**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

Oklahoma Water Resources Board (OWRB) Rules, Chapter 35, Subchapter 11, "Plugging and Capping Requirements for Wells and Test Holes", shall apply.

Where not in conflict with or less stringent than that required in OWRB rules, 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."

**Contaminated Water Wells.** Contaminated wells require more precautions and greater protection. Treatment may be required prior to decommissioning depending on the severity and type of contaminant. Refer to the OWRB rules concerning abandonment of contaminated wells.

**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 deemed 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 100 ppm or higher as specified by local, State, Tribal, or Federal requirements. After being agitated in the well water, the solution shall remain for no less than 24 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.

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.

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.

**Cavernous Formations**. Wells drilled into open cavernous formations, where the well casing is not extended down into the formation, can be sealed by placing a plug at the bottom of the casing and filling the interior of the casing to the surface following the methods and criteria described in this Standard and the OWRB regulations. A variance must be first requested by the Landowner and granted by the OWRB to complete the decommissioning in this manner.

## CONSIDERATIONS

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

When plugging uncontaminated groundwater wells, fresh water observation wells, or heat exchange wells in the alluvium and terrace deposits of the Arkansas, Cimarron, Salt Fork of the Arkansas, North Canadian, Canadian, Washita, North Fork of the Red, Salt Fork of the Red River, Red River, and other streams or rivers authorized by the Board, OWRB rules governing such shall be considered.

If feasible, a metal “target” shall be added 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

Persons plugging wells, other than the landowner, must be licensed by OWRB. A Multi Purpose Completion Report (MPCR) must be submitted to the OWRB within sixty (60) days after completion.

## 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

Title 785. Oklahoma Water Resources Board, Chapter 35. Well Drill and Pump Installer Licensing

American Society for Testing and Materials (ASTM), D5299 “Standard Guide for Decommissioning of Groundwater Wells, Vadose Zone Monitoring Devices, Boreholes, and Other Devices for Environmental Activities.