NATURAL RESOURCES CONSERVATION SERVICE
Wyoming
CONSTRUCTION SPECIFICATIONS
FOR
WELL DECOMMISSIONING

_____ _____

(Owner/Operator) (Project)

GENERAL

The well sealing procedure shall be in accordance with a plan approved by the responsible technician. Details of construction shown in the design and plan or described in the State of Wyoming State Engineer's Office Regulations and Instructions, Part III "Water Well Minimum Construction Standards" or described in ASTM D5299, "Standard Guide for Decommissioning of Groundwater Wells, Vadose Zone Monitoring Devices, Boreholes, and Other Devices for Environmental Activities", but not included here shall be considered as a part of this specification. Construction activities shall be in accordance with applicable OSHA regulations.

WELL PREPARATION

Equipment/Debris Removal – Pumping equipment and any obstacles or debris shall be removed from the well before sanitation or sealing procedures begin. Casings, liners, and screens shall also be removed, unless impracticable.

SANITIZATION

If sanitization of the well is required in the construction drawings, the following requirements shall be followed:

The water in the well shall be brought to a 50 PPM chlorine concentration before sealing:

A 50 PPM chlorine solution will require one of the following:

- 1 gallon 5.25 percent chlorine bleach per 1030 gallons of water.
- 1 gallon 6 percent chlorine bleach per 1200 gallons of water.
- Note: For chlorine bleach sanitization, check label to ensure that it is **only sodium hypochlorite.** Do not use bleaches made for synthetic fabrics or those with fragrances.
- 1.5 oz high-test calcium hypochlorite (65%-75% available chlorine) per 100 gallons of water.

After being agitated in the well water, the solution shall remain for no less than 12 hours to assure complete disinfection.

MATERIALS

The entire well depth shall be filled with sealing materials. Sealing materials shall meet the requirements of ASTM D 5299, "Standard Guide for Decommissioning Ground Water Wells, Vadose Zone Monitoring Devices, Bore Holes, and Other Devices for Environmental Activities" and State of Wyoming State Engineer's Office Regulations and Instructions, Part III "Water Well Minimum Construction Standards". The following selection of sealing material mixtures may be used:

Neat Cement Grout Slurry – A mixture of Portland Cement and not more than 6 gallons of clean water per bag (1 cubic foot or 94 pounds) of cement.

Sand Cement Grout Slurry – A mixture of Portland Cement, sand, and water in the proportion of

not more than 1 part by weight of sand to 1 part of cement with not more than 6 gallons of clean water per bag of cement (1 cubic foot or 94 pounds).

Concrete Grout Slurry – A mixture of Portland cement, sand and gravel aggregate, and water in the proportion of at least 1 part by weight of aggregate to 1 part of cement with not more than 6 gallons of clean water per bag of cement.

Nonslurry Bentonite Grout – Chipped or pelletized bentonite varieties that are hydrated to manufacturer's specifications.

Cement/Bentonite Grout Slurry – A mixture of cement and bentonite in the proportion of not more than 6.5 gallons of water and 3 to 5 pounds of powdered bentonite per 94-pound sack of Portland Cement.

Bentonite Grout Slurry – An inorganic mixture of a minimum 20% by weight solids bentonite, with polymers, water, or other additives for the yield/rate control, which forms a low permeability seal (not greater than 1×10^{-7} cm/sec), and is mixed to the manufacturer's specifications.

Water to be mixed with sealing materials shall be of quality that conforms to criteria provided in ASTM D5299, part 7.3.3. The quality of the water must be compatible with the grouting material and not introduce contamination.

Sealing material mixtures shall be mixed to the proportions of the selected mix listed above. At least 15 calendar days before the placement of the sealing material mixture, the NRCS shall be provided documentation depicting the type of mixture selected to be used and the proportions of it constituents. The NRCS shall accept or reject the mixture. After a mix has been accepted, neither the type nor materials used shall be changed without prior notice to the NRCS.

Table 1 can be used to determine the minimum volume of materials required per foot of depth in the hole.

TABLE 1

Hole diameter	Volume per foot of depth	
(inches)	(gal/ft)	(cu. ft./ft)
4	0.7	0.1
6	1.5	0.2
8	2.6	0.3
10	4.1	0.5
12	5.9	0.8
14	8.0	1.1
16	10.5	1.4
20	16.4	2.2
24	23.6	3.1
36	53.0	7.1
48	94.2	12.6

SEALING PROCEDURE

Sealing materials shall be placed from bottom to top in order to accomplish a complete seal. All material shall be placed from the bottom of the well upward by methods that avoid segregation, dilution, or bridging of the material.

If there is free-standing water present in the well prior to filling, the water shall be pumped or bailed out, or its volume shall be determined and figured into the amount of water used to mix the sealing material. Sealing material mixtures shall not be poured from the land surface through a column of water. Sealing materials shall be pumped via tremie pipe by positive displacement or similar method (pressure grouted) from the bottom of the well to the ground surface so an uninterrupted seal may be placed.

If cement grout or concrete is used, the well shall be filled through a pipe (tremie), from the bottom of the well upward, in one continuous operation.

If possible without damaging, caving or blocking the drill hole bore, the casing and/or liner pipe shall be carefully removed from the well as sealing materials are placed. If possible, the casing shall be removed from the well by either pulling or over drilling (over-reaming) as explained in ASTM 5299, part 7.3.1 and 7.3.8. When the casing cannot be removed, the top 5.0 ft of the casing below the ground surface shall be ripped or perforated to ensure that sealing materials fill any annular space that may exist between the casing and the well bore (Note: WY SEO "Water Well Minimum Construction Standards" require the well casing to be cut off at a minimum of 18" below the ground surface). In-lieu of ripping or perforating the top 5.0 ft of the casing, the casing may be cut off 5.0 ft below the ground surface and removed.

If the casing was not removed nor the top 5.0 ft ripped or perforated, after filling with sealing materials, the top 5 feet of the well shall be dug out and the well casing shall be cut off to a minimum of 5 feet below the original ground surface, unless otherwise shown on the drawings. The interval between the ground surface and the top of the cut-off casing shall be sealed with a sealing material mixture. The hole shall be covered with at least 1.0 ft layer of topsoil. The topsoil shall be clean and free of foreign matter. Topsoil shall be tamped in place and shall be graded such that surface water is directed away from the abandoned well location and ponding of water is precluded.

Well Pits. If the abandoned well is located in a walled well pit, proceed with the sealing process as described above. Prior to sealing above the well pit, the well pit shall be removed and then filled with sealing materials and topsoil as outlined above, unless otherwise shown on the drawings.

Control of Artesian Pressure. If a well is under artesian pressure (flowing or not flowing), the grout (sealing material mixture) 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.

ADDITIONAL SPECIFICATIONS