be removed from the well. *At a minimum where the well casing cannot be removed, the casing shall be cut off at a depth not less than 3-ft. below the land surface or at the maximum depth of frost penetration, whichever is greater.*

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Where the well casing cannot be removed and an open annular space exists between the outside of the casing and the well bore, the annular space must be sealed using the sealing materials and methods described in Sections 7 and 8. All casing left in place shall be perforated or ripped sufficiently to ensure sealing materials completely fill the casing and any annular space.

7. *SEALING MATERIALS*

Properties of sealing materials shall conform to characteristics listed in ASTM D-5299, part 6.3 Plugging Materials. Sealing materials do not require disinfection.

(a) Cement - A neat slurry of Portland cement, having a density of not less than 15.36 gal/cu. ft. (This density may be achieved by mixing 5.5 gallons of water with one 94 pound sack of Portland cement), or a cement slurry which contains cement along with bentonite, gypsum or other additives achieving the same density requirement.

(b) Bentonite Slurry - A fluid mixture of sodium bentonite and potable water mixed at the manufacturers' specifications to a slurry consistency that can be pumped through a pipe and achieving a weight of not less than 10 pounds per gallon of mix.

(c) Granular Sodium Bentonite - 3/8-inch or larger, coarse ground, untreated, sodium based bentonite (montmorillonite).

8. *SEALING METHODS*

The well shall be filled and sealed by one of the following methods:

(a) The entire well shall be pressure filled via a tremie pipe with cement from the bottom up to the land surface.

(b) The entire well shall be pressure filled via tremie pipe with clean bentonite slurry from the bottom up. The top 2-ft. of the well shall be filled with cement as an atmospheric barrier. *Bentonite slurry may not be used if a water zone contains chlorides above 1500-ppm or if hydrocarbons are present.*

(c) If the well has 100-ft. or less of standing water, the entire well may be filled with a solid column of granular sodium bentonite hydrated at frequent intervals while strictly adhering to the manufacturers' recommended rate and method of application. Care should be taken to ensure bridging does not occur by pouring the material slowly and/or agitation. The top 2-ft. of the well shall be filled with cement as an atmospheric barrier. *Granular sodium bentonite may not be used if a water zone contains chlorides above 1500-ppm or if hydrocarbons are present.*

(d) Method (a), (b), or (c) above with the following exceptions. The well shall be filled from the bottom of the well to within 6-ft. of the land surface. The interval between 4-ft. and 6-ft. below the land surface shall be filled with cement. The interval between the land surface and 4-ft. depth shall be filled with soil materials that achieve an in-place hydraulic conductivity equivalent to or less than the surface soil surrounding the well. The land surface shall be mounded to compensate for settling and shall be graded in a manner that prevents ponding of surface runoff.

(e) Large hand dug and bored wells 36-inches or greater in diameter to 100-ft. in depth may be filled to the surface with compacted clay or caliche. The backfill material shall be placed in a manner that minimizes segregation and bulking, mounded above the surface to compensate for settling, and shall be graded in a manner that prevents ponding of surface runoff.

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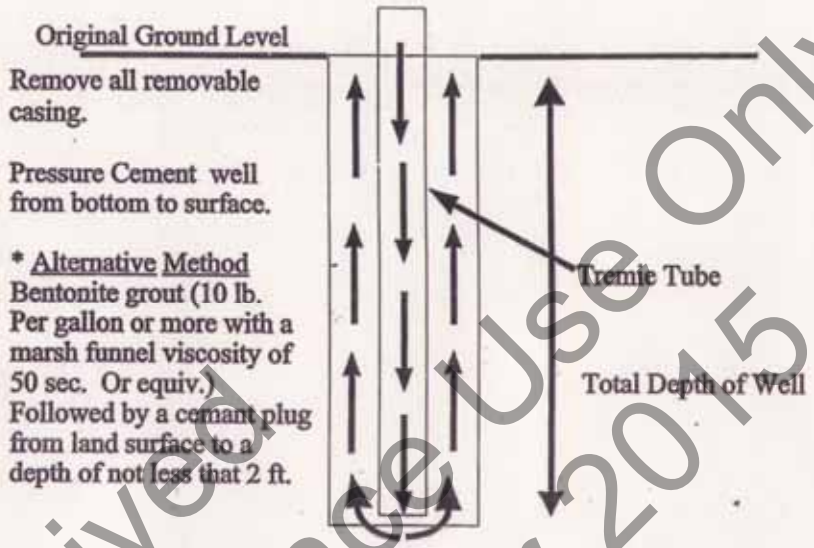
(f) Undesirable water or constituents shall be isolated from the fresh water zone(s) with cement plugs and the remainder of the well bore filled with cement or clean bentonite grout. The top 2-ft. of the well shall be filled with cement as an atmospheric barrier.

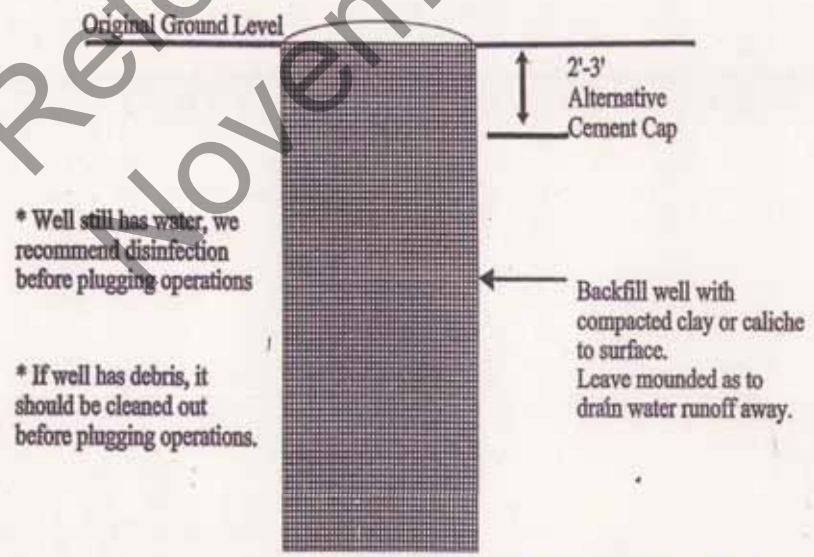
9. *TDLR DRAWINGS*

The following drawings are from the Texas Administrative Code; Title 16 Economic Regulation; Part 4 Texas Department of Licensing and Regulation (TDLR); Chapter 76 Water Well Drillers and Water Well Pump Installers Administrative Rules.

Plugging of Drilled Wells
Chapter 76.1004



Plugging of Large Diameter/Hand Dug Wells (Exception)



Drawings downloaded October 17, 2006 from the TDLR website (http://www.license.state.tx.us/wwd/wwdspecs.htm)

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10. CERTIFICATION

The contractor shall furnish the owner/operator a written certification (with a copy provided to USDA-NRCS) that the decommissioned well conforms to the requirements of this specification and to the Texas Administrative Code; Title 16 Economic Regulation; Part 4 Texas Department of Licensing and Regulation (TDLR); Chapter 76 Water Well Drillers and Water Well Pump Installers Administrative Rules, http://www.license.state.tx.us/wwd/wwdrules.htm. The contractor shall also certify that they are licensed by the State of Texas as a well driller or pump installer.

The certification shall also provide the following:

(a) Copy of the TDLR Plugging Report
(b) NRCS Contractor's Certification Sheet - Well Decommissioning

11. MEASUREMENT

Payment will only be made for decommissioned wells that meet this specification. The measurement for payment will be based on the cubic feet of the well sealed or decommissioned. The volume will be calculated based upon the depth as reported in feet on the TDLR Plugging Report and the nominal diameter of the casing. Payment will be one price per cubic foot which includes the removal of pumping equipment, piping, removable casing and screens, and obstructing materials; disinfecting the well; providing and installing well sealing materials; and shaping the well area. An onsite check of the completed work will be performed by a USDA-NRCS representative.

12. CONSTRUCTION DETAILS

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ATTACHMENTS: TX-ENG-80 Utilities Inventory Form, Texas Department of Licensing and Regulation Plugging Report, NRCS Contractor's Certification Sheet.

This construction specification, attached construction details and the requirement for completion of a TX-ENG-80, UTILLITIES INVENTORY have been reviewed with me and I agree to decommission my water well according to these construction specifications.

_____ _____

Owner / Operator ***Date***