

NATURAL RESOURCES CONSERVATION SERVICE**CONSERVATION PRACTICE STANDARD****WELL DECOMMISSIONING****(NO.)****CODE 351****DEFINITION**

The sealing and permanent closure of an inactive, abandoned, or unusable water or monitoring well.

PURPOSE

A well is decommissioned to achieve one or more of the following purposes:

- Remove a water or monitoring well from active use when it is no longer needed, it cannot be rehabilitated, or it has failed structurally.
- Remove a monitoring well from use when it is no longer capable of providing representative samples or it is providing unreliable samples.
- Eliminate a physical hazard to people, animals, and farm machinery and prevent entry of animals, debris, or other foreign substances.
- Prevent contamination of groundwater by surface water inflow.
- Restore the natural hydrogeologic conditions, to the extent possible, by preventing vertical or lateral cross-contamination or commingling of groundwater between separate water-bearing zones.
- Eliminate the possibility of repurposing the well.
- Allow for future alternative use or management of the site.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to any water well or monitoring well selected for decommissioning.

This practice does not apply to water wells that were used for waste disposal, petroleum wells or geothermal wells.

CRITERIA

General Criteria Applicable to All Purposes

Criteria for all purposes must conform to decommissioning procedures presented in ASTM D5299, Standard Guide for Decommissioning of Ground Water Wells, Vadose Zone Monitoring Devices, Boreholes, and Other Devices for Environmental Activities.

Materials and procedures used must be consistent with local groundwater conservation district rules and State requirements contained in Water Well Drillers and Pump Installers Administrative Rules of the Texas Department of Licensing and Regulation (TDLR), 16 Texas Administrative Code, Chapter 76, Section 76.104, Technical Requirements - Standards for Capping and Plugging of Wells and Plugging Wells that Penetrate Injurious Water Zone.

Wells must be decommissioned by a well driller with a valid license from the TDLR. An exception may be made for hand dug wells less than 20-feet in depth.

Data Collection.

Collect and review all as-built construction documents, maintenance records, and other available data for the well(s). Include this information in the decommissioning plan.

Well Preparation.

Clear the well of all pumping equipment, valves, pipelines, grease, oil, scum, debris, and other foreign material. To the extent practicable, remove all casings, liners, and screens. Remove casing by either pulling or overdrilling (over-reaming) in accordance with guidance in ASTM D5299.

If some or all of the casing resists removal by pulling or overdrilling, it must be ripped, perforated, or cut off below the ground surface. For the cut-off depth, use the greater of 2-feet, the maximum potential depth for frost penetration, or the depth of any other near-surface soil fracturing process (such as desiccation).

Disinfection.

All wells containing standing water must be disinfected by adding chlorine bleach at a rate of 1-gallon of bleach for every 500-gallons of standing water (100-ppm chlorine concentration). Agitate the well water and keep the solution undisturbed for no less than 12-hours to assure complete disinfection.

Sealing Materials.

All wells must contain sealing material. Sealing materials must conform to the characteristics listed in ASTM D5299. Sealing materials do not require disinfection. Select sealing materials that have an in-place hydraulic conductivity equivalent to or less than the ground surface soil surrounding the well head.

The quality of the water used for mixing with sealing materials must meet or exceed criteria provided in ASTM D5299.

Fill (plugging) Materials.

Select fill materials that are free of clay, silt and organic and foreign matter, *except large hand dug and bored wells 36 inches or greater in diameter to 100 feet in depth may be plugged by back filling with compacted clay or caliche consistent with TDLR rules.* Select a gradation and a filling process that will not cause bridging during the filling process.

Plugging and Sealing Procedures.

Do not place sealing and fill materials until after completion of the disinfection process.

The first layer of fill material will be placed in the bottom of the well and will extend upward to a point that is no less than one foot above the top of the lowest water-bearing zone.

Sealing materials are used to restrict vertical movement of water and to prevent comingling of waters from different production zones. Seal material is placed at a minimum thickness of one foot starting at no less than one foot above the lowest water bearing zone and may be successively placed with fill materials at intervals every 10- feet or less throughout the entire well column, *with written approval from TDLR.* If another water-bearing zone is encountered, adjust the spacing of the fill layers so that the zone is sealed.

Fill the well to a point that is not less than 2-feet from the ground surface or to the top of the cutoff casing, whichever is greater. The last layer must be a sealing layer.

Use installation methods that avoid segregation, dilution, or bridging of the fill or sealing material.

For wells greater than 30-inches in diameter, place and compact fill in a manner that minimizes segregation and bulking and prevents surface subsidence.

Casings Grouted-in-Place.

Use a pressurized grouting procedure that will completely fill and seal all open spaces in the annulus. Acceptable grout sealant includes cement or bentonite that conforms to guidance provided in ASTM D5299.

If casings are within a collapsing formation, conduct the grouting procedures concurrently with removal of the casing so that the bottom of the casing remains submerged in the grout.

Well-head Seal.

Seal the interval between the ground surface and the top of the cut-off casing or last sealed layer with cement that conforms to requirements in ASTM D5299.

Mound the well-head seal about the ground surface. Grade the ground surface at the well-head in a manner that prevents ponding of surface water at the well-head.

Control of Artesian Pressure.

If a well is under artesian pressure (flowing or not flowing), maintain a sufficiently high grout pressure to counteract the artesian pressure until initial grout set occurs. Use procedures for balancing pressures during grouting operations given in ASTM D5299.

CONSIDERATIONS

If allowed by State regulations, fill materials, such as sand, pea gravel, sand-gravel mix, crushed rock, or agricultural lime, (*compacted clay or caliche for large hand dug and bored wells 36-inches or greater in diameter to 100-feet in depth*) can be used to fill the well provided that the zones of sealing material conform to requirements in ASTM D5299.

To eliminate a physical hazard to farm machinery and damage to the well head seal, *placement of the sealing material may be no less than 4-feet below the land surface. The interval between 4-feet and 6-feet below the land surface must be filled with cement that conforms to requirements in ASTM D5299. The interval between the land surface and 4-feet depth may be filled with soil materials that achieve an in-place hydraulic conductivity equivalent to or less than the surface soil surrounding the well.*

If feasible, consider adding a metal “target” to the top 3-inches of the well-head seal so that the decommissioned well may be easily located with a metal detector.

PLANS AND SPECIFICATIONS

Prepare plans and specifications for decommissioning a well that describe the requirements for applying the practice to achieve its intended purposes. Make a record of the installation of this practice that includes the following:

- Location of the decommissioned well by Global Positioning System (GPS), latitude/longitude, township/range, or other georeferencing convention, of such precision that allows the ready location of the site
- Date of completion of well decommissioning
- Name of landowner
- Name, title, and address of person responsible for well decommissioning
- Total depth of well
- Length of casing prior to decommissioning
- Length of casing removed or length of casing cut off below ground level
- Lengths of casing ripped or perforated and the method used
- Inside diameter of well bore or casing
- Type or schedule of casing material (e.g., standard weight steel, or PVC Sch-80)

- Static water level measured from ground surface prior to decommissioning
- Photographs before and after decommissioning
- Types of materials used for filling and sealing, quantities used, depth intervals for installation of each type of material, and the placement method used
- Detailed documentation of all other information pertinent to site conditions and other problems encountered during decommissioning

OPERATION AND MAINTENANCE

Inspect the practice site periodically to ensure there is no ground settlement, erosion, or other disturbance. Maintain the site in a manner that prevents ponding or surface runoff toward the site

REFERENCES

American Society for Testing and Materials, D5299, "Standard Guide for Decommissioning of Groundwater Wells, Vadose Zone Monitoring Devices, Boreholes, and Other Devices for Environmental Activities." ASTM International. 100 Barr Harbour Dr., P.O. Box C-700, West Conshohocken, PA.

Water Well Drillers and Pump Installers Administrative Rules of the Texas Department of Licensing and Regulation (TDLR), 16 Texas Administrative Code, Chapter 76, Section 76.104, Technical Requirements - Standards for Capping and Plugging of Wells and Plugging Wells that Penetrate Injurious Water Zone.

APPROVAL AND CERTIFICATION

WELL DECOMMISSIONING

(NO)

Code 351

PRACTICE STANDARD APPROVED:

/s/ JOHN MUELLER

State Conservation Engineer

November 30, 2015

Date