Natural Resources Conservation Service

CONSERVATION PRACTICE STANDARD

WELL DECOMMISSIONING

CODE 351

(no)

DEFINITION

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

PURPOSE

This practice is used to accomplish one or more of the following purposes:

- Protect ground water from surface water contamination
- Protect the aquifer water quality
- Restore the natural hydrogeologic conditions

CONDITIONS WHERE PRACTICE APPLIES

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

This practice is intended for wells where no unidentified waste has been observed or is expected per NRCS National Engineering Manual (NEM) (Title 210), Part 503, Subpart E, “Prohibited Technical Assistance.”

CRITERIA

General Criteria Applicable to All Purposes

Laws and regulations

Well decommissioning must comply with all applicable governmental regulations, laws, permits, licenses, and registrations.

Roles and responsibilities

A water well must be decommissioned by a licensed water well driller. When allowed by State and local regulations, hand-dug wells less than 60-feet deep and without steel or plastic casing, may be decommissioned by the landowner, engineer, geologist, licensed pump installer, or licensed water well driller.

The person decommissioning the well is responsible for submitting the well closure report to all applicable government entities.

Data collection

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

Well preparation
Remove all equipment, material, and debris that may obstruct access to the bottom of the well. Sound the well to verify all obstructions were removed.

Remove casing by either pulling or over drilling (over-reaming) according to ASTM D5299, "Standard Guide for Decommissioning of Groundwater Wells, Vadose Zone Monitoring Devices, Boreholes, and Other Devices for Environmental Activities," and American Society of Agricultural and Biological Engineers (ASABE), EP400.3 Section 8.0, "Designing and Constructing Irrigation Wells."

If some or all the equipment and casing resists removal by pulling or over drilling, the casing must be ripped, perforated, or cut off a minimum of 2.0 feet below the ground surface.

Disinfection
Prior to filling and/or sealing, disinfect the well with a minimum chlorine solution concentration of 50 mg/L (50 ppm), or the minimum chlorine solution concentration specified by the regulating authority, whichever one is greater. After adding the chlorine solution, agitate the well water to distribute the solution, and keep the well undisturbed for a minimum of 12 hours to allow for disinfection.

Sealing materials
All sealing materials must conform to ASTM D5299 or State regulatory requirements. Sealing materials do not require disinfection. Select sealing materials that have an in-place hydraulic conductivity equivalent to, or less than, ground surface soil surrounding the well head.

Water quality used for mixing with sealing materials must meet or exceed ASTM D5299 criteria.

Fill (coarse-grained) materials
When allowed by State regulations, fill materials, such as sand, pea gravel, and sand-gravel mix; crushed rock; or agricultural lime can be used to fill the well, if sealing material zones conform to ASTM D5299 or State regulatory requirements. Select a soil gradation and a filling process that will not cause bridging during installation. Fill materials require disinfection prior to placement.

Sealing/filling procedures
When well disinfection is required by State law, do not place sealing or select fill materials until after disinfecting the well.

Place sealing materials from the well bottom to ground surface. If allowed by applicable regulations, backfill with select fill materials, according to ASTM D5299. Use installation methods that avoid segregation, dilution, or bridging of fill or sealant, such as a pump and hose, or tremie pipe.

Use boring logs to identify zones for fill and sealant placement. In the absence of a boring log, use a downhole camera to identify sealant placement. Downhole cameras are not required for wells where sealing material is used for the entire well column.

For grouting ratios and placement procedures, follow American Water Works Association (AWWA), A100-15, "Water Wells Standard," and ASTM D5299.

Sealing collapsible formations
When casings are within a collapsing formation, install sealing material concurrently with casing removal 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. Sealing thickness must comply with all applicable Federal and State requirements.

Mound or crown the native soil to compensate for settling and to prevent ponding of water directly over the well site.

Control of artesian pressure
When a well is under artesian pressure (flowing or not flowing), pressure grout from the bottom of the well to ground surface. Procedures for balancing formation pressures during grouting operations must conform to ASTM D5299.

CONSIDERATIONS

When 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. Record the following information about the completed installation of this practice:

- Location of water well by Global Positioning System (GPS) coordinates or in a sufficiently detailed narrative description to readily locate the well.
- 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 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 immediately 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.
- Schematic drawing of well construction showing well diameter and depth, casing diameters, fill, bentonite, or grouting depths.

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 National Standard/American Water Well Association. 2015. ANSI/AWWA A100-15, Standard for Water Wells. Denver, CO. AWWA catalog no: 41100-2015. http://www.awwa.org.

American Society of Agricultural and Biological Engineers (ASABE). 2007. ANSI/ASAE EP400.3, Designing and Constructing Irrigation Wells. https://elibrary.asabe.org.

ASTM International. 2018. ASTM Standard D5299/D5299M. Standard Guide for Decommissioning of Groundwater Wells, Vadose Zone Monitoring Devices, Boreholes, and Other Devices for Environmental Activities. West Conshohocken, PA. DOI: 10.1520/D5299_D5299M-18. http://www.astm.org.

USDA NRCS. 2017. National Engineering Manual (Title 210), Part 503, Subpart E, Prohibited Technical Assistance. Washington, D.C. https://directives.sc.egov.usda.gov/.