



**NATURAL RESOURCES CONSERVATION
SERVICE MISSOURI CONSTRUCTION
SPECIFICATION**

**WELL
DECOMMISSIONING
CODE 351**

GENERAL

Construction operations shall be carried out in such a manner and sequence that erosion and air and water pollution will be minimized and held within legal limits. Do not disturb area larger in size than is needed for site preparation. Trees, stumps, and brush removed from the construction area may be piled for wildlife habitat when approved by the landowner.

The completed job shall present a workmanlike appearance and shall conform to the line, grades, and elevations shown on the drawings or as staked in the field.

All operations shall be carried out in a safe and skillful manner. Safety and health regulations shall be observed and appropriate safety measures used.

All work shall comply with the Well Construction Code of the Missouri Department of Natural Resources (MDNR), Geological Survey Program, Wellhead Protection Section (Missouri 10 CSR 23-3.110). The well owner shall contact the Missouri DNR, before commencing well decommissioning operations, for approval of the plan for plugging a well when the plan deviates from the published Missouri DNR requirements.

Except for landowners decommissioning their own wells located on property they own or lease, persons decommissioning wells other than hand dug wells must be permitted by the Missouri DNR. Wells decommissioned and certified by a MDNR permitted well or pump installation contractor following the MDNR Well Construction Code shall be considered to have met the intent of this specification.

SITE PREPARATION

All well equipment, trash, and debris shall be removed from the well and immediate area and disposed of in an appropriate manner. Any obstruction in the well shall be removed before initiating the plugging operation.

FILL MATERIALS

Materials to be used shall be kept clean and free of contamination. Fill materials may be any of the following unless otherwise stated on the plans:

1. Clean fill such as gravel, sand, varied sized agricultural lime or other approved material.
2. As allowed by the plans for Hand Dug Wells or Cisterns only, clean surface clay material of local origin from below the topsoil, free of organic material, pesticides, hydrocarbon

Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resource Conservation Service or download the standard from the electronic Field Office Technical Guide for Missouri.

residue, and other contaminants with a medium or loamy texture or classified as a silty clay (CL-ML) or lean clay (CL) in the Unified Soil Classification System.

3. Other fill material as allowed by the plans and meeting the requirements of ASTM D5299 and the approval of the Missouri DNR.

SEALING MATERIALS

Sealing materials shall be in accordance with one of the following:

1. Cement Grout - Mixture of cement, sand (1:1 ratio) and water (not more than 6 gallons of fresh water per bag of cement).
2. Cement (neat cement) - Mixture of cement and water with not more than 6 gallons of fresh water per bag of cement.
3. Cement-bentonite - Mixture shall consist of cement and bentonite (up to 6 percent by dry weight) with water (not more than 6 gallons of clean water per bag of cement).

Cements shall be in accordance to ASTM C-150, Types I, II, and V, commonly known as Portland cement. One bag of cement weighs 94 pounds and is one cubic foot in volume.

4. High solids grout - Blend of powdered polymer-free bentonite clays mixed with fresh water that forms a creamy slurry with a minimum of 20% solids by weight and a density of 9.4 lb/gal.
5. Bentonite pellets - Granular powdered bentonite, compressed into tablets 1/4 inch to 3/4 inch in diameter.
6. Bentonite chips - Raw mined bentonite in the form of chunks, 1/4 inch to 3/4 inch in diameter. Fine-grained material resulting from handling and shipping should be screened through a 1/4 inch mesh screen and removed to prevent clumping and bridging during placement of the chips.

Note: The rate of pour of bentonite chips and pellets into the bore hole should not be more than 50 pounds (one bag) in 5 minutes. If there is not sufficient water in the well to saturate the bentonite, water should be added at the rate of 8 gallons per bag of bentonite pellets or chips.

7. Other sealing material as allowed by the plans and meeting the requirements of ASTM D5299 and the approval of the Missouri DNR.

Pressure grouting or a tremie pipe shall be used to place cement or bentonite grouts in water filled wells.

CASING TREATMENT PROCEDURES

If possible, the casing can be completely removed from the well by either pulling or overdrilling (overreaming) as explained in ASTM D5299, part 7.3.1.

Casing that cannot be removed completely shall be ripped, perforated, or cut off (including removing stone, brick or concrete linings in hand dug wells or cisterns) at a depth as shown on the plans.

When cutting off a casing, excavate the ground above the top of the cut off casing such that the remaining hole is at least two (2) feet in diameter larger than the casing.

Casings to be grouted in place shall employ a pressurized grouting procedure that will completely fill and seal the open space around the casing.

Perforated or ripped casing shall provide sufficient apportioned open area to assure passage of the grout into the 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 such that the bottom of the casing remains submerged in the grout.

PLUGGING AND SEALING PROCEDURES

Each well casing and boring hole shall be completely filled, including the annular space outside of the casing or liner. The well casing or dug well liner that was removed shall be disposed of properly.

Well diameter and depth may be used to calculate quantity of materials needed to fill and seal the well. To determine the volume of materials needed or volume of water (per foot of depth) in the hole, use Table 1.

Fill material shall be placed into the well only after the well water has been disinfected. The entire column of well water shall be brought to a minimum available chlorine concentration of 100 ppm or other solution as specified by the plans. After being agitated in the well water, the chemical solution shall be left for no less than 24 hours to assure complete disinfection.

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

Backfill shall be placed and compacted in a manner that minimizes segregation and bulking to prevent surface subsidence.

Unless plans show an alternate procedure that has been approved by the Missouri DNR follow the appropriate procedure listed below when filling the well:

Hand dug or bored wells or cisterns (less than 80 feet in depth)

Fill well to within 3 feet of the ground surface with disinfected fill material as shown on the plans. Fill material shall be of the type shown on the plans.

Remove the top 3 feet of casing or lining leaving a hole that is 2 feet larger in diameter than the original well diameter.

Cap the remaining well depth above the fill material to 1 foot above the soil surface. The capping material shall be compacted clay or clay-rich soil that is free of contaminants. Mound and smooth the cap surface to prevent ponding of surface water.

Drilled wells in unconsolidated deposits

Fill the well to within 50 feet of the ground surface with disinfected fill material. Fill material shall be of the type shown on the plans.

Remove the top 3 feet of casing leaving a hole that is 2 feet larger in diameter than the original well diameter.

Seal the well depth between the top of the fill material to 1 foot above the top of the cut off casing with a sealing material. Sealing material shall be of the type shown on the plans.

Cap the remaining well depth above the sealing material to 1 foot above the soil surface. The capping material shall be compacted clay or clay-rich soil that is free of contaminants. Mound and smooth the cap surface to prevent ponding of surface water.

Drilled wells in bedrock.

Fill the well to within 50 feet below the bottom of the casing with disinfected fill material. Fill material shall be of the type shown on the plans.

Remove the top 3 feet of casing leaving a hole that is 2 feet larger in diameter than the original well diameter.

Seal the well depth between the top of the fill material to 1 foot above the top of the cut off casing with a sealing material. Sealing material shall be of the type shown on the plans.

Cap the remaining well depth above the sealing material to 1 foot above the soil surface. The capping material shall be compacted clay or clay-rich soil that is free of contaminants. Mound and smooth the cap surface to prevent ponding of surface water.

VEGETATION

On areas not cultivated or paved, refer to the JS AGRON-25 job sheet or equivalent for seeding and mulching recommendations.

ABANDONMENT REGISTRATION RECORD

Submit a completed ABANDONMENT REGISTRATION RECORD form to the Missouri DNR.

Table 1 - Hole Diameter vs. Volume

Hole Diameter	Volume (per foot of depth)	
	<i>Gal/Ft</i>	<i>Cu Ft/Ft</i>
<i>4</i>	0.7	0.09
<i>6</i>	1.5	0.20
<i>8</i>	2.6	0.35
<i>10</i>	4.1	0.55
<i>12</i>	5.9	0.79
<i>14</i>	8.0	1.07
<i>16</i>	10.4	1.40
<i>20</i>	16.3	2.18
<i>24</i>	23.5	3.14
<i>36</i>	52.9	7.07
<i>48</i>	94.0	12.57

Additional Details:
