

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD**

WATER WELL DECOMMISSIONING

(No.)

CODE 351

DEFINITION

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

PURPOSE

- Eliminate physical hazard to people, animals, and farm machinery; and to 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 cross-contamination or commingling of groundwaters between separate water bearing zones
- Eliminate the possibility of the water well being used for any other purpose
- Allow future alternative use or management of the site

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to any vertical water well that is to be decommissioned.

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

CRITERIA

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.

Data collection. As-built construction documents, maintenance records, and other available data for the water well shall be collected, reviewed, and included in a well decommissioning plan. Existing conditions shall be documented as defined in Plans and Specifications.

Well preparation. The well shall be cleared of all pumping equipment, valves, pipelines, grease, oil, scum, debris, and other foreign material. Casings, liners, and screens shall also be removed, unless impracticable.

Disinfection. Water wells shall be disinfected as an integral part of the decommissioning process. Before sealing, the entire column of well water shall be brought to an available chlorine concentration of 50 ppm or greater, or other higher chlorine concentration as specified by local, State, Tribal, or Federal requirements. After being agitated in the well water, the solution shall remain for no less than 12 hours to assure complete disinfection.

Plugging the well. The well shall be plugged by using suitable fill materials, with layers of sealing material emplaced to restrict movement of water vertically in the well.

Sealing materials. Sealing materials used in water well decommissioning shall be of sufficiently low hydraulic conductivity to prevent groundwater flow vertically in the well. Properties of sealing materials shall conform to characteristics listed in ASTM D5299, part 6.3. Acceptable sealing materials are provided in ASTM D5299, part 6.4 to 6.6. Sealing materials do not require disinfection.

Water to be mixed with sealing materials shall be of a quality that conforms to criteria provided in ASTM D5299, part 7.3.3.

Fill material. Fill material shall be clean and free of organic or other foreign matter. The fill material will be graded so that bridging will not occur during placement.

Plugging procedures. Sealing and fill materials shall be placed in the well only after the well water has been disinfected.

Place fill material from the bottom of the well to the top of the lowest water-bearing zone.

Sealing material is placed at a minimum thickness of one foot starting at the top of the lowest water bearing zone and successively placed at intervals every 10 feet or less throughout the remaining well column.

All material shall be placed from the bottom of the well upward by methods that avoid segregation, dilution, or bridging of the material.

For wells greater than 30 inches in diameter, backfill shall be placed and compacted in a manner that minimizes segregation and bulking to prevent surface subsidence.

Removal of well casing. If possible, the casing shall be completely removed from the well by either pulling or overdrilling (over-reaming) as explained in ASTM D5299, part 7.3.1 and 7.3.8. Casing that cannot be removed completely shall be ripped, perforated, or cut off at a depth greater than the maximum potential for frost penetration or any other near surface soil fracturing hazard (such as desiccation), or two feet, whichever is greater.

Casings grouted in place. Casings to be grouted in place shall employ a pressurized grouting procedure that will completely fill and seal any open space around the casing. Grout may consist of cement, sand, bentonite, an approved combination of these constituents, or other approved sealing materials.

Casings to be removed from a collapsing formation shall be grouted concurrently with removal, so that the bottom of the casing remains submerged in the grout.

Well-head seal. The interval between the ground surface and the top of the cut-off casing shall be sealed with materials that conform to ASTM D5299, part 6.3. These materials may be an extension of the sealing materials used below this depth.

The soil material or sealing materials shall achieve an in-place hydraulic conductivity equivalent to or less than the surface soil surrounding the well. The ground surface at the sealed well-head shall be mounded and graded in a manner that prevents ponding of surface runoff.

Control of artesian pressure. If a well is under artesian pressure (flowing or not flowing), the grout pressure must be maintained to counteract the artesian pressure until initial grout set occurs. Procedures for balancing pressures during grouting operations shall conform to ASTM D5299, part 7.3.7.

CONSIDERATIONS

If allowed by state regulations, fill materials, such as sand, pea gravel, sand-gravel mix, crushed stone or agricultural lime can be used to fill the well, provided that zones of sealing material conform to ASTM D5299, part 6.3.

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

PLANS AND SPECIFICATIONS

Plans and specifications for decommissioning a water well shall be consistent with this standard and shall describe the requirements for applying the practice to achieve its intended purposes. A record of the installation of this practice shall be made and shall include the following information:

- Location of the decommissioned well by Global Positioning System, latitude/longitude, township/range, or other georeferencing convention, of such precision that it can be readily re-located
- 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
- Length of casing removed or length of casing cut off below ground level
- Lengths of casing ripped or perforated and method used
- Inside diameter of well bore or casing
- Type of casing material or schedule (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 emplacement of each type, and emplacement method used
- All other pertinent information based on site conditions and any other problems encountered during decommissioning should be documented in detail
- Refer to the section SUPPORTING DATA AND DOCUMENTATION for additional requirements.

OPERATION AND MAINTENANCE

The practice site shall be inspected periodically to ensure that the decommissioned well and the adjacent area have not settled or eroded, or are otherwise adversely disturbed. The well site and adjacent ground surfaces shall be maintained in a manner that prevents ponding of surface runoff on the site.

SUPPORTING DATA AND DOCUMENTATION

The following is a list of the minimum data and documentation to be recorded in the case file:

1. Location the practice on the conservation map.
2. Assistance notes. The notes shall include dates of site visits, name or initials of the person who made the visit, specifics as to alternatives discussed, decisions made, and by whom.

Field Data and Survey Notes. The following is a list of the minimum data needed:

1. Plan view sketch.
2. Name of the landowner.
3. Location of the well by latitude and longitude or state coordinates.
4. Inside diameter of well bore or casing.
5. Total depth of the well.
6. Length of casing.
7. Casing material type or schedule (e.g. standard weight steel, or PVC sch-80).
8. Static water level measured from the ground surface.

Design Data. Record on appropriate engineering paper. For guidance on the preparation of engineering plans see Chapter 5 of the Engineering Field Handbook – Part 650. The following is a list of the minimum required design data:

1. Location of the decommissioned well by latitude and longitude, or other georeference convention, of such precision that it can be readily located in the field in the future.
2. Detailed plans for the well decommissioning, with the type of materials used for filling and sealing, quantities used, and depth intervals for placement of each type, and emplacement method to be used.
3. Length of casing to be removed or length to be cut off below ground level.
4. Plan view sketch and final grading plan as required.
5. Seeding, fertilizing, and mulching requirements.
6. Include the Miss Utility notification statement.
7. Show job class on the plan.
8. Special safety requirements.
9. Quantities estimate.
10. Identification of needed Erosion and Sediment Control measures.
11. Written Operations and Maintenance Plan.

Construction Check Data/As-Built Plans.

Record on survey notepaper, NRCS-ENG-28, or other appropriate engineering paper. Survey data will be plotted in red on the as-built plans. Document approval by the designer of any changes from the drawings or specifications before implementation of the change.

The following is a list of minimum data needed for as-built documentation:

1. Documentation of site visits on CPA-6. The documentation shall include the date, who performed the inspection, specifics as to what was inspected, all alternatives discussed and decisions made and by whom.
2. Check notes recorded during or after completion of decommissioning giving the date of well decommissioning, the information regarding the length of casing removed, the sealing materials and quantities used and their depth intervals, and the emplacement method used.
3. Final quantities and documentation for quantity changes. Materials certifications as appropriate.
4. Sign and date check-notes and plans by someone with appropriate approval authority. Include statement that practice meets or exceeds plans and NRCS practice standards.

In addition, the as-built drawings shall include name, title, and address of the person responsible for well decommissioning and the date of the decommissioning. The as-built records shall also include any applicable "Statement of Conformance" presented or certified by the suppliers. The design folder, as-built drawings, certifications, and specifications shall be filed in the case file.

REFERENCES

1. American Society for Testing and Materials, *ASTM Standards*, Philadelphia, Pennsylvania.
2. USDA, Natural Resources Conservation Service, *Maryland Field Office Technical Guide, Section IV, Standards and Specifications*.
3. USDA, Natural Resources Conservation Service, *National Engineering Handbook, Part 650*.