

**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 groundwaters 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.

CRITERIA

General Criteria Applicable to All Purposes

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

Decommissioning shall be compatible with all applicable local, State, Tribal, and Federal requirements.

All work planned shall be in compliance with "Mississippi Surface Water and Groundwater Use and Protection Regulations." Regulations are available from the Mississippi Department of Environmental Quality – Office of Land and Water Resources (www.deq.state.ms.us).

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, "Standard Guide for Decommissioning of Groundwater Wells, Vadose Zone Monitoring Devices, Boreholes, and Other Devices for Environmental Activities."

If some or all of the casing resists removal by pulling or overdrilling, it must be ripped,

Conservation practice standards are reviewed periodically and updated if needed. To obtain the current version of this standard, contact your Natural Resources Conservation Service [State Office](#) or visit the [Field Office Technical Guide](#).

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perforated, or cut off below the ground surface. For the cut-off depth, use the greater of two feet, the maximum potential depth for frost penetration, or the depth of any other near-surface soil fracturing process (such as desiccation).

Sealing materials. 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. Select a soil gradation and a filling process that will not cause bridging during installation.

Plugging and sealing procedures. Do not place sealing and fill materials until after completion of the disinfection process, if conducted.

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.

Place sealing material in a layer no less than one-foot thick above the top of the first layer of fill material. Sealing materials are used to restrict vertical movement of water and to prevent comingling of waters from different production zones. Install an alternating sequence of one-foot of sealing material and a maximum of 10 feet of fill material throughout the remaining well column. If another water-bearing zone is encountered, adjust the spacing of the fill layers so that the zone is sealed. Fill the borehole to a point that is two 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 backfill 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 a combination of cement, sand, 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 materials that conform to guidance in ASTM D5299. These materials may be an extension of the sealing materials used below this depth.

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, can be used to fill the well provided that the zones of sealing material conform to requirements in ASTM D5299.

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.

Before sealing the well, consider bringing the entire column of well water to an available chlorine concentration of no less than 50 ppm, or use the greatest concentration specified by government authority. Agitate the well water and keep the solution undisturbed for no less than 12 hours to assure complete disinfection.

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.

**Natural Resources Conservation Service
Construction Specifications**

WELL DECOMMISSIONING

1. SCOPE

Work shall consist of recording well data, providing and installing well sealing materials, and shaping well area.

2. SITE PREPARATION

All well equipment, trash and debris shall be removed from the well area and disposed of in an appropriate manner.

3. DISINFECTION

The well water shall be decontaminated by bringing the well water to a 100 ppm chlorine concentration. A 100 ppm chlorine solution will require: 1 pint of 5 percent chlorine bleach per 62 gallons of water or 1.3 pounds high-test calcium hypochlorite tablets per 1000 gallons of water. After being agitated in the well water, the solution shall remain for no less than 12 hours to assure complete disinfection.

4. MATERIALS

Well grouting and backfill materials shall be clean and free from contaminants and pollutants. Materials shall be in accordance with the following and meet ASTM D5299, part 6.3 characteristics:

- a. Sand/gravel mixture shall consist of a sand and gravel "filter pack" compatible with the well screen. The maximum particle size of the gravel shall not exceed 1/10 of the diameter of the well or 2 inches in diameter, whichever is smaller.
- b. Cement grout shall consist of a mixture of cement, sand, (1:1 ratio) and not more than 7 gallons of clean water per sack (94 pounds) of cement.
- c. Neat cement shall consist of a mixture of cement and water with not more than seven (7) gallons of water per sack (94 pounds) of cement.
- d. Cement-bentonite mixture shall consist of cement and bentonite (5-8 percent bentonite by dry weight) with not more than 10 gallons of clean water per sack (94 pounds) of cement.

e. Bentonite may be used in powder, granular, chip, or pelletized form. Powder bentonite will be used in slurry and grouting mixtures. Granular, chip, and pellet bentonite will be used to fill the inside of the well casing.

f. Native clayey soil used for backfill shall be free from pesticides and other contaminants.

5. PLUGGING

Measured or estimated well diameter and depth shall be used for calculating material quantities needed to fill the well.

Each well shall be completely filled starting at the bottom and proceeding to the top by methods that avoid segregation, dilution, or bridging of the material. Granular material may be allowed to free-fall for depths less than 20 feet provided that the material is tamped into place. Fill material for a dug well shall be placed in 2-foot layers and compacted.

Sand/gravel mixture and bentonite pellets placed in wells less than 10 inches in diameter at depths greater than 20 feet shall be placed with a tremie pipe to ensure continuous placement of the material without air or water gaps. The cement-bentonite mixture, neat cement, and cement grout shall be placed by pumping methods. For wells greater than 30 inches in diameter, backfill shall be placed in a manner that minimizes segregation and bulking in order to prevent surface subsidence.

6. CASING REMOVAL

If possible, the casing shall be completely removed from the well by either pulling or over drilling (over-reaming) as explained in ASTM D5299, part 7.3.1 and 7.3.8. For those wells where removal of the well casing is impractical, the well casing or dug well liner shall be cut off at least 3 feet below ground surface and removed from the site. Casings to be grouted in place shall employ a pressurized grouting procedure that will

completely fill and seal any open space around the casing.

7. WELL-HEAD SEAL

The area over the sealed well shall be backfilled with compacted, clean native clayey soil and shaped with a slight mound to direct surface water sway from the site and prevent ponding. Backfill material shall be free of pesticide and waste contaminants and shall conform to ASTM D5299, part 6.3.

8. VEGETATION

All disturbed areas associated with the well decommissioning shall be vegetated according to NRCS Conservation Practice Standard 342 – Critical Area Planting

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9. CONSTRUCTION DETAILS

10. FORM COMPLETION

The person who plugs the abandoned well shall complete and submit the MDEQ-OLWR Water Well Plugging/Decommissioning Form OLWR-DF-1 (04/08) within 30 days of completion and provide a copy to the Natural Resources Conservation Service field office for records. This form can be found on the MDEQ- OLWR website (www.deq.state.ms.us).