

**NATURAL RESOURCES CONSERVATION SERVICE**  
**CONSERVATION PRACTICE STANDARD**  
**WELL DECOMMISSIONING**

(NO.)

CODE 351

**DEFINITION**

The sealing and permanent closure of a water well no longer in use.

standards. Treatment of contamination source(s) is required before a well is decommissioned.

**PURPOSES**

This practice serves to:

- \* Prevent entry of vermin, debris, or other foreign substances into the well or well bore hole;
- \* Eliminate the physical hazard of an open hole to people, animals, and farm machinery;
- \* Prevent entry of contaminated surface water into well and migration of contaminants into unsaturated (vadose) zone or saturated zone
- \* Prevent the commingling of chemically or physically different ground waters between separate water bearing zones.

**CRITERIA**

**General criteria for design parameters, acceptable installation processes, or minimum performance requirements applicable to all purposes named above:**

All planned work shall comply with General Manual Title 450-GM, Part 405, Subpart A, Compliance with Federal, State, and Local laws and regulations. ASTM Standard Guide D5299 provides information on properties of common well sealing materials.

Colorado statutes govern the use of underground water. The "Rules and Regulations for Water Well Construction, Pump Installation, and Monitoring and Observation Hole/Well Construction" as set forth by the State of Colorado - State Board of Examiners of Water Well Construction and Pump Installation Contractors shall be followed. (See Reference) These regulations contain specific requirements for plugging wells and test holes.

**CONDITIONS WHERE PRACTICE APPLIES**

This practice applies to any drilled, dug, driven, bored, or otherwise constructed vertical water well determined to have no further beneficial use.

This practice does not apply to wells that were used for waste disposal, or if evidence of contamination still exists. This practice does not apply to wells that contain contaminant levels that exceed state or federal water quality

**Data collection** - All available data for the well shall be collected and reviewed from as-built construction and maintenance records; i.e., well log, the materials schedule, length, and diameter of casing, total well depth, type of liners and screens, and related information. The existing conditions of the well shall be documented as shown in the "Plans and Specifications" section.

Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service.
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**Well preparation** - The well shall be cleared of all pumping equipment, valves, pipelines, casing liners, debris, and other foreign material.

**Casing** - The well casing should be removed if possible. Where the well casing cannot be removed, and an open annular space exists between the outside of the casing and the well bore, then the annular space must be sealed, using sealing materials described in this standard. Sealing materials can be directed into the annular space as grout. As alternative the casing may be ripped or perforated to ensure that sealing materials completely fill the casing and any annular space. Also see "Surface Seal" part of this standard.

**Disinfection** - Before sealing, the well water shall be brought to a 100 ppm chlorine concentration or other solution specified by local or state requirements.

**Sealing materials** - All materials used for sealing any portion of the well shall have a hydraulic conductivity equivalent to or less than that of the lowest hydraulic conductivity of the geologic materials being sealed. Properties of sealing materials shall conform to characteristics listed in ASTM D5299, part 6.3 Plugging Materials.

**Fill materials** - Fill materials, such as drill cuttings, clean sand, clean gravel, clean sand-gravel mix, can be used to plug the well to the static water level provided that zones of sealing materials (conforming to ASTM D5299, part 6.3) are placed no less than one foot thick each at intervals no greater than 10 feet within the column. Above the static water level, use clean native clays, cement, or high solid bentonite grout to the ground surface. Fill materials shall be clean and free of organic or other foreign matter. The gradation shall be such that bridging will not occur during placement.

**Placement of materials** - All materials shall be placed without bridging. 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.

**Surface seal** - The casing shall be completely removed from the well or cut off at a depth not less than 3 ft. below ground surface or at the maximum depth of frost penetration, whichever is greater. Local frost heave and fracturing hazards shall be considered in the design of the surface seal. An interval not less than 3 ft. Below the cut-off casing shall be sealed with sealing materials. These materials may be an extension of the sealing materials used below this depth.

State of Colorado - Rule 16 (see reference) requires that "if the casing is cut off below land surface, the uppermost five (5) feet of remaining casing shall be filled with grout or a permanent cover shall be installed at the top of the casing." If the casing is removed, the top five (5) feet of the hole shall be filled with materials less permeable than the surrounding soils that are compacted to prevent settling.

The interval between the ground surface and the top of the cut-off casing 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 ground surface at the sealed well site shall be mounded and graded in a manner that prevents ponding of surface runoff.

**Additional criteria to prevent commingling of ground waters between separate water bearing zones:**

Wells with open annular space around the casing shall be treated in a manner that seals the voided annular space. Methods of treatment include (1) removing the casing or (2) grouting the casing in place.

Casing removal is acceptable when the entire casing can be removed from the well. Casings removed from a collapsing formation shall be grouted concurrent with removal such that the bottom of the casing remains submerged in the grout.

Casings grouted in place shall employ a grouting procedure that will fill the open space. Perforated or ripped casing shall provide sufficient apportioned open area to assure

passage of the grout to the annular space. The casing shall be perforated or ripped throughout the entire length of a confining layer.

Flowing wells present special problems for sealing. Grout and cement materials introduced into the bottom of the well must be heavy enough to overcome the hydraulic pressure of the aquifer without becoming diluted or segregated. Only a licensed well driller with experience in sealing flowing wells shall be contracted to do this work.

### CONSIDERATIONS

This practice may be part of a ground water protection system that includes water and chemical management practices.

To the extent practicable, an abandoned well should be decommissioned in a manner that restores the original hydrogeologic conditions of the well site and does not preclude the use of the site from future land management practices.

Decommissioning requires special consideration of specific geological, biological, physical, and climatic conditions, the chemical composition of the surrounding soil, rock, and ground water at the well site, and the well's construction practices. All procedures, fill and sealing materials need to be selected according to these considerations.

### PLANS AND SPECIFICATIONS

Plans and specifications for decommissioning abandoned water wells 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 latitude/longitude, township/range, or other georeference convention, of such precision that it can be readily located in the field, if required, in the future.
- \* Date of well decommissioning
- \* Name of landowner
- \* Total depth of well
- \* Inside diameter of well bore or casing
- \* Casing material type or schedule (e.g., standard weight steel, or PVC sch-80)
- \* Static water level measured from ground surface
- \* Types of materials used for filling and sealing, quantities used, and depth intervals for emplacement of each type.

### 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.

### REFERENCES

State of Colorado - Rules and Regulations for Water Well Construction, Pump Installation, and Monitoring and Observation Hole/Well Construction (Water Well Construction Rules) 2 CCR 402-2 can be located at the following web address: <http://water.state.co.us/boe/>