

Title 134 Chapter 4

Regulations Governing Water Well Construction,
Pump Installation, and Water Well
Decommissioning Standards

Effective Date - June 28, 2026

001. GENERAL PROVISIONS

These requirements apply to all water wells constructed under this Chapter, except as modified in 002 through 008 of this Chapter.

001.01 WELL PITS - A well must not be located/constructed in a well pit.

001.02 PROTECTION FROM CONTAMINATION - A water well must be protected from surface drainage, flooding, and seepage, from sources of contamination and pollution by:

- **001.02(a)** Locating the well site to promote drainage away from the well; and
- **001.02(b)** Terminating the top of the well and vent above 100-year flood plain; or
- **001.02(c)** Locating on a berm and/or within a dike to protect the well from a 100-year flood; or
- **001.02(d)** Plugging the vent and seal at the top of the well if yield is less than 50 GPM.

001.03 SEPARATION DISTANCES - Separation distances must be at a minimum comply with the distances established in this section. Be aware that other state, natural resource district, and local statutes and regulations may have more restrictive requirements. If locations are found to not comply with more stringent standards of other state or local regulations that apply, the Department may notify the appropriate authority.

- **001.03(a)** All water wells except those covered in 005 of this Chapter must meet the minimum separation distances in accordance with Chart 1 below.

Chart 1

Minimum Distance in Feet	From
1,000 ft	Any Title 179 community water supply wells under different ownership.
1,000 ft	Any industrial wells under different ownership*
600 ft	Any irrigation wells under different ownership*
100 ft	Any wastewater lagoon
100 ft	Any privy, cesspool, subsurface disposal system
100 ft	Any septic lateral field (soil absorption system)
100 ft	Any animal waste containment structure (lagoon, holding pond, pit, debris basin)
100 ft	Any holding pens associated with an animal feeding operation, as defined in Neb. Rev. Stat. § 54-2417(1)
100 ft	Any other known sources of contamination or pollution
50 ft	Any pressurized sanitary sewer line
50 ft	Any non-watertight sanitary sewer line
10 ft	Any watertight sanitary sewer line
10 ft	Any storm sewer line
50 ft	Any septic tank
10 ft	Any storm water way
10 ft	Any frost proof hydrant
10 ft	Any well pit
* Only applies to drilling industrial and irrigation wells.	

- **001.03(b)** A well driller may locate a well as indicated in Chart 2 below only if:
- **001.03(b)(1)** Compliance with the separation distances established in Chart 1 cannot be met;
- **001.03(b)(2)** The well driller notifies the Department in writing of his/her intent and receives Department written approval prior to construction;
- **001.03(b)(3)** The water well is grouted the full length of the annular space from immediately above the gravel pack above the screened openings to the surface with chip bentonite; and
- **001.03(b)(4)** The subsurface geology includes sufficient silts and/or clays that will provide a protective seal to the groundwater when combined with chip bentonite.

Chart 2

These Separation Distances Require Prior Written Approval from the Department	
Minimum Distance in Feet	From
50-100 ft	Any wastewater lagoon
50-100 ft	Any privy, cesspool and subsurface disposal system
50-100 ft	Any septic lateral field (soil absorption system or reserve area)
50-100 ft	Any animal waste contaminant structure (lagoon, holding pond, pit, debris basin)
50-100 ft	Any holding pens associated with an animal feed operation, as defined in Neb. Rev. Stat. § 54-2417(1)
50-100 ft	Any other known sources of contamination or pollution
25-50 ft	Any pressurized sanitary sewer line
25-50 ft	Any non-watertight sanitary sewer line
5-10 ft	Any watertight sanitary sewer line
5-10 ft	Any storm sewer line
25-50 ft	Any septic tank
5-10 ft	Any stormwater way
5-10 ft	Any frost proof hydrant

- **001.03(c)** If a person wants to locate a well closer than the listed separation distances in Chart 2, a request for a declaratory ruling may be submitted to the Department in accordance with 011 of this Chapter.

001.04 SANITATION-All water wells must be constructed to prevent the introduction of biological, chemical, or radiological substances which may degrade the groundwater.

- **001.04(a) Drilling Equipment** - The water well contractor must use precautions to ensure that all downhole equipment used in the construction of water wells is free of contaminated or polluted materials.
- **001.04(b) Secure Cover** - All water wells must be protected with a secure cover or cap. All inactive water wells must be capped with a watertight secure cover. When the pump is in place, it must be made secure and watertight in accordance with 009.03.

01.05 WELL SCREENS - All well screens must meet the following requirements:

- **001.05(a) Materials** - Well screens must be constructed of durable non-toxic materials of sufficient strength to withstand the pressure to which they may be subjected. They must also be resistant to any corrosion which may result from the characteristics of the water and aquifer materials in which they are placed.
- **001.05(b) Screen Apertures** - Screen apertures must be formed by the continuous slot method, louver, punched casing, molded, or mill-slotted. Torch slotted casing must not be used. The method of construction must allow for control of aperture width. In general, the aperture width should retain a minimum of 85% of the gravel pack, if used, or a minimum of 50% of the aquifer material if gravel pack is not used.

001.06 WELL CASING

All wells other than test holes and closed loop heat pump wells must be cased. Well casing must be composed of nontoxic durable material compatible with the water quality encountered.

- **001.06(a) Casing Wall Thickness** - The wall thickness of water well casing must be sufficient to withstand the pressures exerted by the surrounding materials, forces imposed on it during installation, and corrosion by soil and water environments.
- **001.06(b) Casing Placement** - The casing must be centered in the borehole in areas of grout so there is a minimum two-inch uniform annular space.
- **001.06(c) Watertight Casing** - The casing and joints must be:
 - **001.06(c)(1)** Watertight;
 - **001.06(c)(2)** Constructed of:
 - **001.06(c)(2)(i)** Steel;
 - **001.06(c)(2)(ii)** Polyvinyl chloride (PVC);
 - **001.06(c)(2)(iii)** Fiberglass; or
 - **001.06(c)(2)(iv)** Teflon; and
 - **001.06(c)(3)** Manufactured expressly for water well casing.

001.07 GRAVEL PACK

Gravel pack must consist of clean sand or gravel of selected grain size and gradation. Gravel Pack, screen size, and gradation must be determined based upon the grain size and gradation of the portion of the aquifer to be screened. Gravel pack must be designed to stabilize the aquifer material and to permit the fine fraction to move into the water well during development. Gravel pack, when used, must extend to a length equal to at least 2.5 times the casing diameter above the screen apertures.

001.08 GROUT

Cement-based grouts must not contain fly ash. The Department has approved the following grout materials:

- **001.08(a) Neat Cement Grout Slurry** - Neat cement grout slurry must consist of a mixture of Portland Cement and no more than six gallons of clean water per bag (one cubic foot or 94 pounds) of cement. Non-toxic additives may be used to minimize shrinkage and cracking.
- **001.08(b) Sand Cement Grout Slurry** - This grout must consist of a mixture of Portland Cement, sand and water in the proportion of no more than two parts by weight of sand to one part of cement with no more than six gallons of clean water per bag of cement (one cubic foot or 94 pounds).
- **001.08(c) Non-slurry Bentonite Grout** - Non-slurry bentonite grout must consist of chip, chunk, or pelletized, bentonite varieties that are hydrated to manufacturer's specifications.
- **001.08(d) Cement/Bentonite Grout Slurry** - Cement/bentonite grout slurry must consist of a mixture of Portland Cement and bentonite in the following proportion: no more than 6.5 gallons of water and three to five pounds of bentonite per 94-pound sack of Portland Cement.
- **001.08(e) High Solids Bentonite Grout Slurry** - High solids bentonite grout slurry must consist of an inorganic mixture of:
 - **001.08(e)(1)** Soda ash for pre-treatment of makeup water;
 - **001.08(e)(2)** A minimum of 20% by weight active solids bentonite-to water ratio; and
 - **003.08(e)(3)** Fine to medium grade sand added at a minimum ratio of four-to-one sand to bentonite by weight; and, if needed
 - **001.08(e)(4)** Additives designed for yield/rate control for bentonite products that form a low permeability seal not greater than one times ten to the negative seven centimeters per second (1×10^{-7} cm/sec) which resists flow of fluid through the seal, is pumpable, and is mixed to the manufacturer's specifications.
- **001.08(f) Bentonite Grout Slurry** - Bentonite grout slurry must consist of an inorganic mixture of:
 - **001.08(f)(1)** Soda ash for pretreatment of makeup water; and
 - **001.08(f)(2)** A minimum of 20% solids by weight bentonite that forms a low permeability seal not greater than one times ten to the negative seven centimeters per second (1×10^{-7} cm/sec) which resists flow of fluid through the seal, is pumpable, and is mixed to the manufacturer's specifications; and, if needed
 - **001.08(f)(3)** Additives designed for yield/rate control for bentonite products that form a low permeability seal not greater than one times ten to the negative seven centimeters per second (1×10^{-7} cm/sec) which resists flow of fluid through the seal, is pumpable, and is mixed to the manufacturer's specifications.

001.09 PLACEMENT OF GROUT

Placement of grout must be as follows:

- **001.09(a) Slurry Grout** - Grout slurry must be placed by tremie or by pumping. Cement-based grout must not be allowed to free-fall more than 10 feet. Cement based grout must be separated from bentonite grouts by a two-to-four-foot interval of fine sand.
- **001.09(b) Non-slurry Grout** - Pellet, chip, chunk bentonite, or any combination of those materials, must be placed, measured frequently, and hydrated, before installing another interval to confirm the grout is placed without bridging and provides a tight homogeneous seal.

001.10 AQUIFER PROTECTION

A water well must be filled and sealed in a manner that protects the water bearing formations from contamination from surface runoff and from subsurface contaminants.

- **001.10(a) Primary Aquifer Seal.** A water well must have a five-foot primary aquifer seal of non-slurry bentonite or high solids bentonite slurry, as defined in 001.08(c) and 001.08(e), respectively. The primary aquifer seal must be placed in the borehole at one or more of the following locations to provide optimal aquifer protection:
 - **001.10(a)(1)** On top of the gravel pack just above the screened openings (Figure 1A);
 - **001.10(a)(2)** Beginning at the base of the first layer of silt/clay above the production zone (Figure 1B); and/or
 - **001.10(a)(3)** At or immediately below the static water level (Figure 1C).
- **001.10(b) Primary Seal Exceptions.** The following wells do not require a primary seal:
 - **001.10(b)(1)** Bored wells (002.04 and 003.04);
 - **001.10(b)(2)** Temporary dewatering wells (004.02);
 - **001.10(b)(3)** Wells that require surface casing and additional gravel pack throughout the life of the well (003.06); and
 - **001.10(b)(4)** Wells that must be screened above static water for monitoring purposes may have less than five feet of seal (005.01).

- **001.10(c) Filling the Annular Space.** The annular space of all wells except closed loop heat pump wells that are part of a closed loop heat pump system in 008.03(e) must be filled from the top of the primary aquifer seal to the bottom of the surface seal (001.10(d)) with:
 - **001.10(c)(1)** Non-slurry bentonite grout;
 - **001.10(c)(2)** Non-slurry bentonite grout mixed with gravel pack in a one-to-one ratio by weight;
 - **001.10(c)(3)** Sand and granular bentonite mixed in a two-to-one sand-to bentonite ratio by weight;
 - **001.10(c)(4)** High solids bentonite slurry as defined in 001.08(e);
 - **001.10(c)(5)** A mixture of bentonite/clay, drilling fluid, and gravel pack; or
 - **001.10(c)(6)** Cement-based grouts.
- **001.10(d) Surface Seal** - The annular space of all wells, except bored wells and temporary dewatering wells, must have at least five feet of non-slurry bentonite, high solids bentonite slurry, or sand cement grout, placed between five and 15 feet below grade or at the static water level, whichever is less (Figure 2A). If a pitless unit is used to terminate the top of the well, the surface seal must extend five feet down the borehole below the bottom of the pitless adapter (Figure 2B).
- **001.10(e) Above Ground Protection** - Cased water wells that terminate in a pump house must be protected with a concrete floor measuring a minimum of four inches thick by 12 inches beyond the borehole wall and sloping away from the water well. Watertight casing must extend 12 inches above the floor of the pump house.
- **001.10(f) Surface Completion.** The earth surrounding the casing must slope away from the water well and must be firmly tamped to prevent water from seeping down around the casing.
- **001.10(g) Confining Aquifers.** Where multiple aquifers that are separated by a confining layer are penetrated by the same borehole, they must be separated from each other utilizing watertight casing and a primary aquifer seal.
- **001.10(h) Contaminated Water Bearing Zone.** All water bearing zones which contain groundwater which is known to be contaminated with materials hazardous to human health, must be effectively sealed utilizing watertight casing and non-slurry bentonite grout throughout the length of such zones, unless the well does not penetrate any other water bearing zone. Watertight casing must conform with 001.06.

001.11 WELL DEVELOPMENT

All cased water wells must be developed to repair the alterations to the formation during the construction of the well and to enhance the porosity and permeability of materials surrounding the intake portion of the well. The development process is the application of mechanical devices and/or the use of chemicals to remove drilling fluids and debris left in the filter pack and formation as a result of the drilling process.

001.12 TEST PUMPING A WELL

Test pumping must be utilized to determine the most efficient production rate for the well. The pumping water level must be recorded during the period of test pumping.

001.13 REPAIRING A WELL

Only the portion(s) of a well being repaired must meet the same minimum standards as it would if it were within a new well with regard to design, construction, and material. Bored and dug wells must be repaired so that they meet the standards of a bored well (Figure 3).

001.14 WELL LOGS

The well log must be available to the Department for inspection and copying during reasonable hours or the regular business hours of the contractor. In addition to the information required by the Act, the well log must include Global Positioning System coordinates of the location of the water well or test hole.

001.14(a) Well Log; Required Content - The well log shall include the following information:

- **001.14(a)(1)** Legal description of the water well
- **001.14(a)(2)** Description and depth of geologic materials encountered
- **001.14(a)(3)** Depth and diameter or dimension of constructed water well and test hole
- **001.14(a)(4)** Depth and diameter or dimension of excavated hole if applicable
- **001.14(a)(5)** Depth of formation stabilizer or gravel pack and size of particles if used
- **001.14(a)(6)** Depth and thickness of grout or other sealing material if applicable
- **001.14(a)(7)** Casing information, including length, inside diameter, wall thickness, and type of material if applicable
- **001.14(a)(8)** Screen information, including length, trade name, inside and outside diameter, slot size, and type of material if applicable
- **001.14(a)(9)** Static water level
- **001.14(a)(10)** Water level when pumped at the designated rate, giving the rate of pumping and amount of time pumped, if applicable
- **001.14(a)(11)** Yield of water well in GPM
- **001.14(a)(12)** Signature of water well contractor

- **001.14(a)(13)** Dates drilling commenced and construction completed
- **001.14(a)(14)** Intended use of the water well
- **001.14(a)(15)** Name and address of the owner
- **001.14(a)(16)** Identification number of any permit for the water well issued pursuant to any provision of law, including Chapters 46 and 66 of the Nebraska Revised Statutes
- **001.14(a)(17)** Name, address, and license number of any license issued pursuant to the Water Well Standards and Contractors' Practice Act of any person, other than the owner of the water well, who constructed the water well; and
- **001.14(a)(18)** Other data as the board reasonably requires.

001.15 REGISTRATION

A licensed water well contractor must register all wells with the Department on forms provided by the Department within 60 days of completion, except as otherwise provided by Neb. Rev. Stat. § 46-602.

002. POTABLE WELL CONSTRUCTION

A water well contractor must verify the purpose of a new water well with the owner or the system's engineer at the time of construction. If the water well is to serve water to the public, see 006.

002.01 SANDPOINT WELL

A potable water well to be used for human consumption must not be constructed as a driven sandpoint well.

002.02 CASING A POTABLE WELL

A potable water well must be cased with unused watertight casing in the following manner:

- **002.02(a) Surface Completion** - The top of the well must extend at least 12 inches above the grade of the land surface. The earth surrounding the well must slope away from the well and must be firmly tamped to prevent water from seeping down the casing.
- **002.02(b) Non-steel Casing** - Non-steel cased wells must be fitted with a watertight connection to 0.237 of an inch wall minimum steel casing through the frost zone, unless terminating in a pump house. Non-steel watertight casing must be manufactured expressly for well casing, and must meet the following specific requirements:
 - **002.02(b)(1)** - Casing strength must be not less than 160 pounds per square inch or Standard Dimension Ratio (SDR) 26.
 - **002.02(b)(2)** - Plastic or other non-steel casing must bear the National Sanitation Foundation (NSF) Standard 61 stamp of approval.
- **002.02(c) Special Engineered Plastic Pipe** - Special Engineered (SE) plastic piping systems must meet the requirements of 002.02(b)(2).
- **002.02(d) Thread Compounds** - Packaging of thread compounds, sealants and lubricants must bear the NSF Standard 61 stamp of approval.

002.03 POTABLE WELL SHOCK DECONTAMINATION

When a well which will produce water for human consumption is constructed or altered, it must be decontaminated.

- **002.03(a) Informational Brochure** - The water well contractor/pump installation contractor must supply the landowner with an informational brochure that tells the owner why the owner should test the owner's water and what the results mean.
- **002.03(b) Shock Decontamination** - Shock decontamination must be accomplished by:
 - **002.03(b)(1)** Using a solution equivalent to 200 parts per million chlorine (Table 1)
 - **002.03(b)(2)** Pouring the solution directly into the well; splashing the well pump, piping, casing, and other well equipment as much as possible; agitating the water in the well by surging the pump or by other means to mix the solution with the water or recirculating the water into the well, always washing down the casing or drop pipe;
 - **002.03(b)(3)** Letting the mixture stand in the well for a minimum of four hours;
 - **002.03(b)(4)** Opening all water taps and pumping the well until evidence of the solution is detected at all taps. The system must be allowed to stand idle for a minimum of two additional hours and then the entire system must be flushed to waste.

002.04 BORED (SEEP OR CISTERN) WELLS

Bored wells must be constructed to the same minimum standards for potable wells with the following exceptions (Figure 3):

- **002.04(a) Casing** - Casing materials may be concrete, tile, or other material approved in 001.06(c).
- **002.04(b) Annular Space** - The annular space below the surface seal must be filled with gravel.
- **002.04(c) Surface Completion** - Watertight casing and grout must be placed from 10 feet below the surface or the static water level, whichever is less, to the surface or the bottom of the pitless unit.

002.05 OPEN HOLE WELLS.

Open hole wells must be constructed to the same minimum standards for potable wells and in the following manner (Figure 4).

- **002.05(a) Casing** - The casing must extend at least two feet into the open borehole. A seal must be created between the casing and the lower borehole to ensure that the annular fill material remains in the upper borehole. This can be accomplished by using a collar attached to the casing, a drive shoe, or other sealing device.

- **002.05(b) Primary Seal** - A minimum five-foot primary aquifer seal must be placed in the annular space directly above the collar, drive shoe, or other sealing device.
- **002.05(c) Multiple Water Bearing Zones** - Open hole wells in multiple water bearing zones within the same aquifer must be constructed to the same minimum standards for potable wells and must comply with 002.05(a), 002.05(b), and 003.05(c), of this Chapter (Figure 5).
- **002.05(c)(1)** The screened section must be gravel packed.
- **002.05(c)(2)** The gravel pack must extend both above and below the screen for a length equal to 2.5 times the diameter of the well.
- **002.05(c)(3)** A five-foot minimum primary aquifer seal must be placed directly above the gravel pack.

003. NON-POTABLE WELL CONSTRUCTION

A water well contractor must verify the purpose of a new well with the owner or the system's engineer at the time of construction.

003.01 SANDPOINT WELLS

Driven sandpoint wells are permitted only for temporary use and must be decommissioned within 90 days of installation. They must meet the requirements specified in 001.

003.02 OBSERVATION WELLS.

Observation wells must be located as required in 001.03(a).

003.03 CASING

A non-potable water well must be cased with unused watertight casing in the following manner:

- **003.03(a) Casing Outside Diameter of Six and Five-Eighths (6 $\frac{5}{8}$) Inches or Less**
The following apply for this diameter of casing.
 - **003.03(a)(1) Surface completion** - The top of the well must extend at least 12 inches above the grade of the land surface. The earth surrounding the well must slope away from the well and must be firmly tamped to prevent settling around the casing.
 - **003.03(a)(2) Non-steel casing** - Non-steel cased wells must be fitted with a watertight connection to 0.237 of an inch wall minimum steel casing or fitted inside a metal sleeve secured and cemented in the borehole. The metal sleeve must be placed a minimum of 48 inches below grade. The annular space between the metal sleeve and the casing must be a minimum of two inches and must be filled with an approved grout (see 001.08 of this Chapter) or annular fill (see 001.10(c) of this Chapter) (Figures 6 & 7).
 - **003.03(a)(2)(i) Observation Wells** - Non-steel cased observation wells completed above ground must be enclosed with a metal casing/sleeve, buried a minimum of two feet below the ground surface, and covered with an overlapping, vandal-resistant secured metal cap.

- **003.03(b) Casing Outside Diameter Larger Than Six and Five-Eighths (6 $\frac{5}{8}$) Inches.**

The following apply for this diameter of casing (Figure 8).

- **003.03(b)(1) Surface completion** - The casing must extend a minimum of 6 inches above the grade of the land surface.
 - **003.03(b)(1)(i)** The well must have a concrete pad a minimum of 40 inches by 40 inches by 8 inches thick. Prefabricated slabs are acceptable. The concrete must contact the entire circumference of the casing, unless a pitless unit is utilized.
 - **003.03(b)(1)(ii)** The earth surrounding the well must slope away from the well and must be firmly tamped to prevent settling around the casing.
- **003.03(b)(2) Thickness** - Watertight steel casing must be a minimum of 0.219 of an inch wall thickness.
- **003.03(b)(3) Specifications** - Watertight non-steel casing must be manufactured expressly for well casing and must meet the following specific requirements:
 - **003.03(b)(3)(i)** Casing strength must not be less than 160 pounds per square inch or Standard Dimension Ratio (SDR) 26 for 8 $\frac{5}{8}$ inches (8.625 in) or less OD casing. Casing strength must not be less than schedule 40 for casing larger than 8 $\frac{5}{8}$ inches (8.625 in) OD; and
 - **003.03(b)(3)(ii)** Non-steel casing must bear the National Sanitation Foundation (NSF) 61 stamp of approval.
- **003.03(b)(4) Special engineered plastic pipe** - Special Engineered(SE) plastic piping systems must meet the requirements of 002.02(b)(2) of this Chapter.
- **003.03(b)(5) Thread compounds** - Packaging of thread compounds, sealants, and lubricants must bear the NSF 61 stamp of approval.

003.04 BORED (SEEP OR CISTERN) WELLS

Bored wells must be constructed to the same minimum standards for non-potable wells with the following exceptions (Figure 3):

- **003.04(a) Casing** - Casing may be concrete, tile, or other material approved in 001.06(c) of this Chapter;
- **003.04(b) Annular Space** - The annular space must be filled with gravel;
- **003.04(c) Surface Seal** - Watertight casing is required and grout must be placed from 10 feet below the surface or the static water level, whichever is less, to the surface or the bottom of the pitless unit.

003.05 OPEN HOLE WELLS

Open hole wells must be constructed to the same minimum standards for non-potable wells with the following exceptions (Figure 4).

- **003.05(a) Casing** - The casing must extend at least two feet into the open borehole. A seal must be created between the casing and the lower borehole to ensure that the annular fill material remains in the upper borehole. This can be accomplished by using a collar attached to the casing, a drive shoe, or other sealing device.
- **003.05(b) Primary Seal** - A minimum five-foot primary aquifer seal must be placed in the annular space directly above the collar, drive shoe, or other sealing device.
- **003.05(c) Multiple Water Bearing Zones** - Multiple water bearing zones within the same aquifer must be constructed to the same minimum standards for nonpotable wells and must comply with 003.05(a) and 003.05(b) of this Chapter. The screened section must be gravel packed. The area of gravel pack must extend both above and below the screen for a length equal to 2.5 times the diameter of the well. A minimum five-foot primary aquifer seal must be placed directly above the gravel pack (Figure 5).

003.06 WELLS LOCATED IN THE ARIKAREE FORMATION SUBJECT TO SUBSIDENCE

A water well located in the Arikaree Formation subject to subsidence must be constructed to the same minimum standards as non-potable wells with the following exceptions (Figure 9).

- **003.06(a) Surface Casing Annular Space** - The borehole for the surface casing must allow for a uniform annular space of four inches or larger than the surface casing.
- **003.06(b) Annular Space Between Casings** - A minimum six-inch annular space must exist between the surface casing and the well casing to provide for gravel placement.
- **003.06(c) Surface Casing** - The metal surface casing must be a minimum of 20 feet in length
- **003.06(d) Setting Surface Casing** - A minimum of five feet of concrete must be placed between the borehole wall and the surface casing and allowed to set, encasing the bottom five feet of surface casing.
- **003.06(e) Sealing Surface Casing** - A minimum layer of five feet of non-slurry bentonite must be placed between the borehole wall and the surface casing above the concrete, with an additional five feet of concrete placed on top of the non-slurry bentonite. The concrete must be set prior to drilling inside the surface casing.
- **003.06(f) Gravel Chute** - The metal gravel chute must be straight and a minimum of 6½ inches OD. The top of the chute must extend a minimum of six inches above the concrete pad and be equipped with a vandal-resistant, secure cover or cap. The bottom of the gravel chute must extend from the surface casing a minimum of two feet below grade. The gravel chute and the upper five feet of surface casing must be encased in concrete.
- **003.06(g) Surface Completion.** The concrete pad must extend a minimum of 12 inches beyond the surface casing borehole and be a minimum of five feet by five feet which surrounds the gravel chute. The thickness must be a minimum of 12 inches above grade and an additional minimum of 12 inches below grade within the boreholes.

004. DEWATERING WELLS

Wells must be constructed to the same minimum standards as non-potable wells with the following exceptions.

004.01 PERMANENT INSTALLATION

Permanently constructed dewatering wells must be constructed to the same standards as non-potable wells.

004.02 TEMPORARY INSTALLATIONS

Temporary installations must be constructed in a manner that prevents the introduction of contaminants into the ground water. They must be decommissioned within 30 days after completion of the project.

- **004.02(a) Location** - Dewatering wells must be located or the site graded so that surface drainage is away from the well.
- **004.02(b) Sanitation** - Temporary dewatering wells must be constructed to prevent the introduction of microbiological, chemical, or radiological substances which may be toxic into the aquifer or aquifers penetrated.
- **004.02(c) Well Screen** - Screens must be composed of nontoxic, durable material and be re-used.
- **004.02(d) Casing** - Casing may be re-used.
- **004.02(e) Casing Wall Thickness** - The wall thickness of temporary dewatering well casing must be sufficient to withstand the forces imposed on it during installation and removal, and pressures exerted on it by the surrounding materials.
- **004.02(f) Secure Cover** - Any temporary dewatering well which is under construction must be protected with a secure cover or cap when it is unattended.
- **004.02(g) Repair of A Dewatering Well** - All temporary dewatering well repairs must be done in accordance with current standards.

005. GROUND WATER MONITORING AND RECOVERY WELLS.

Wells must be constructed in the following manner.

005.01 WELL SCREEN

The top of the screen aperture may extend to within two feet of the land surface. The gravel pack thickness may be reduced so as to not compromise the surface seal.

- **005.01(a) Material** - Screen material must be compatible with water quality and be chemically resistant to all contaminants which are expected to be encountered.

005.02 CASING

The watertight casing must extend at least 12 inches above ground level except for construction in sidewalks, roadways, driveways, parking lots, other heavily trafficked areas, or wherever else the situation requires flush mounted installation with watertight caps.

- **005.02(a) Material** -Casing material must be compatible with water quality and be chemically resistant to all contaminants which are expected to be encountered.
- **005.02(b) Watertight Cap** - Casing must be equipped with a watertight cap or plug in conjunction with both flush mount and above-ground protectors.

005.03 GROUTING THE ANNULAR SPACE

A non-slurry bentonite seal with a minimum thickness of five feet must be placed on top of the gravel pack immediately above the screen. All wells must be grouted from immediately above the non-slurry bentonite seal/fine sand to the surface in accordance with 001.09 of this Chapter.

005.04 ABOVE GROUND PROTECTION

Non-steel cased wells completed above ground must be enclosed with a steel casing embedded in the concrete pad and covered with an overlapping, vandal-resistant secured metal cap.

005.05 PAD

Ground water monitoring and recovery wells must have a concrete pad extending a minimum of 12 inches past the walls of the original borehole and must be a minimum of 3.5 inches thick. The concrete must contact the entire outer circumference of the protective casing or flush mount cover.

005.06 WELL LOGS.

The location of each well must be shown on a site diagram in addition to the driller's log, to be provided in accordance with § 46-1241.

005.07 NESTED WELL DESIGN

Wells constructed for ground water investigations may use a nested design (Figure 10).

- **005.07(a) Vertical Separation** - Individual casings must be separated vertically by a minimum of two feet of non-slurry bentonite grout between casings of different lengths within the borehole. A one foot minimum non-slurry bentonite grout must be placed on top of each gravel pack interval. The annular space must be grouted, as per 001.08 and 001.09 of this Chapter, between non-slurry bentonite grout and the next gravel pack interval.
- **005.07(b) Horizontal Separation** - Individual casings must be separated horizontally by a two-inch annular space, including two inches between the outermost casing and the borehole wall.

005.08 TEMPORARY WELL INSTALLATION

The Department must be notified advance if a temporary well is planned to be in use longer than 10 days (does not apply to temporary dewatering wells). The notification must indicate what type of surface seal will be provided. Temporary wells must be decommissioned within 90 days of installation and cannot be used as a monitoring, recovery, or test well on a permanent basis unless the construction complies with the provisions of 001.06(b) of this Chapter, or the Department issues a declaratory ruling, pursuant to 011 of this Chapter, permitting such use before the well is constructed.

006. PUBLIC WATER SUPPLY SYSTEMS

If a well is to serve water to the public, the contractor must verify if the well is to serve a community or a non-community system.

006.01 COMMUNITY

Community public water wells must be sited, constructed, and/or relined, in accordance with Title 179 of the Nebraska Administrative Code requirements, including Department-approved plans and specifications. Examples of community public water systems include, but are not limited to mobile home parks, subdivisions, and nursing homes or assisted living residences.

006.02 NON-COMMUNITY

Non-community public water systems include, but are not limited to gas stations, factories, schools, rest areas, and recreation camps. When a well is intended to be a non-community public water supply well, the contractor may drill the well in accordance with the requirements of this Chapter only when:

- **006.02(a)** The capacity of the well is less than 100 GPM in a water system with a total system capacity not exceeding 200 GPM;
- **006.02(b)** The top of its well screen is greater than 50 feet from the original ground surface;
- **006.02(c)** The location of the well is greater than 200 feet from a surface water source, and
- **006.02(d)** The owner supplies the contractor with written confirmation from the Department that states the well may be drilled according to Title 134 NAC 4 standards.

006.03 FAILS TO MEET STANDARDS

Any public water system wells not meeting the criteria in this Chapter must be constructed in accordance with Title 179 plans and specifications prepared by a registered Nebraska engineer and approved by the Department.

007. TEST HOLES

Test holes, constructed in conjunction with ground water investigations must not be retained for more than 10 days, must be covered when not in use, and must be properly decommissioned, pursuant to 010.09(a) of this Chapter, within 10 days of drilling completion.

007.01 LOCATION

A test hole must be located so that it is protected from surface waters and seepage from sources of contamination and pollution.

007.02 SURFACE CASING

When onsite conditions dictate, surface casing is permitted but must be protected with a secure cover or cap when left unattended, and decommissioned, pursuant to 010.09(a) of this Chapter, within 10 days of drilling completion.

008. GROUND WATER HEAT PUMP WELLS

A water well contractor must verify the purpose of a new well with the owner or the system's engineer.

008.01 OPEN LOOP HEAT PUMP RETURN WELLS

Water wells intended only to inject ground water must comply with Title 122 of the Nebraska Administrative Code.

- **008.01(a) Open Loop Heat Pump Source Wells** - Water wells intended only to withdraw water to supply an open loop heat pump must comply with 002 of this Chapter.

008.02 CLOSED LOOP HEAT PUMP WELLS

Water wells for closed loop heat pump systems must be constructed in accordance with the following standards. These wells should be registered as Ground Heat Exchange Wells.

- **008.02(a) Pre-notification** - For a closed loop heat pump system that has 10 or more boreholes, the Department must be pre-notified a minimum of 14 working days prior to initial construction with the following information:
- **008.02(a)(1) Location of project;**
 - **008.02(a)(2)** Name and address of licensed water well contractor supervising the installation of the heat pump system; and
 - **008.02(a)(3)** A completed copy of the information referenced in Neb. Rev.Stat. § 46-1241, showing proposed construction and installation of the closed loop heat pump system.

- **008.02(b) Location** - All water wells constructed for closed loop heat pump systems must be located in accordance with 001.02 and 001.03 of this Chapter. Be aware that other state and local statutes and regulations may have more restrictive requirements. If locations do not comply with more stringent standards of other applicable state or local regulations, the Department may notify the appropriate authority which could require the well to be decommissioned.
 - **008.02(b)(1) Location where saltwater may be encountered** - Closed loop heat pump wells located geologically in areas that are prone to salt water will require the following.
 - **008.02(b)(1)(i) Proof** - The contractor will need to furnish either water results from the portion of the aquifer tested or an e-log verifying salinity.
 - **008.02(b)(1)(ii) Department Approval** - A well located in saline groundwater must apply for a declaratory ruling pursuant to 011 of this Chapter for an alternative grout that is compatible with saline groundwater of greater than one thousand milligrams per liter (1,000 mg/L).
 - **008.02(b)(2) Location from a public water system well** - The location of a closed loop heat pump well must comply with 001.03(a) of this Chapter with the following exceptions:
 - **008.02(b)(2)(i) Non-community** - A water well constructed for a closed loop heat pump system must be located more than 100 feet from a noncommunity public water system well.
 - **008.02(b)(2)(ii) Community** - A closed loop heat pump system must be located more than 1,000 feet from a community public water system well with the following exception.
 - **008.02(b)(1)(ii)(A) Professional report to the Director** - The Department will consider approval for location of closed loop heat pump wells at closer proximity than 1,000 feet horizontal separation distance, when the licensed professional engineer or licensed professional geologist representing the owner(s) of the closed loop heat pump wells, demonstrates to the Director or Director's designee that such location will not constitute a pollution hazard to the safety of the water supply, and that the owner(s) of the community water system has no objection to the location of the closed loop heat pump wells. The engineer or geologist must submit the supporting data as appropriate to make a case for approval of the proposed location of heat pump wells to the Department 30 working days prior to the date on which action by the Director or Director's designee is desired. The contractor must not begin construction until the Department has approved the location.

- **008.02(c) Borehole Diameter** - The borehole diameter of a closed loop heat pump well must be of sufficient size to allow placement of the pipe and placement of a tremie to emplace the grout. The borehole diameter must be a minimum of four inches larger than the total outside diameter of the loop pipes.
- **008.02(d) Pipe** - Pipe material must be composed of polyethylene, grade p34, minimum cell classifications PE 355434C or PE 345434C, when tested under ASTM Standard 3350.
- **008.02(e) Pipe Joining Method** - Heat fusion methods for pipe joining must be the socket or butt heat fusion technique as referenced in ASTM Standards D3261 or D2683.
- **008.02(f) Pressure Testing** - The installed system must be pressure tested to a minimum of 100 psi. After six hours it is permissible for the pressure to drop a maximum of 15% of the initial psi due to expansion of the HDPE piping. A pressure loss greater than 15% in six hours is an indication of a leak in the circulating system. If a pressure loss is detected, the cause must be properly repaired, the material replaced, or the well must be properly decommissioned.
- **008.02(g) Purging A Loop System** - After a loop system is installed and pressure tested, and prior to introducing additives to the circulating fluid, the entire loop, header and associated plumbing must be purged at a minimum rate of five feet per second to remove any debris that has entered the loop during construction.
- **008.02(h) Circulating Fluids** - When food grade propylene glycol is added to water for antifreeze protection, it must be non-toxic in nature when combined with the circulating fluid additives in a closed loop heat pump system. If needed, the addition of corrosion inhibitors and biocides may be used in circulating fluid if such additives are also:
 - **008.02(h)(1)** Non-toxic;
 - **008.02(h)(2)** Compatible with food grade propylene glycol; and
 - **008.02(h)(3)** Non-hazardous materials upon disposal or a change of circulating fluid.

008.03 COMPLETION OF A VERTICAL CLOSED LOOP SYSTEM

Completion of a borehole for a closed loop heat pump well must be finished within six hours from the time the borehole is drilled.

- **008.03(a) Drilling Fluids.** Drilling muds or cuttings cannot be used as completion materials.
- **008.03(b) Tremie Pipe.** The tremie pipe must not be left in the borehole.
- **008.03(c) Greater Than 10 Boreholes** - Systems that have 10 or more boreholes must be grouted full-length with high solids bentonite slurry in accordance with 001.08(e) of this Chapter and requires pre-notification (Figure11A).

- **008.03(d) Fewer Than Ten Boreholes, Less Than 1,000 Feet From Community Well -**
Systems that have fewer than ten (10) boreholes must be grouted full-length with high solids bentonite slurry in accordance with 001.08(e) of this Chapter when they are located less than 1,000 feet of a community public water well. This requires written permission from the community public water supplier before construction begins (Figure 11B).
- **008.03(e) Fewer Than 10 Boreholes, Greater Than 1,000 Feet From Community Well.**
Systems that have fewer than 10 boreholes and are located 1,000 feet or more from a community public water well must use one of the following methods to complete construction of the boreholes (Figure 11C):
 - **008.03(e)(1)** High solids bentonite slurry that meets the requirements of 001.08(e) of this Chapter must be used to grout the full length of the borehole; or
 - **008.03(e)(2)** Sand or gravel must be placed through a sodium bentonite fluid with a viscosity that allows the sand to settle through the fluid from the bottom of the borehole to the static water level by tremie or free fall method.
 - **008.03(e)(2)(i)** A five-foot interval of bentonite chips must be placed at the static water level.
 - **008.03(e)(2)(ii)** The remainder of the borehole must be sand/gravel packed through the sodium bentonite fluid to within 30 feet of the surface minus excavation for the header piping.
 - **008.03(e)(2)(iii)** The remaining annular space must be filled with nonslurry bentonite chips.

008.04 HORIZONTAL CLOSED LOOP SYSTEM

A horizontal closed loop heat pump system must meet the construction standards above with the following exceptions:

- **008.04(a) Trenching or Digging -** A horizontal closed loop system that is constructed by trenching or digging is exempt from the grouting requirements of closed loop systems provided that no part of the horizontal loop is constructed at or below the ground water level.
- **008.04(b) Drilling or Boring -** A horizontal closed loop heat pump system constructed by boring or drilling must be grouted with high solids bentonite slurry grout that meets the requirements of 001.08(e) of this Chapter.

009. INSTALLATION OF PUMPS AND PUMPING EQUIPMENT

A pump installation contractor must verify the use of the pump or pumping equipment.

009.01 GENERAL REQUIREMENTS.

The following are general requirements and apply to the installation of all pumps and pumping equipment not already regulated, such as public water systems under Title 179.

- **009.01(a) Contamination** - Pumps and pumping equipment must be installed in a manner that prevents contaminants from entering the well.
- **009.01(b) Disinfection** - Disinfection solution must be equivalent to 50 parts per million chlorine solution (Table 2).
 - **009.01(b)(1) Tools, pumps, and pumping equipment** - Care must be taken so that all tools used in the removal of pumps and pumping equipment are disinfected periodically, or as needed. It is not permissible to lay the drop pipe, pump, pumping equipment, or wire directly on the ground.
 - **009.01(b)(2) Potable wells** - When a pump for a potable well is installed or repaired the well must be disinfected.
 - **009.01(b)(2)(i) Landowner Waiver** - Disinfection may be waived in writing by the landowner. The waiver must be worded in accordance with Attachment 1, "Waiver of Disinfection." The water well contractor/pump installation contractor must supply the landowner with an informational brochure that tells the owner why s/he should test his/her water and what the results mean.
- **009.01(c) Secure Cover** - Any water well which is being serviced or repaired must be protected with a secure cover or cap during periods when the water well is left unattended.
- **009.01(d) Packaging** - Packaging of thread compounds, sealants, and lubricants must bear the NSF Standard 61 stamp of approval or be labeled as food grade.
- **009.01(e) New Electrical Installations** - When designing and installing a new water supply system, the electrical components must comply with the state electrical code. Electrical work that does not appear to meet standards may be reported to the State Electrical Board.
- **009.01(f) Repair or Modifications to Pumps and Pumping Equipment** - Upon the removal of, or the repair and/or modification to the pump or pumping equipment in which replacement of original equipment is required, current pump and pumping equipment installation standards must be followed. This includes replacement of, or modification to the electrical wiring and/or controls located in the electrical layout serving the pump and pumping equipment including connection to the load side of the service disconnect or breaker. Any upgrade of this electrical system must be in compliance with all current applicable state or national electrical codes and be installed according to the manufacturer's specifications.
- **009.01(g) Casing Vent** - If a vent is used, the vent must terminate in a downturned position, at or above the top of the casing or pitless unit and be covered with a 24 mesh corrosion-resistant screen.

009.02 INSTALLATION OF PUMPS

All pump installation must comply with 009.01 and 009.03 of this Chapter.

- **009.02(a) Line Shaft Pumps** - Line shaft pumps must be equipped with a pump base and be designed so the weight of the pump and column pipe is supported by the casing or is resting on a concrete platform which rests upon natural ground and they must be secured to prevent movement.
- **009.02(b) Submersible Pumps** - The drop pipe must be steel pipe, NSF Standard 61 approved plastic material, or fiberglass. There must be at least one check valve within the casing which may be furnished with the pump.
- **009.02(c) Centrifugal and Jet Pumps** - Centrifugal and jet pumps do not require a relief valve. They must be equipped in the following manner:
 - **009.02(c)(1) Offset location** - The suction pipe must be encased in a sleeve from the basement or well pit wall to the well. In the instance of a packer jet system, the pressured pipeline can serve as a sleeve for the suction line.
 - **009.02(c)(2) Priming port** - The priming port must be located higher than the discharge of the pump. Discharge of the priming port may be controlled with a shut off valve. Potable water must be used for priming the pump. Priming valve must be sealed when not in use to prevent contamination from accumulating above the valve.
- **009.02(d) Reciprocating Pumps** - Reciprocating pumps must be equipped with a pump base. The pump base must be designed so the weight of the pump pipe and cylinder is supported by steel casing or a metal sleeve embedded in concrete. It must be secured to prevent movement.

009.03 INSTALLATION OF PUMPING EQUIPMENT

Pumping equipment must be installed in a manner that prevents contaminants from entering the well.

- **009.03(a) Pitless Units** - Pitless units must meet all of the following criteria:
 - **009.03(a)(1)** Bear the Pitless Adapter Standard (PAS) stamp of approval of the Water Systems Council.
 - **009.03(a)(2)** Be factory assembled and ready for installation from a point of connection with the well casing to the unit cap or cover.
 - **009.03(a)(3)** Be a threaded, welded, screwed, or flanged, gasket compression connection to the well casing.
 - **009.03(a)(4)** Be of watertight construction throughout, except for any required vent.
 - **009.03(a)(5)** Be made of steel through the frost zone and be compatible with the casing.
 - **009.03(a)(6)** Have a field connection to the lateral discharge from the pitless unit of threaded, flanged, or mechanical, joint connection.

- **009.03(a)(7)** Terminate at least 12 inches above final ground elevation. Where a water well needs to be located in an area of high traffic and physical damage to the pitless unit is probable, the contractor must finish off the water well even with the grade of the surrounding land surface and protect it by terminating it in a pitless unit covered by a watertight flush mount cover capable of withstanding high vehicle traffic conditions. In all cases where the top of the pitless unit is enclosed in a watertight flush mount vault, the vent opening must be sealed and all electrical conduit fittings must be watertight. If the entrance of the electrical conduit is below ground level, then the opening around the wire must be sealed (Figure 12).
- **009.03(a)(8)** Provide:
 - **009.03(a)(8)(i)** Access to the well for disinfecting or other purposes;
 - **009.03(a)(8)(ii)** A properly constructed vent for wells with a pumping rate greater than 50 GPM;
 - **009.03(a)(8)(iii)** A watertight secure cover at the upper terminal of the well that will prevent the entrance of contamination;
 - **009.03(a)(8)(iv)** A contamination-proof entrance connection for electrical cable; and
 - **009.03(a)(8)(v)** An inside diameter sufficient for the insertion and removal of the pump and pumping equipment.
- **009.03(b) Pressure Relief Valve** - Pressure relief valves must be installed on any pump capable of developing a pressure higher than 115 psi or exceeding the safe working pressure rating of the water supply system. Relief valve must be of adequate size and the plumbing where the relief valve is located must have sufficient capacity to accommodate 50% of the rated pump volume.
- **009.03(c) Backflow Protection** - The discharge piping from any pump and pumping equipment must be equipped with a backflow preventer. A backflow preventer must be placed before any other device or branches in the distribution piping. Check valves must not be buried at the well for backflow prevention. The device must be located within one foot of the discharge head and prior to any other devices.
- **009.03(d) Discharge Piping**. Discharge piping includes any and all piping beginning at the discharge head or pitless unit tapping, extending to the first shut off valve or backflow preventer.
 - **009.03(d)(1) Above ground discharge piping** - Above ground discharge piping must:
 - **009.03(d)(1)(i)** Be protected against the entrance of contamination;
 - **009.03(d)(1)(ii)** For potable water use, be constructed of materials appropriate to each specific service;
 - **009.03(d)(1)(iii)** Be equipped with a backflow preventer, chemigation valve, or air gap;
 - **009.03(d)(1)(iv)** For air gap protection, daylight above the high water line of any tank, pond, stream, or reservoir;
 - **009.03(d)(1)(v)** Be properly anchored to prevent movement; and
 - **009.03(d)(1)(vi)** Be protected against water hammer.

- **009.03(d)(2) Underground discharge piping** - Underground discharge piping must be equipped with a curb stop valve and schedule eighty (80) plastic or metal riser within one foot of the discharge and be in compliance with 009.01 of this Chapter.
- **009.03(e) Sample Point** - Distribution piping must include a sample point. Location of the sample point must be as follows:
 - **009.03(e)(1)** Sample point must terminate no less than 12 inches above the floor of the basement, well pit, or pump house floor.
 - **009.03(e)(2)** A primary sample point must not be located down flow from any filter, trap, or conditioning equipment. A secondary sample point may be located down flow from a filter, trap, or conditioning equipment to verify the proper operation of such equipment.
- **009.03(f) Storage Tanks** - When storage tanks are used, they must meet the following criteria.
 - **009.03(f)(1) Pressurized** - Hydro-pneumatic or captive-air design.
 - **009.03(f)(1)(i)** Tank construction must be of materials approved for use in potable water systems; and
 - **009.03(f)(1)(ii)** Tanks must be equipped with identification as to size, maximum working pressure, and name of manufacturer; and
 - **009.03(f)(1)(iii)** Tanks and combinations of tanks and mechanical or electronic short cycle prevention devices must be of adequate size and design to prevent short cycling of the pump motor as per the pump motor manufacturer's specifications.
 - **009.03(f)(2) Non-pressurized** - Reservoirs, cisterns, and standpipes.
 - **009.03(f)(2)(i)** Underground storage tanks must be constructed of material that is structurally adequate to withstand being buried below ground surface without collapsing when emptied;
 - **009.03(f)(2)(ii)** Vent must be turned downward and be covered with a #24 mesh screen;
 - **009.03(f)(2)(iii)** Vent piping must be of adequate size to prevent either a positive or negative pressurization of the buried tank; and
 - **009.03(f)(2)(iv)** Vent piping must be constructed of materials approved for use in potable water systems. Inspection hatch and vent must extend 12 inches above grade. Inspection hatch must have a watertight seal to prevent contaminants from entering the tank.
- **009.03(g) Above Ground Connections** - A pump house may be utilized to prevent the freezing of pipes. If used, the pump house must be mounted on a concrete platform which slopes away from the well in all directions. The casing must extend a minimum of 12 inches above the concrete platform and the space between the casing and the pump pipe must be closed with a sanitary well seal. The well seal must be watertight and if vented, must be provided with a screened vent.
- **009.03(h) Well Pit** - The installation of pumping and storage equipment in a pit directly over a well is not allowed. A pit for housing the equipment must be located at least 10 feet away from a well.

010. WATER WELL DECOMMISSIONING.

010.01 GENERAL REQUIREMENTS

The well cavity, casing, and annular space, of all water wells to be decommissioned must be filled, plugged, and sealed, in accordance with the appropriate procedure described below. Any licensed water well contractor constructing a water well for any customer must, as a part of the agreement, include the proper decommissioning of each water well and test hole constructed to explore for ground water pursuant to the agreement. A landowner may only decommission a driven sandpoint water well on land owned by him/her and used by him/her for farming, ranching, or agricultural purposes or as his/her place of abode. For wells constructed after October 1, 1988, but not constructed according to this Chapter, the Department must issue a declaratory ruling pursuant to 011 of this Chapter prior to decommissioning.

010.02 PRELIMINARY WORK

Prior to decommissioning a water well, the depth of the well and the static water level must be measured, and an investigation must be made to determine the details of the well construction, including annular fill material and seal placement. Potential sources of well construction details include:

- **010.02(a)** The personal records of the owner;
- **010.02(b)** The contractor that drilled the well;
- **010.02(c)** The registration forms on file with the Nebraska Department of Natural Resources, available on its website;
- **010.02(d)** Water well contractors familiar with the area; and
- **010.02(e)** Water well records on file with the University of Nebraska-Lincoln Conservation and Survey Division, School of Natural Resources.

010.03 DECONTAMINATING

Disinfectant equivalent to at least 200 ppm chlorine must be introduced into the well before any material is placed into the well (Table 1). The disinfectant can be in a liquid, granular, or pellet form. This will also decontaminate the fill material placed adjacent to the water-bearing zones.

010.04 OBSTRUCTIONS

Every effort must be made to remove obstructions. If they cannot be removed, the well cavity must be filled with approved fill material in accordance with 001.10(c) of this Chapter from the bottom of the well to a point immediately above the obstruction. If this is not possible, a five-foot non-slurry bentonite grout plug must be placed above the obstruction.

010.05 MATERIAL VOLUME

The volume of material required to decommission a water well can be determined using Table 3. Volumes for each interval that is to be either filled or sealed must be calculated prior to beginning. Materials used and calculated volumes must be consistent. If they are not, then:

- **010.05(a)** Additional material must be added to replace lost volumes until the interval is filled or sealed; or
- **010.05(b)** If material bridges in the well (evidenced by calculated amount of filler/sealer being too much), operations must stop until the bridge is removed by high pressure jetting, drilling, or other, methods.

010.06 WELL DECOMMISSIONING MATERIALS

Approved fill material (001.10(c), 010.06(b) of this Chapter) or grout material (010.06(a) of this Chapter) must be used to decommission water wells. Grout plugs and seals must be used to prevent water movement into or between water-bearing zones; approved fill material may be used where grout plugs or seals are not required.

- **010.06(a) Grout Material** - Grout material found in 001.08 of this Chapter can be used as a seal in decommissioning water wells.
- **010.06(b) Fill Material** - Fill material to be used in water wells in intervals where grout plugs or seals are not required, must be disinfected sand, gravel, or crushed stone except that native earth material may be used in large diameter bored or dug wells greater than 24 inches in diameter because of the volume required. All fill material must be free of potentially toxic chemical residue and trash such as leaves and foreign materials. All fill material must be sized and introduced into the well at a rate to avoid bridging.

10.07 GENERAL PROCEDURES FOR ALL WELLS WITH ANNULAR SPACE.

- **010.07(a) Plugs** - Place five-foot grout plugs inside the casing at all of the following locations whenever possible (Figure 13):
 - **010.07(a)(1)** In the bottom of the well if there is no water in the well.
 - **010.07(a)(2)** At the water table.
 - **010.07(a)(3)** Directly across from all primary seals.
 - **010.07(a)(4)** Within 10 feet of the surface.
- **010.07(b) Casing Removal** - Remove the upper three feet of casing in all cased wells unless (Figure 14A):
 - **010.07(b)(1)** The well is located in an area surrounded by permanent pavement (asphalt or concrete) (Figure 14B); or
 - **010.07(b)(2)** The top of the casing is already at least three feet below the land surface.

- **010.07(c) Capping** - A cap must meet the following criteria (Figures 14A & 14B):
 - **010.07(c)(1)** The cap must consist of either non-slurry bentonite or sand cement grouts. Concrete or asphalt may be utilized in situations as outlined in 010.07(b)(1) of this Chapter.
 - **010.07(c)(2)** The cap must be a minimum of one foot thick and extend 1 foot past the original borehole wall except in situations as outlined in 010.07(b)(1) of this Chapter.
- **010.07(d) Surface Completion** - The cap may be covered with native earth which should be mounded to prevent settling. Asphalt or concrete may be utilized in situations outlined in 010.07(b)(1) of this Chapter (Figures 14A & 14B).

010.08 RESERVED.

010.09 PROCEDURES FOR SPECIFIC WELL TYPES

- **010.09(a) Test Holes**
 - **010.09(a)(1) In general** - All obstructions must be removed prior to decommissioning. Test holes must be sealed with a five-foot grout plug placed at static water level and/or confining layer and a five-foot grout plug near the surface. Fill material must be placed from the five-foot grout plug at the static water to the surface seal which must be placed within the top 10 feet. The fill material may be any grout (001.08 of this Chapter), annular fill material (001.10(c) of this Chapter), or clean cuttings.
 - **010.09(a)(2) Areas of known contamination** - Test holes drilled in areas of known contamination must be sealed full length with non-slurry bentonite grout.
- **010.09(b) Drilled, Bored, or Dug Water Wells With No Annular Space**
 - **010.09(b)(1) Plugs** - Place five-foot grout plugs inside the casing/borehole at all of the following locations whenever possible:
 - **010.09(b)(1)(i)** In the bottom of the well if there is no water in the well.
 - **010.09(b)(1)(ii)** At the water table.
 - **010.09(b)(1)(iii)** Within 10 feet of the surface.
 - **010.09(b)(2) Fill material** - If the well bore is greater than 24 inches, then natural earth may be used.
 - **010.09(b)(3) Casing Removal** - Remove the upper three feet of casing in all cased wells unless (see Figure 14A):
 - **010.09(b)(3)(i)** The well is located in an area surrounded by permanent pavement (asphalt or concrete) (see Figure 14B); or
 - **010.09(b)(3)(ii)** The top of the casing is already at least three feet below the land surface.
 - **010.09(b)(4) Capping** - A cap must meet the following criteria (see Figures 14A & 14B):
 - **010.09(b)(4)(i)** The cap must consist of either non-slurry bentonite or sand cement grouts. Concrete or asphalt may be utilized in situations as outlined in 010.07(b)(1) of this Chapter.
 - **010.09(b)(4)(ii)** The cap must be a minimum of one foot thick and extend one foot past the original borehole wall except in situations as outlined in 010.07(b)(1) of this Chapter.
 - **010.09(b)(5) Surface completion** - The cap may be covered with native earth which should be mounded to prevent settling. Asphalt or concrete may be utilized in situations outlined in 010.07(b)(1) of this Chapter (see Figures 14A & 14B).

- **010.09(c) Driven Sandpoint Wells**
 - **010.09(c)(1)** Fill the entire casing with grout to the top and cut off the casing three feet below the ground surface or water level. Place a one-foot grout seal one foot beyond the casing and backfill the remainder of the hole with native soil mounded for settlement (see Figure 14A), or
 - **010.09(c)(2)** If the casing is pulled, decommission like a test hole as described in 010.09(a) of this Chapter.
- **010.09(d) Full-length Grouted Wells** - The entire casing of a full-length grouted well must be filled with non-slurry bentonite grout. The rest of the well must be decommissioned, pursuant to 010.07 of this Chapter.
- **010.09(e) Multiple Aquifer Wells/Flowing Water Wells**
 - **010.09(e)(1) Annular Seals** - If the installation of an annular seal is required or necessary to further protect the groundwater, every effort must be made to place them in appropriate locations during decommissioning. Each annular seal must be a minimum of five feet in length. Methods of placing the seals may include but not be limited to injection into the annulus or by ripping, breaking, or perforating the casing and placing the seal from inside the casing.
 - **010.09(e)(1)(i) Multiple Aquifer Wells** - Water wells that obtained water from more than one distinct aquifer that is separated by a confining layer must have a grout plug not less than five feet in length placed inside the casing adjacent to each seal at each confining layer and a five-foot grout plug placed inside the casing at the static water level. If no primary seals were placed at the confining layer, then every effort must be made to place a five-foot primary seal at each confining layer according to methods outlined in 010.09(e)(1) of this Chapter and plugs must be placed inside the casing adjacent to the newly installed primary seals (see Figure 15).
 - **010.09(e)(1)(ii) Flowing Water Wells** - Decommissioning these wells requires stopping the flow of water through the casing and/or annular space. If water is flowing through the casing, the well must be shut-in to ensure that flow will not come up the annular space.
 - **010.09(e)(1)(ii)(A)** If water is flowing through the casing, the well must be shut-in or capped to ensure that flow will not come up the annular space or outside the casing for a driven well with open hole below.
 - **010.09(e)(1)(ii)(B)** If the well was constructed without primary seals or water flows up the annulus, a five-foot seal must be placed in the annular space adjacent to the confining layer according to 010.09(d)(1) of this Chapter. Neat cement must be utilized for these seals. The seal must be allowed to cure a minimum of 24 hours prior to continuing the decommissioning process in 010.09(e)(1)(ii)(D) of this Chapter.
 - **010.09(e)(1)(ii)(C)** If the well was constructed with primary seals and water does not flow up the annulus, stop the flow of water through the casing by placing a neat cement plug in the casing or well cavity through a tremie line or by using an expandable plug. This plug should be placed across from the primary seal.

- **010.09(e)(1)(ii)(D)** Once the flow is stopped, five-foot plugs must be placed in the casing across from each annular seal. Bentonite grouts can be used for these plugs above the confining layer once flow has been stopped. The rest of the well must be decommissioned as described in 010.07 of this Chapter.
 - **010.09(e)(1)(ii)(E)** The exact location of these wells must be flagged for at least one year after decommissioning.
- **010.09(f) Closed Loop Heat Pump Wells.**
 - **010.09(f)(1)** Remove all heat transfer fluid from the closed loop; and
 - **010.09(f)(2)** Dig down to the top of the borehole and cut off the loop pipe at least six feet below the surface. Pump the remaining loop full of bentonite or cement slurry. The remainder of the borehole is to be decommissioned as described in 010.07(d) or 010.09(b)(4) of this Chapter; or
 - **010.09(f)(3)** Pump the header and loops full of bentonite or cement slurry if the loop field is under a paved parking lot or building.

010.10 DOCUMENTATION

A record that includes the materials used, the quantity of those materials, location of placement thereof, and mix specifications, including the type and viscosity of bentonite grouts, must be maintained on every decommissioned water well, including test holes.

010.11 REPORTING DECOMMISSIONING

A notice of decommissioning for all water wells except test holes must be submitted to the Director of the Department of Natural Resources on the Notice of Decommissioning form supplied by the Department of Natural Resources within 60 days of the decommissioning of the water well as required in Neb. Rev. Stat. § 46-602 as follows:

- **010.11(a)** The pump installation contractor or water well contractor must submit written notice of the decommissioning of a water well to the Department of Natural Resources.
- **010.11(b)** If both a water well contractor and a pump installation contractor are involved in the decommissioning of a water well, the pump installation contractor must submit the notice of decommissioning to the Department of Natural Resources.
- **010.11(c)** If a landowner decommissions a driven sandpoint water well on land owned by him/her and used by him/her for farming, ranching, or agricultural purposes or as his/her place of abode, the landowner must report the decommissioning to the Department of Natural Resources.

011. DECLARATORY RULING OF SUBSTANTIALLY EQUIVALENT PROCEDURE OR MATERIAL

011.01 Any water well contractor, pump installation contractor or any other individual carrying out activities subject to this Chapter who desires to carry out such work by a procedure inconsistent herewith or using materials other than herein prescribed but which the contractor or other individual believes to be substantially equivalent to the standards prescribed in this Chapter may submit a request for a declaratory ruling by the Department.

011.02 Such a request must be submitted by a licensed Well Drilling or Pump Installation Contractor in writing at least 10 days prior to the initiation of construction or alteration of the well(s) involved, unless good cause is shown for a shorter review period.

011.03 The request must include a description of the material(s) and/or construction procedure(s) proposed, identify the procedure or material required by the prescribed standards and include proof of the alleged equivalency and such written arguments as are deemed appropriate by the requesting party.

011.04 Such request must be made on forms provided by the Department.

011.05 The Department may in situations when the submission of a request 10 days in advance would result in an immediate environmental threat, significant economic hardship on, or pose a health threat to the owner or other individuals, waive the 10-day review period.

012. VARIANCES.

The Department may grant a variance from any rule, regulation, or standard adopted and promulgated by the Department relating to the construction of a water well upon proof by a licensed water well contractor or well owner that the enforcement of the rule, regulation, or standard would create an unreasonable hardship or be unreasonable, impractical, or not feasible under the circumstances. A variance is limited to the construction of a water well to replace an existing water well. A variance may only be requested after a declaratory order about substantially equivalent procedure or material has been requested and denied.

012.01 PROCEDURES FOR REQUESTING A VARIANCE

The party requesting the variance or renewing a variance must submit the variance request to the Department along with any applicable fee. The request for a variance must be submitted in writing at least 10 days prior to the planned initiation of construction of the well involved. Variances may only be granted in writing by the Department. All variance requests must contain the following:

- **012.01(a)** The name, address, telephone number, and signature of the individual(s) requesting the variance;
- **012.01(b)** The specific rule(s) for which the variance is requested (if more than one rule is affected then each must be listed);
- **012.01(c)** The reason the rule(s) cannot be met, with supporting evidence;
- **012.01(d)** The length of time for which the variance is requested;
- **012.01(e)** The alternative or protective measure that will be taken to assure a comparable degree of protection to health or environment;
- **012.01(f)** Construction plans and specifications of the proposed water well with all the relevant and required information listed in Neb. Rev. Stat. § 46-1241; and
- **012.01(g)** A scaled map showing the location of the well in relation to property lines, structures, utilities, and contamination sources.

012.02 VARIANCE CONDITIONS

A variance may be under such terms and conditions and for such time as the Department may prescribe. The Department must notify the requesting party in writing of the decision to grant or deny the variance. If a variance is granted, the notification must specify conditions or alternative measures imposed upon the variance, if any. If the variance is denied, the Department will specify the reasons for the denial.

012.03 ALTERNATIVE MEASURES OR CONDITIONS

Alternative measures or conditions attached to a variance have the force and effect of the applicable regulation. If the alternative measure or condition attached to the variance is violated, the party may be enjoined from continuing such activities. The injunction may include an order to properly decommission the water well.

012.04 RENEWAL OF A VARIANCE

A request for a renewal of a variance must be submitted in writing to the Department within 30 days of the expiration date. A renewal request must contain the information in 012.01 of this Chapter. A variance may be renewed if the party continues to satisfy the criteria for granting the variance and demonstrates compliance with the alternative measures or conditions imposed at the time the original variance was approved.

013. PETITIONING FOR RECLASSIFICATION OF ILLEGAL WATER WELL

013.01 IN GENERAL

Whenever the Department determines that any water well is an illegal water well, the Department may classify the water well as an illegal water well.

013.02 NOTICE

If the Department classifies a water well as an illegal water well, then the Department will provide to the landowner a classification notice.

013.03 FILING DEADLINE

If the landowner desires to have the illegal water well reclassified as an active status water well, an inactive status water well, or an abandoned water well, then the landowner shall, within 90 days of receiving the classification notice, file with the Department a petition for reclassification. To be considered timely, the Department must receive the petition for reclassification within 90 days of the landowner's receipt of the classification notice.

013.04 PETITION, REQUIRED CONTENTS

Any petition for reclassification filed under this Chapter shall contain:

- **013.04(a) Abandoned Water Well** - If requesting reclassification as an abandoned water well:
 - **013.04(a)(1)** A statement describing for what, if anything, the water well is currently being used, or explaining whether the use of the water well has been accomplished or permanently discontinued;
 - **013.04(a)(2)** A statement certifying that the water well has been decommissioned, as well as:
 - **013.04(a)(2)(i)** The date on which the water well was decommissioned;
 - **013.04(a)(2)(ii)** The name(s) and contact information of the person(s) who performed the water well decommissioning; and
 - **013.04(a)(2)(iii)** A copy of the notice of abandonment filed with the Department of Natural Resources pursuant to Neb. Rev. Stat. § 46-602(2).
- **013.04(b) Active Status Water Well** - If requesting reclassification as an active status water well:
 - **013.04(b)(1)** An explanation of whether the water well is currently in use and, if so, a description of the particular use; and
 - **013.04(b)(1)** An explanation of what steps, if any, have been taken to bring the water well into compliance with the standards of this Title such that classification as an illegal water well is no longer proper.

- **013.04(c) Inactive Status Water Well** - If requesting reclassification as an inactive status water well:
 - **013.04(c)(1)** A statement with supporting labeled photographs explaining and documenting that the water well is in a good state of repair;
 - **013.04(c)(2)** An explanation of the intended future use, if any, of the water well;
 - **013.04(c)(3)** A description of the steps taken, if any, to prevent impairment of the water quality in the water well or of the ground water encountered by the water well;
 - **013.04(c)(4)** A statement with supporting labeled photographs explaining and documenting that the top of the water well or water well casing has a watertight welded or threaded cover or some other water-tight means to prevent its removal without the use of equipment or tools;
 - **013.04(c)(5)** A statement with supporting labeled photographs explaining and documenting that all entrances and discharge piping to the water well are effectively sealed to prevent the entrance of contaminants; and
 - **013.04(c)(6)** A statement with supporting labeled photographs explaining and documenting that the water well is marked so as to be easily visible and located and is labeled or otherwise marked so as to be easily identified as a water well and the area surrounding the water well is kept clear of brush, debris, and waste material.

013.05 UNTIMELY RECEIPT OF PETITION FOR RECLASSIFICATION

If the Department does not timely receive from the landowner a petition for reclassification, then the landowner shall decommission the illegal water well within 60 days of the expiration of the 90-day reclassification petition filing deadline.

013.06 DEPARTMENT ACTION ON PETITION.

Whenever the Department timely receives a petition for reclassification from the landowner, the Department will grant the petition, deny the petition, or hold the petition in abeyance.

13.07 GRANTING A PETITION FOR RECLASSIFICATION.

- **013.07(a) Conditions for Granting** - If the Department is satisfied that the petition for reclassification contains evidence sufficient to properly reclassify the water well as the requested status, then the Department will grant the petition for reclassification.
- **013.07(b) Notice Provided** - The Department will provide the landowner with written notice upon granting the petition for reclassification.

013.08 DENYING A PETITION FOR RECLASSIFICATION.

- **013.08(a) Conditions for Denying** - The Department will deny the petition for reclassification if the Department is not:
 - **013.08(a)(1)** Satisfied that the petition for reclassification contains evidence sufficient to properly classify the water well as the requested status; and
 - **013.08(a)(2)** Convinced that the landowner could, within 60 days, bring the water well into compliance such that the water well could properly be reclassified as the requested status.
- **013.08(b) Notice Provided** - The Department will provide the landowner with written notice upon denying the petition for reclassification.
- **013.08(c) Effect of Denial** - The landowner shall, within 60 days of receiving the notice described in 013.08(b) of this Chapter, properly decommission the water well and provide to the Department a signed statement certifying that the water well has been properly decommissioned.

013.09 HOLDING A PETITION FOR RECLASSIFICATION IN ABEYANCE.

- **013.09(a) Conditions for Holding in Abeyance** - The Department will hold a petition for reclassification in abeyance if the Department is:
 - **013.09(a)(1)** Not satisfied that the petition for reclassification contains evidence sufficient to properly classify the water well as the requested status; and
 - **013.09(a)(2)** Convinced that the landowner could, within a reasonable amount of time, bring the water well into compliance such that the water well could properly be reclassified as the requested status.
- **013.09(b) Notice Provided**
 - **013.09(b)(1)** The Department will provide the landowner with written notice upon holding the petition for reclassification in abeyance.
 - **013.09(b)(2)** The written notice will:
 - **013.09(b)(2)(i)** Identify the particular deficiencies that must be corrected in order to bring the water well into compliance such that the water well can properly be reclassified as the requested status; and
 - **013.09(b)(2)(ii)** Specify the date by which such deficiencies shall be corrected. The date so specified will not be extended.
- **013.09(c) Additional One-time Compliance Period** - The period of time between the petition being held in abeyance and the date on or before which corrections must be completed constitutes an additional, one-time compliance period. Within 60 days of receiving the written notice provided under 013.09(b) of this Chapter, the landowner shall:
 - **013.09(c)(1)** Cause the water well to be brought into compliance such that the water well can properly be reclassified as the requested status; and

- **013.09(c)(2)** Make a supplemental submission to the Department containing:
 - **013.09(c)(2)(i)** A signed statement certifying that the deficiencies identified in the written notice have been corrected; and
 - **013.09(c)(2)(ii)** Any photographs the landowner believes supports reclassification.
- **013.09(c)(3)** To be considered timely, the Department must receive the supplemental submission within 60 days.
- **013.09(d) Action on Supplemental Submission.**
 - **013.09(d)(1)** If, after reviewing the supplemental submission, the Department is satisfied that the water well may properly be reclassified as the requested status, then the Department will grant the petition for reclassification.
 - **013.09(d)(2)** If, after reviewing the supplemental submission, the Department is not satisfied that the water well may properly be reclassified as the requested status, then the Department will deny the petition for reclassification.
- **013.09(e) Notice Provided** - The Department will provide the landowner with written notice of the action taken on the supplemental submission.
- **013.09(f) Effect of Denial** - The landowner shall, within 60 days of receiving the notice described in 013.09(e) of this Chapter, properly decommission the water well and provide to the Department with a signed statement certifying that the water well has been properly decommissioned.

Table 1
Decontamination Chart Calculator for Total System Volumes

Casing ID Inches	Gal/ft	Ft of H ₂ O	Standing Well Volume ¹ Feet	Total Treat. Volume ²	Total Decontam. Volume ³	200 ppm 5% chlorine gallons ⁴	200 ppm 65% HCL oz. ⁴
4	0.65	100	65	130	260	0.26	15.6
5	1.02	100	102	204	408	0.408	4.48
6	1.47	100	147	294	588	0.588	35.28

Casing ID Inches	Gal/ft	Ft of H ₂ O	Standing Well Volume ¹ Feet	Total Treat. Volume ²	Total Decontam. Volume ³	200 ppm 5% chlorine gallons ⁴	200 ppm 65% HCL oz. ⁴
8	2.61	100	261	391.5	1044	1.044	62.64
10	4.08	100	408	612	1632	1.632	97.92
12	5.87	100	587	880.5	2348	2.348	140.88
16	10.45	100	1045	1567.5	4180	4.18	250.8
24	23.51	100	2351	3526.5	9404	9.404	564.24

¹Standing Well Volume equals the total amount of water in the casing.

²Total Treatment Volume equals the amount of water in the casing plus the annular space of the borehole.

1. For 4-to-6-inch wells, the standing well volume times 2 equals the total treatment volume.
2. For 8-inch and larger wells, the standing well volume times 1.5 equals the total treatment volume.

³Total Decontamination Volume equals the standing volume times 4 to approximate the water in the system.

⁴The decontamination amounts are based on a calculation or percent of the available chlorine dosage strength per given volume of water.

Table 2
Disinfection Chart Calculator for Total System Volumes

Casing ID Inches	Gal/ft	Ft of H ₂ O	Standing Well Volume ¹ Feet	Total Treat. Volume ²	Total Decontam. Volume ³	50 ppm 5% chlorine gallons ⁴	50 ppm 65% HCL oz. ⁴
4	0.65	100	65	130	260	0.065	3.9
5	1.02	100	102	204	408	0.102	6.12
6	1.47	100	147	294	588	0.147	8.82

Casing ID Inches	Gal/ft	Ft of H ₂ O	Standing Well Volume ¹ Feet	Total Treat. Volume ²	Total Decontam. Volume ³	50 ppm 5% chlorine gallons ⁴	50x ppm 65% HCL oz. ⁴
8	2.61	100	261	391.5	1044	0.261	15.66
10	4.08	100	408	612	1632	0.408	24.48
12	5.87	100	587	880.5	2348	0.587	35.22
16	10.45	100	1045	1567.5	4180	1.045	62.7
24	23.51	100	2351	3526.5	9404	2.351	141.06

¹Standing Well Volume equals the total amount of water in the casing.

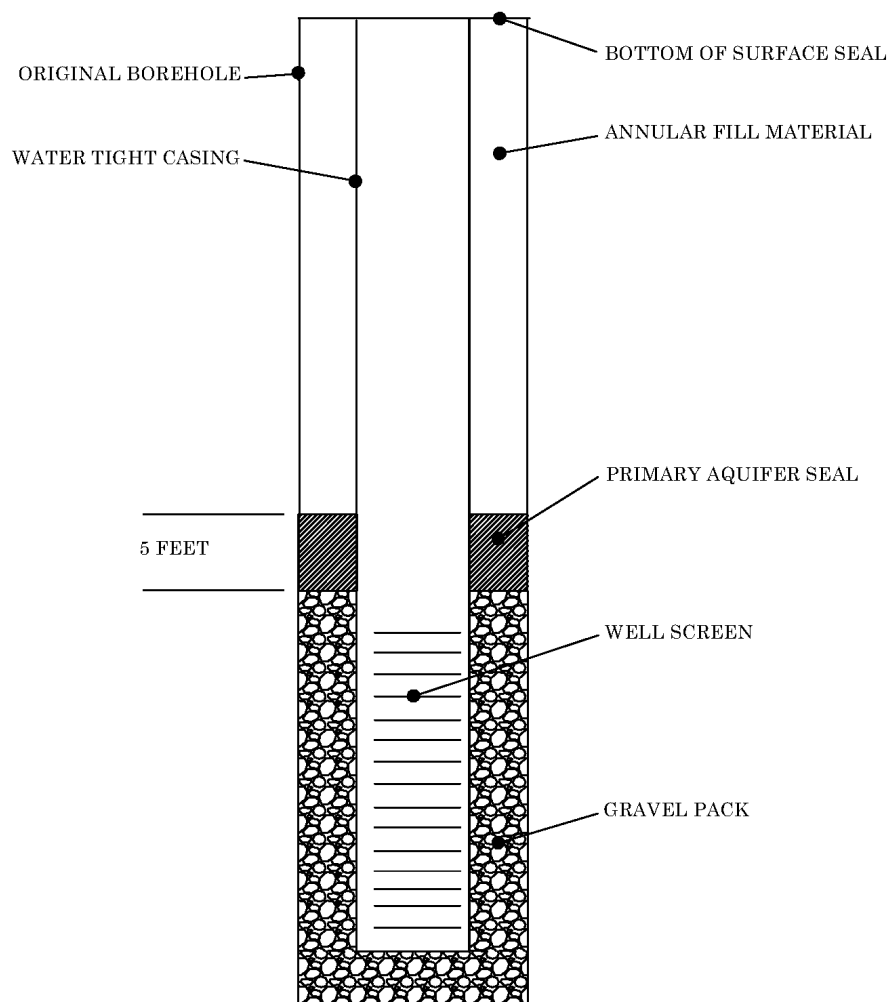
²Total Treatment Volume equals the amount of water in the casing plus the annular space of the borehole.

1. For 4-to-6-inch wells, the standing well volume times 2 equals the total treatment volume.
2. For 8-inch and larger wells, the standing well volume times 1.5 equals the total treatment volume.

³Total Decontamination Volume equals the standing volume times 4 to approximate the water in the system.

⁴The decontamination amounts are based on a calculation or percent of the available chlorine dosage strength per given volume of water.

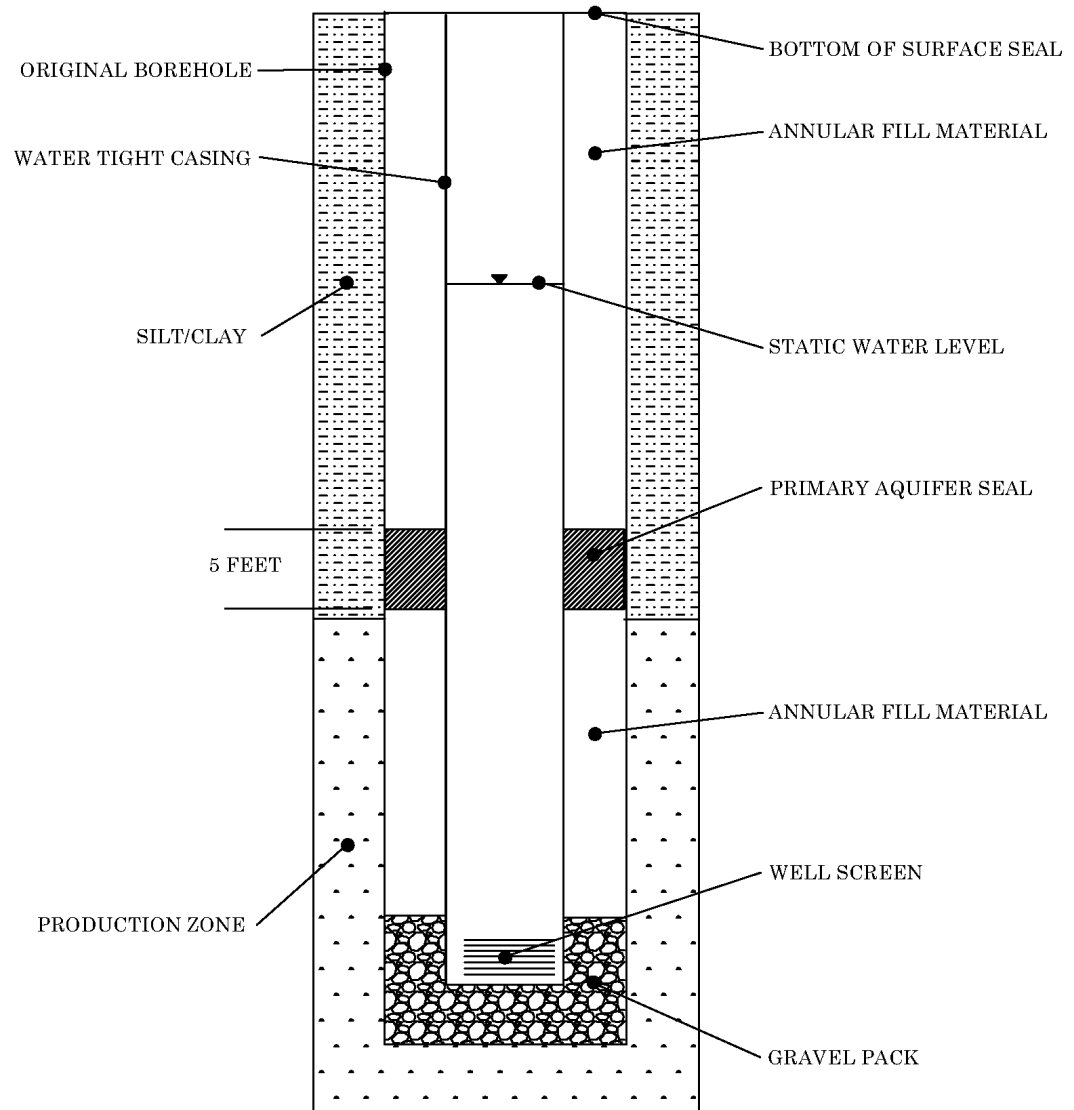
FIGURE 1A
PRIMARY AQUIFER SEAL ON TOP OF
GRAVEL PACK ABOVE THE WELL SCREEN



This figure is only for illustrative purposes of the referenced regulation. See the regulation text for the complete standard requirements.

134 NAC CHAPTER 4 - 001.10(a)(1)

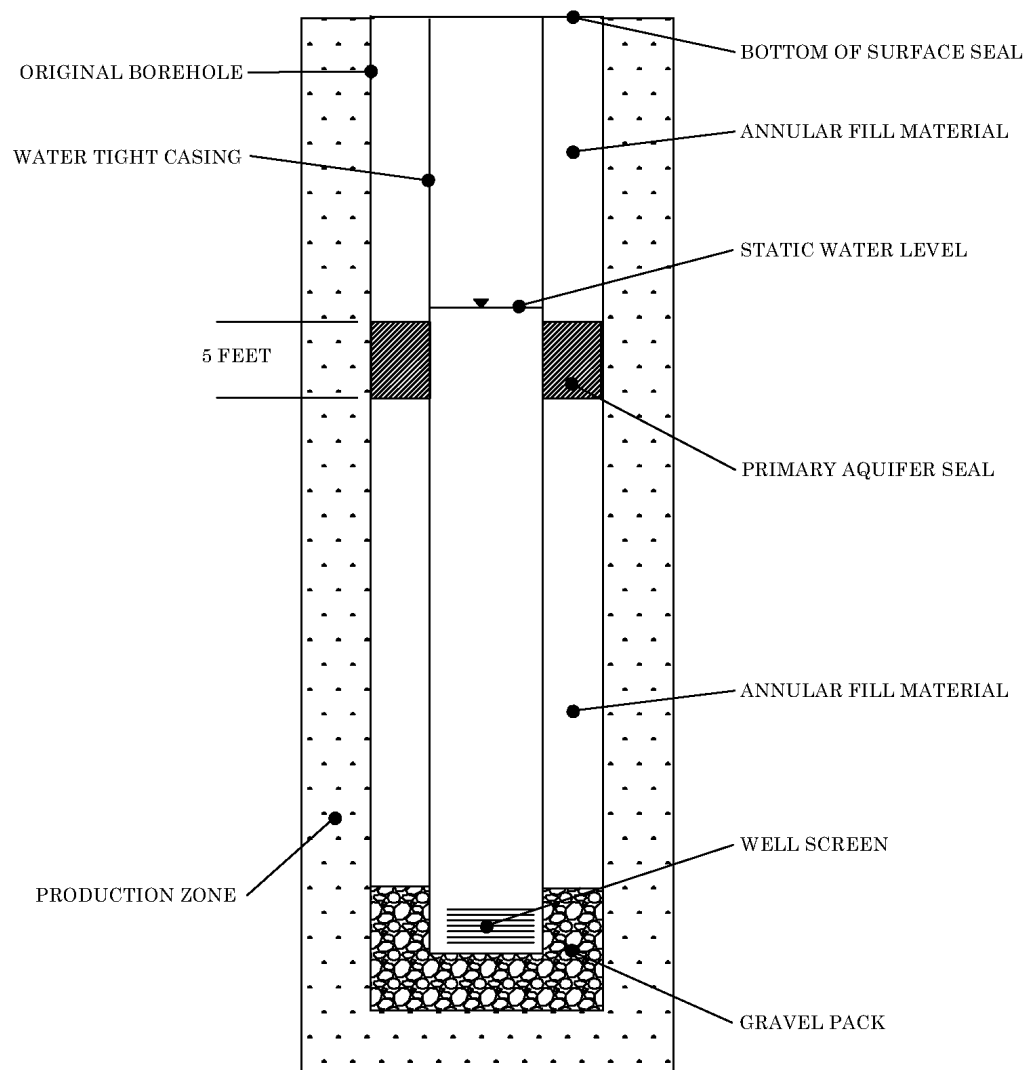
FIGURE 1B
 PRIMARY AQUIFER SEAL AT THE BASE OF THE
 FIRST SILT/CLAY LAYER ABOVE THE PRODUCTION ZONE



This figure is only for illustrative purposes of the referenced regulation. See the regulation text for the complete standard requirements.

134 NAC CHAPTER 4 - 001.10(a)(2)

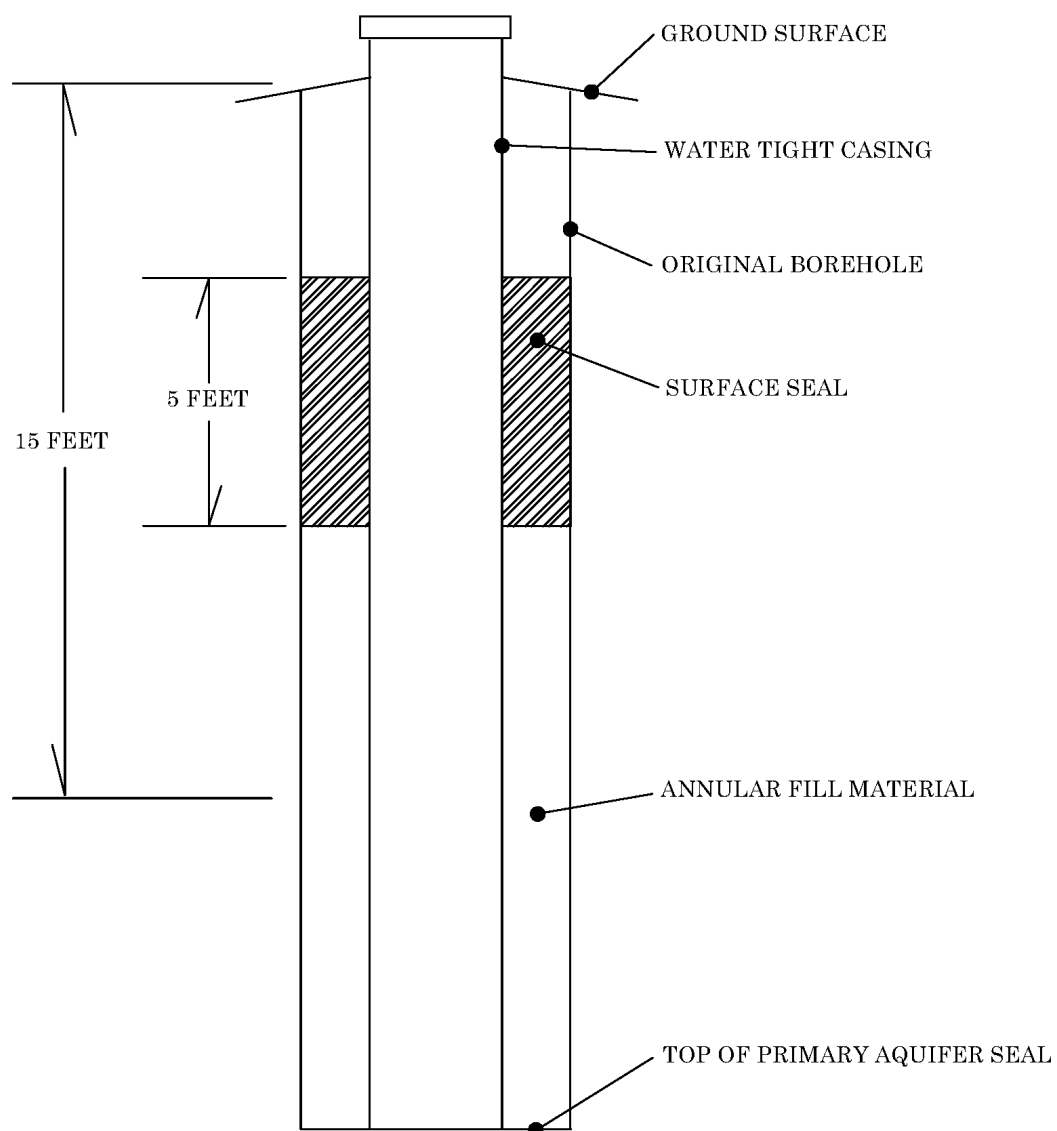
FIGURE 1C
PRIMARY AQUIFER SEAL AT/OR IMMEDIATELY
BELOW THE STATIC WATER LEVEL



This figure is only for illustrative purposes of the referenced regulation. See the regulation text for the complete standard requirements.

134 NAC CHAPTER 4 - 001.10(a)(3)

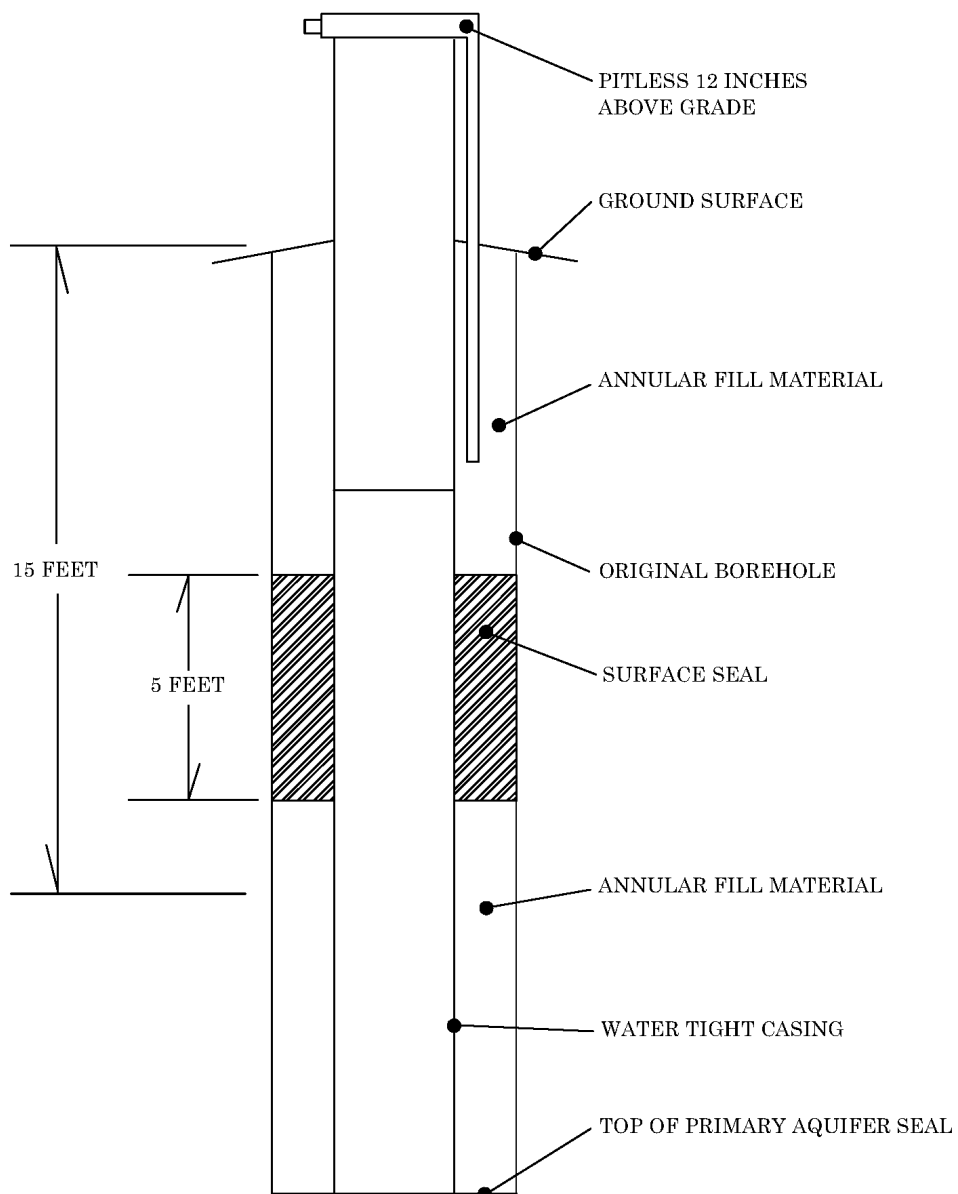
FIGURE 2A
SURFACE SEAL FOR ALL WELLS NOT
EQUIPPED WITH PITLESS UNITS



This figure is only for illustrative purposes of the referenced regulation. See the regulation text for the complete standard requirements.

134 NAC CHAPTER 4 - 001.10(d)

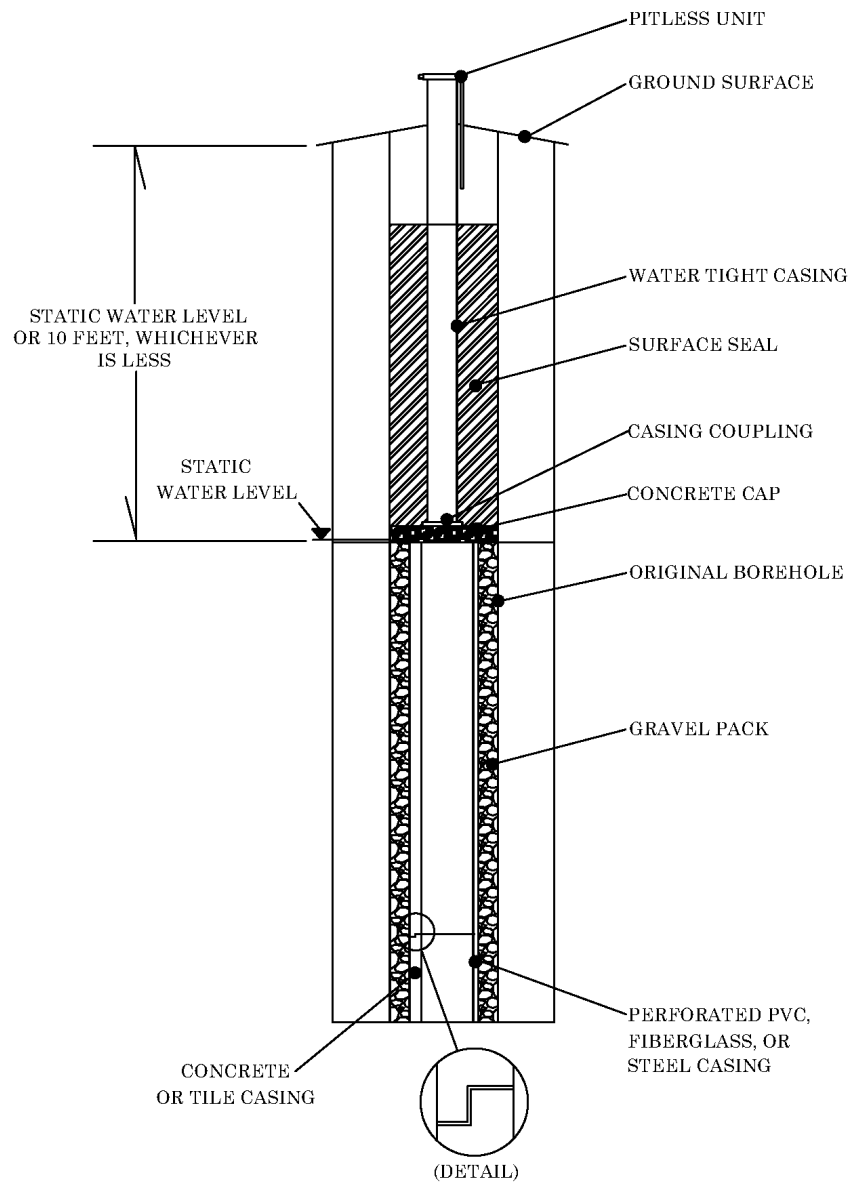
FIGURE 2B
SURFACE SEALS FOR ALL
WELLS WITH PITLESS UNITS



This figure is only for illustrative purposes of the referenced regulation. See the regulation text for the complete standard requirements.

134 NAC CHAPTER 4 - 001.10(d)

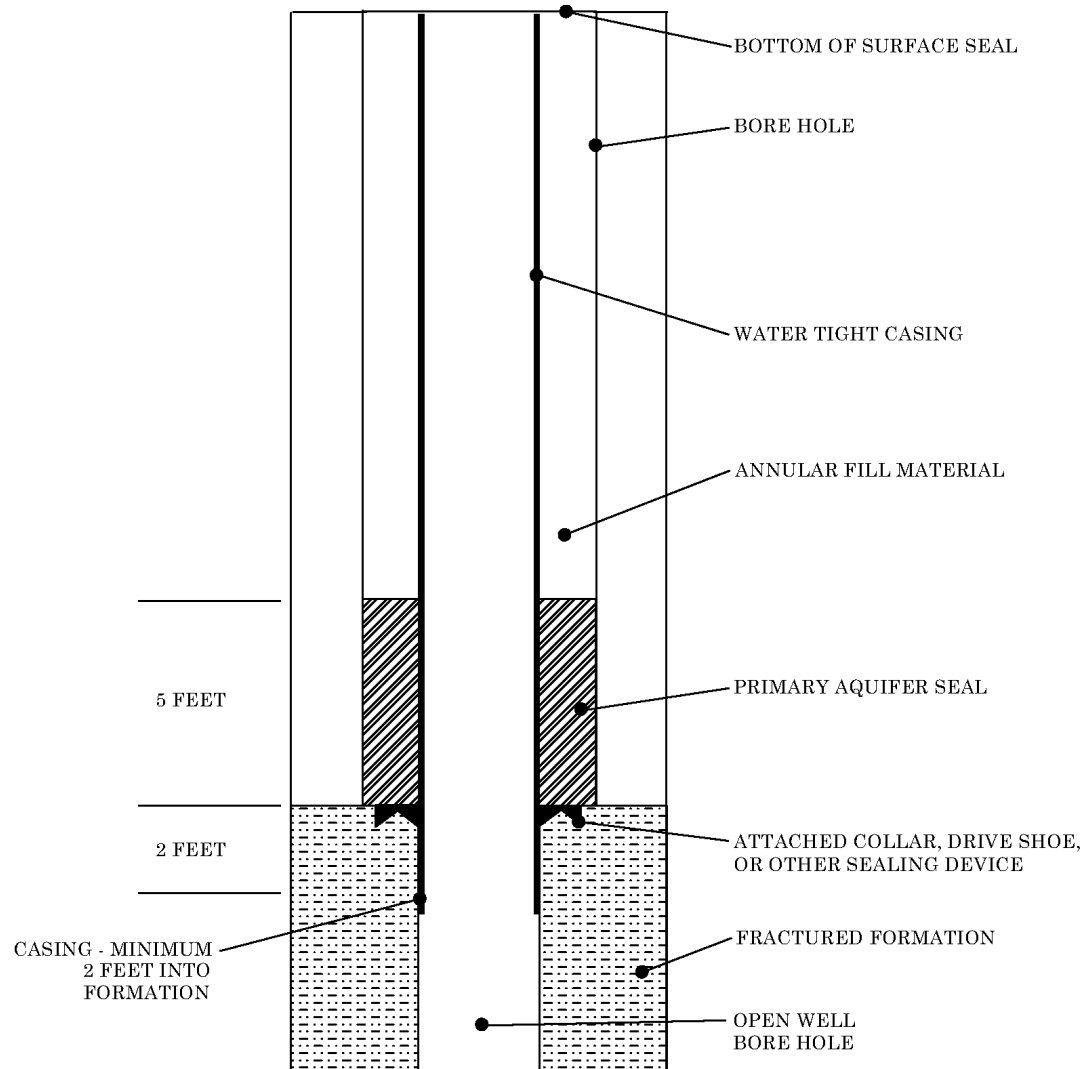
FIGURE 3
CONSTRUCTION AND REPAIRS OF BORED
AND DUG WELLS



This figure is only for illustrative purposes of the referenced regulation. See the regulation text for the complete standard requirements.

134 NAC CHAPTER 4 - 001.13, 002.04, & 003.04

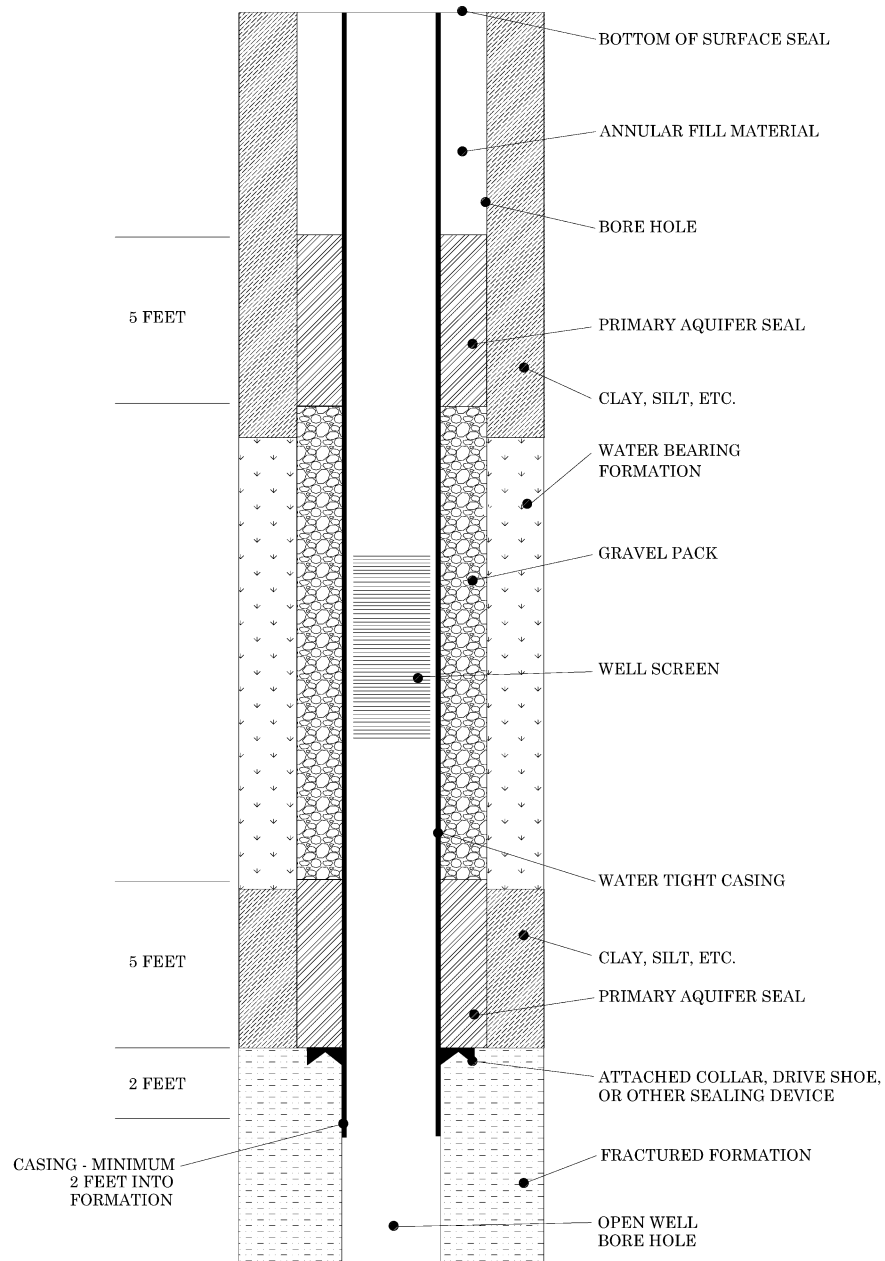
FIGURE 4
OPEN HOLE WELL CONSTRUCTION



This figure is only for illustrative purposes of the referenced regulation. See the regulation text for the complete standard requirements.

134 NAC CHAPTER 4 - 002.05 & 003.05

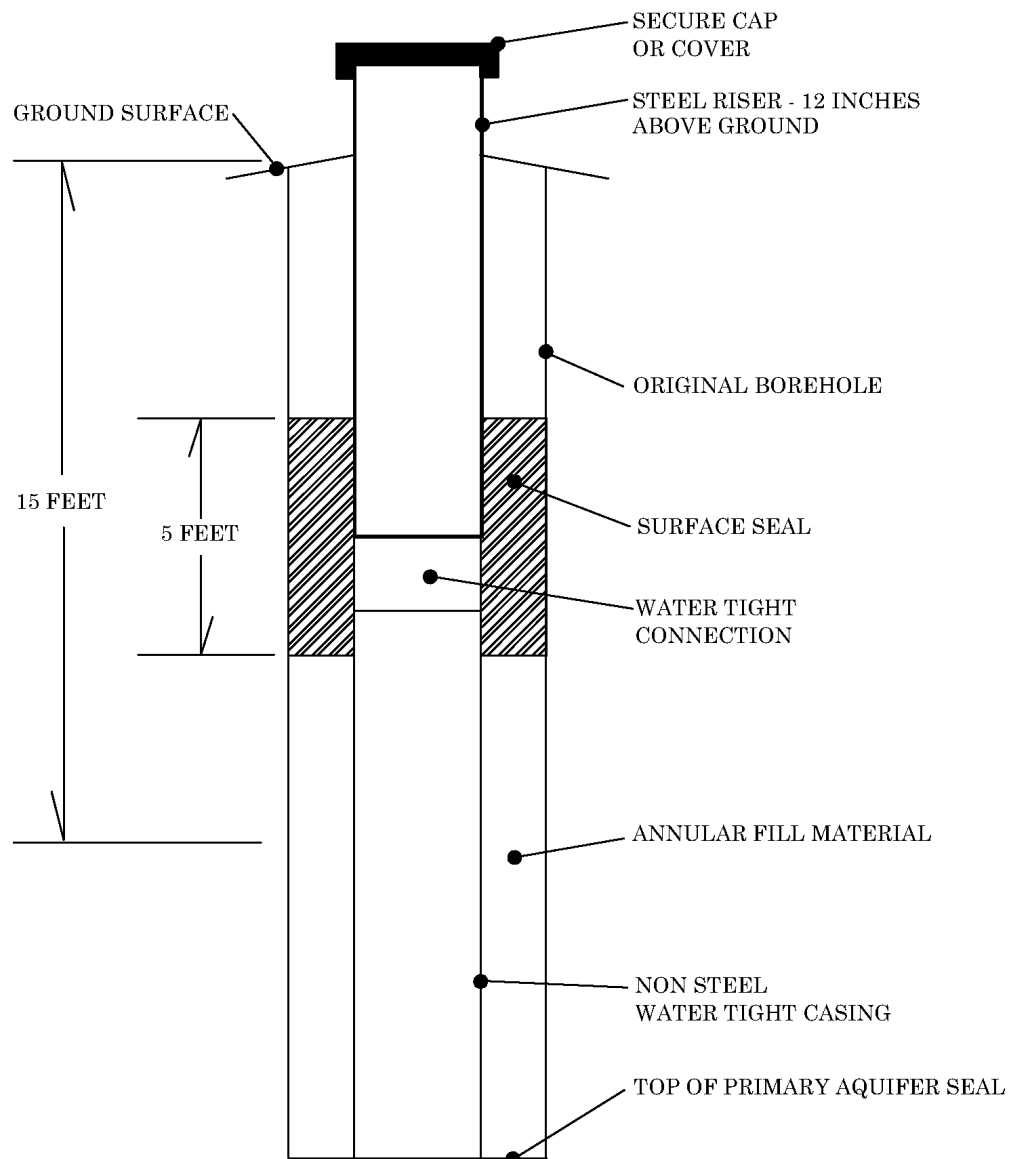
FIGURE 5
OPEN HOLE WELL CONSTRUCTION
MULTIPLE WATER BEARING ZONES



This figure is only for illustrative purposes of the referenced regulation. See the regulation text for the complete standard requirements.

134 NAC CHAPTER 4 - 002.05(c) & 003.05(c)

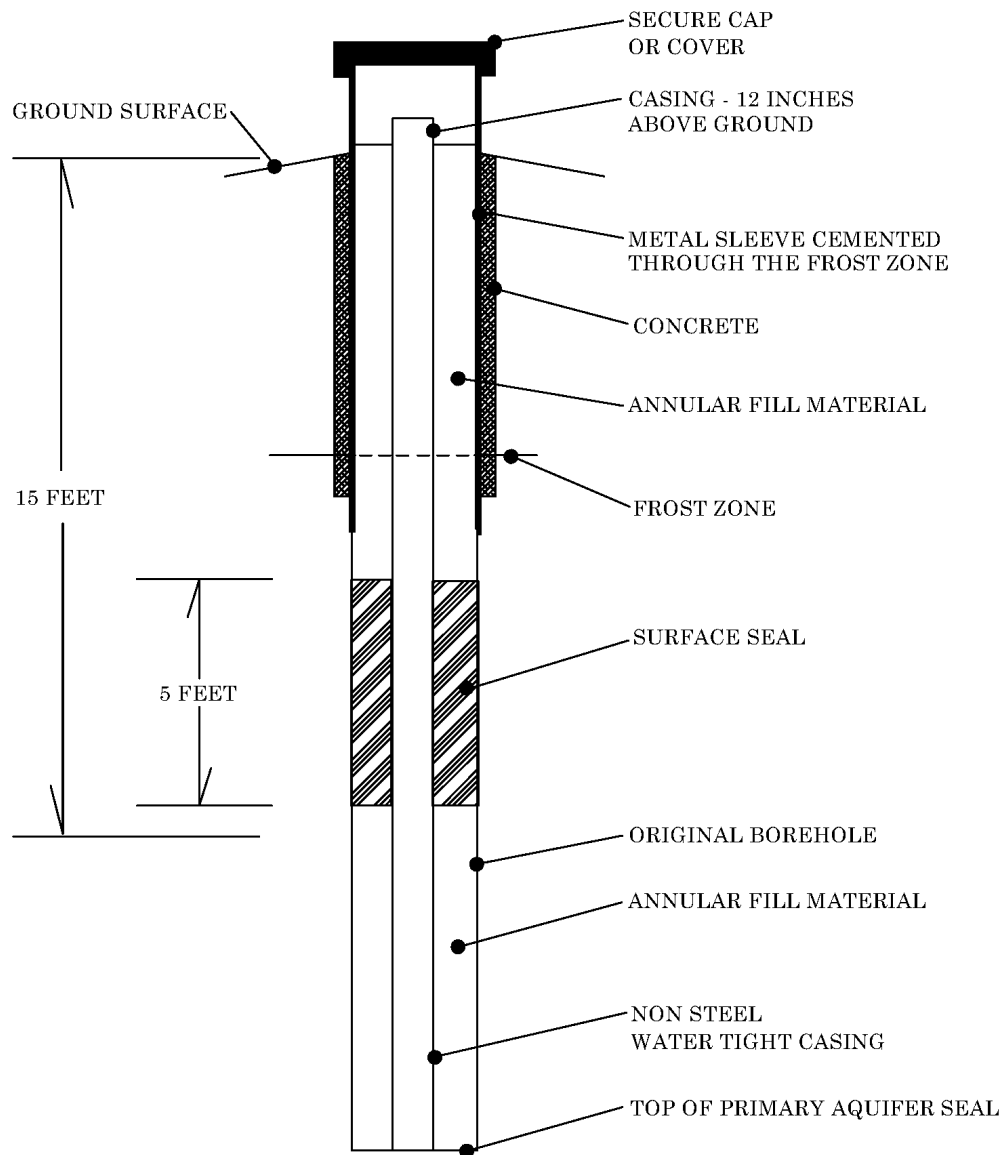
FIGURE 6
UPPER PORTION OF NON-POTABLE WELLS 6-5/8 INCH
OD AND LESS WITH STEEL CASING RISER



This figure is only for illustrative purposes of the referenced regulation. See the regulation text for the complete standard requirements.

134 NAC CHAPTER 4 - 003.03(a)(2)

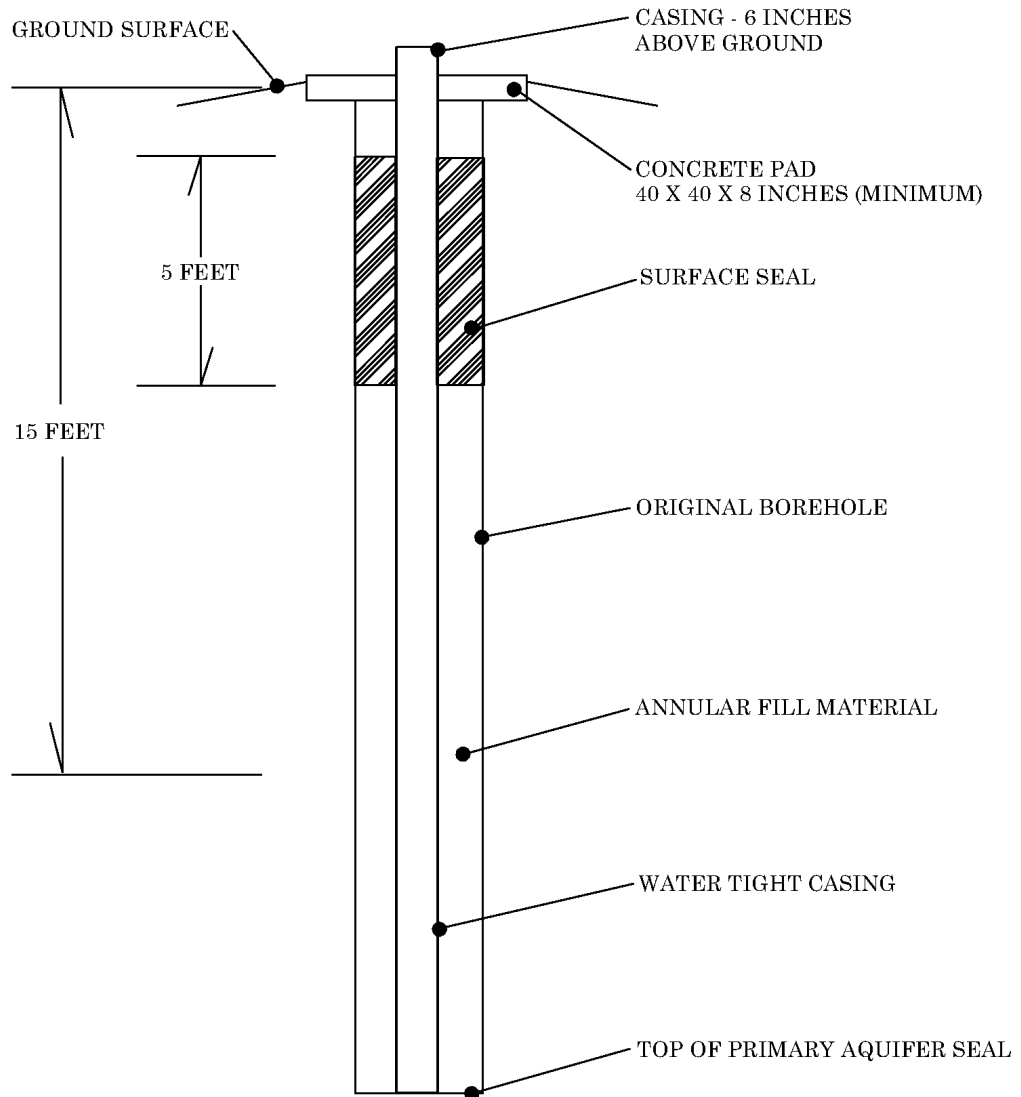
FIGURE 7
UPPER PORTION OF NON-POTABLE WELLS 6-5/8 INCH
OD AND LESS WITH METAL SLEEVE BOLLARD



This figure is only for illustrative purposes of the referenced regulation. See the regulation text for the complete standard requirements.

134 NAC CHAPTER 4 - 003.03(a)(2)

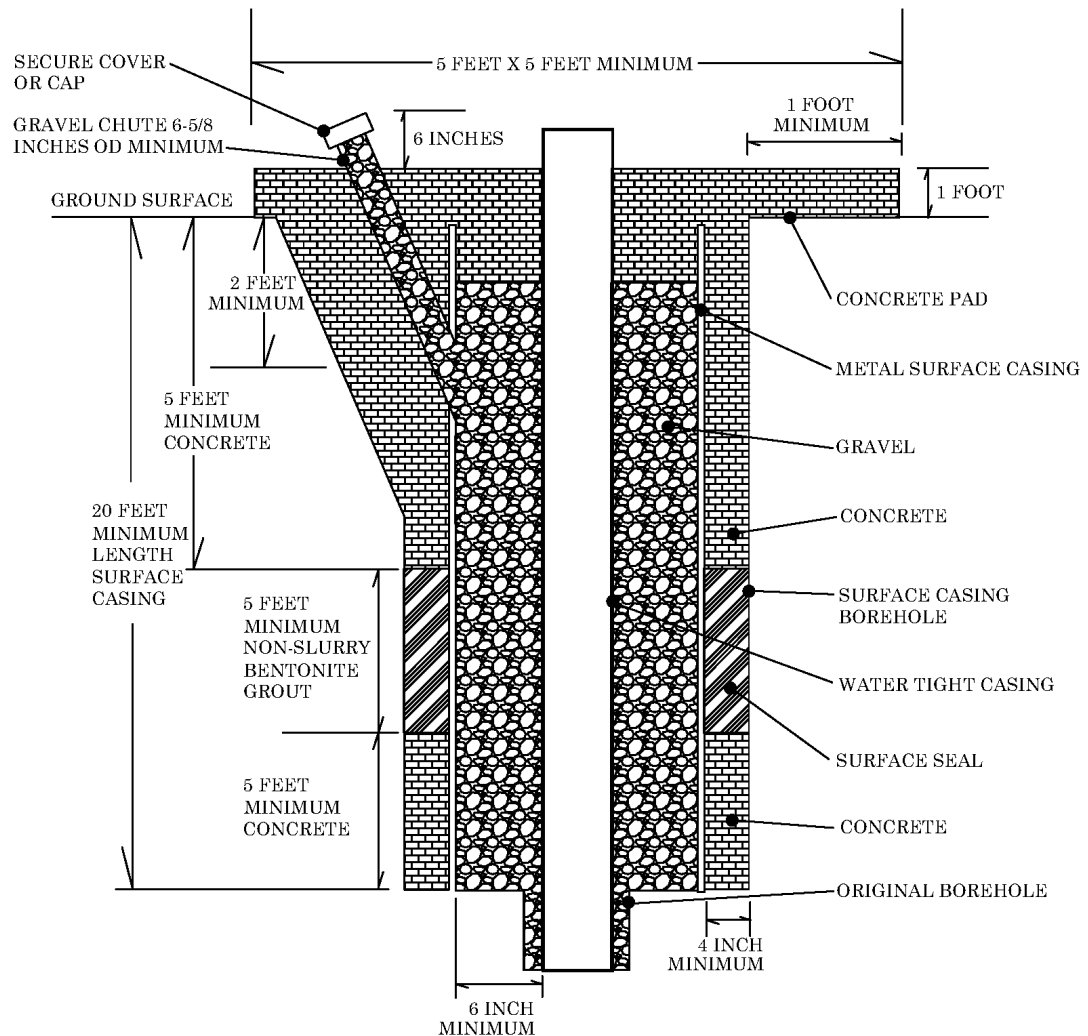
FIGURE 8
CONCRETE PAD FOR NON-POTABLE WELLS
LARGER THAN 6-5/8 INCHES OD



This figure is only for illustrative purposes of the referenced regulation. See the regulation text for the complete standard requirements.

134 NAC CHAPTER 4 - 003.03(b)(1)

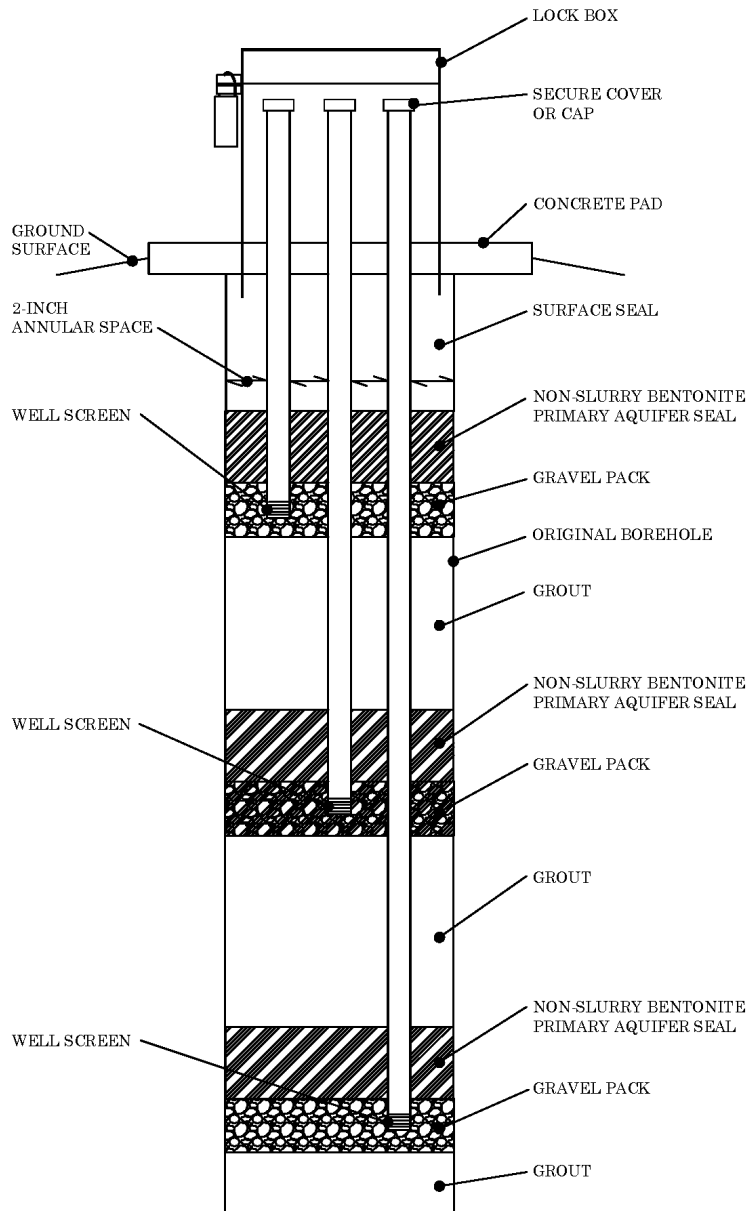
FIGURE 9
WELLS LOCATED IN THE ARIKAREE FORMATION
THAT ARE SUBJECT TO SUBSIDENCE



This figure is only for illustrative purposes of the referenced regulation. See the regulation text for the complete standard requirements.

134 NAC CHAPTER 4 - 003.06

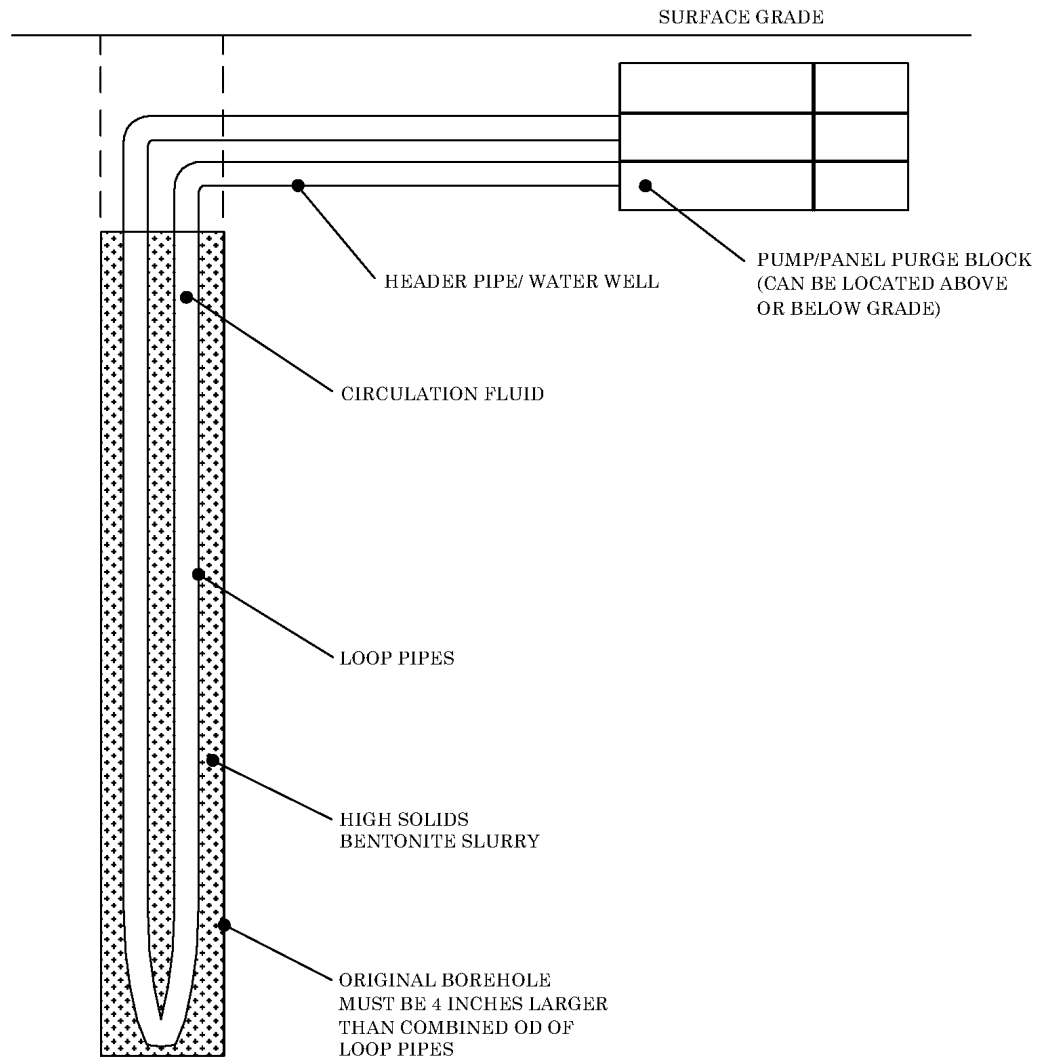
FIGURE 10
NESTED WELL DESIGN



This figure is only for illustrative purposes of the referenced regulation. See the regulation text for the complete standard requirements.

134 NAC CHAPTER 4 - 005.07

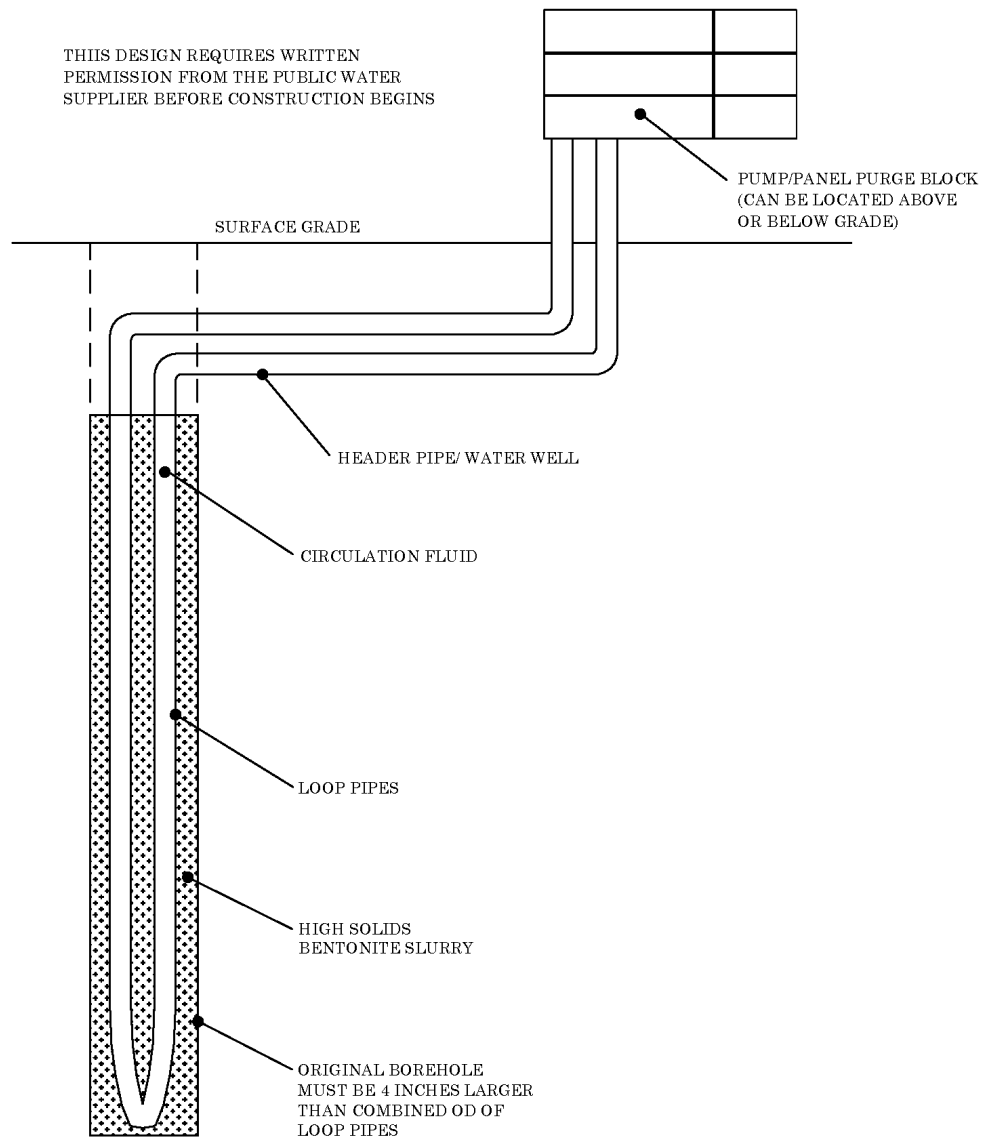
FIGURE 11A
CLOSED LOOP WATER WELL AS PER 46-1212
GREATER THAN TEN (10) BOREHOLES



This figure is only for illustrative purposes of the referenced regulation. See the regulation text for the complete standard requirements.

134 NAC CHAPTER 4 - 008.03(c)

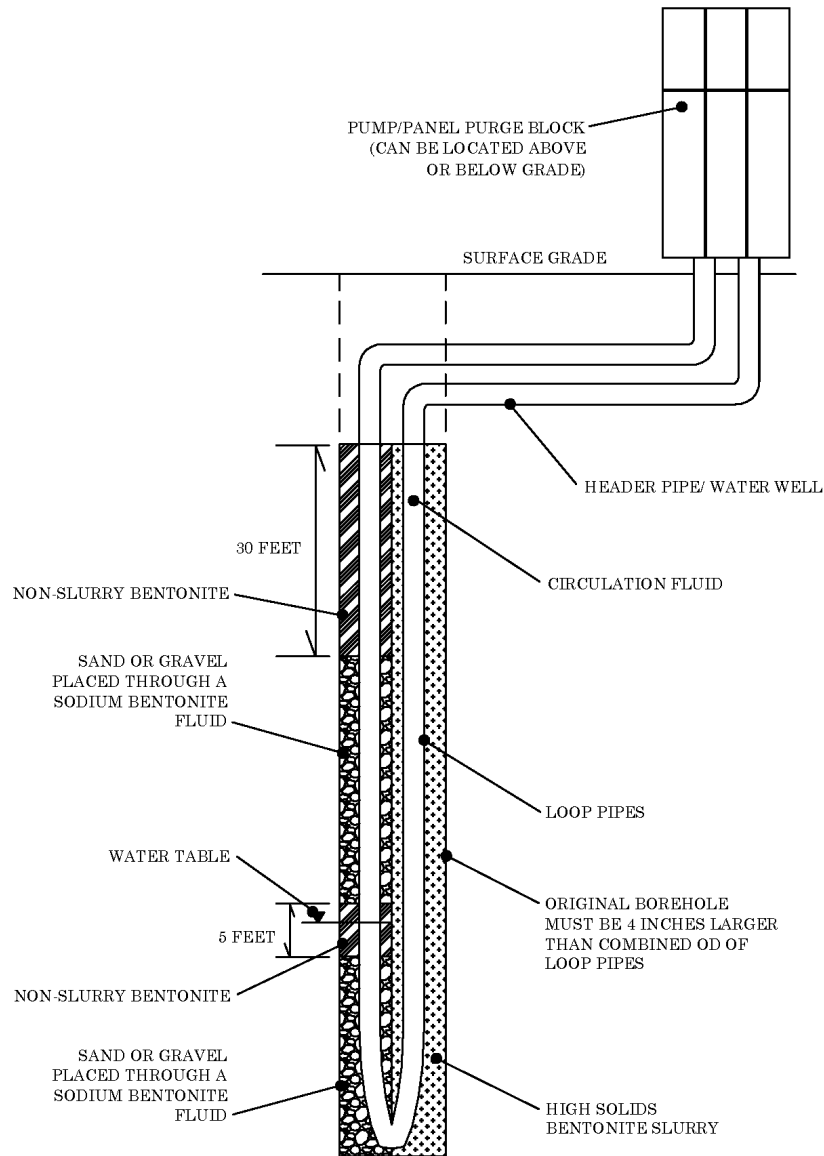
FIGURE 11B
CLOSED LOOP WATER WELL AS PER 46-1212
LESS THAN TEN (10) BOREHOLES AND LOCATED
LESS THAN 1000 FEET FROM A COMMUNITY PUBLIC WATER SYSTEM



This figure is only for illustrative
purposes of the referenced regulation.
See the regulation text for the complete
standard requirements.

134 NAC CHAPTER 4 - 008.03(d)

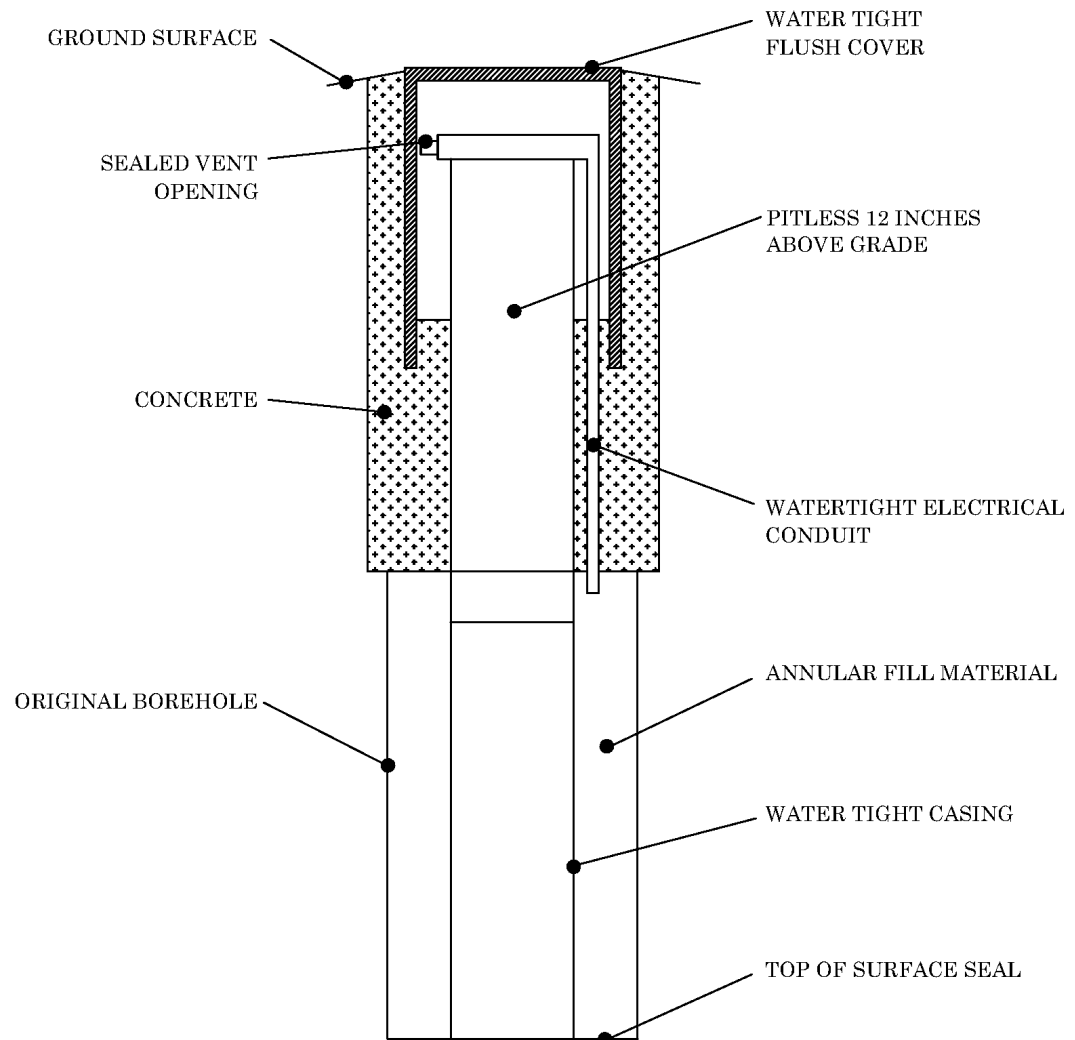
FIGURE 11C
 CLOSED LOOP WATER WELL AS PER 46-1212
 LESS THAN TEN (10) BOREHOLES AND LOCATED
 1000 FEET OR MORE FROM A COMMUNITY PUBLIC WATER SYSTEM



This figure is only for illustrative
 purposes of the referenced regulation.
 See the regulation text for the complete
 standard requirements.

134 NAC CHAPTER 4 - 008.03(e)

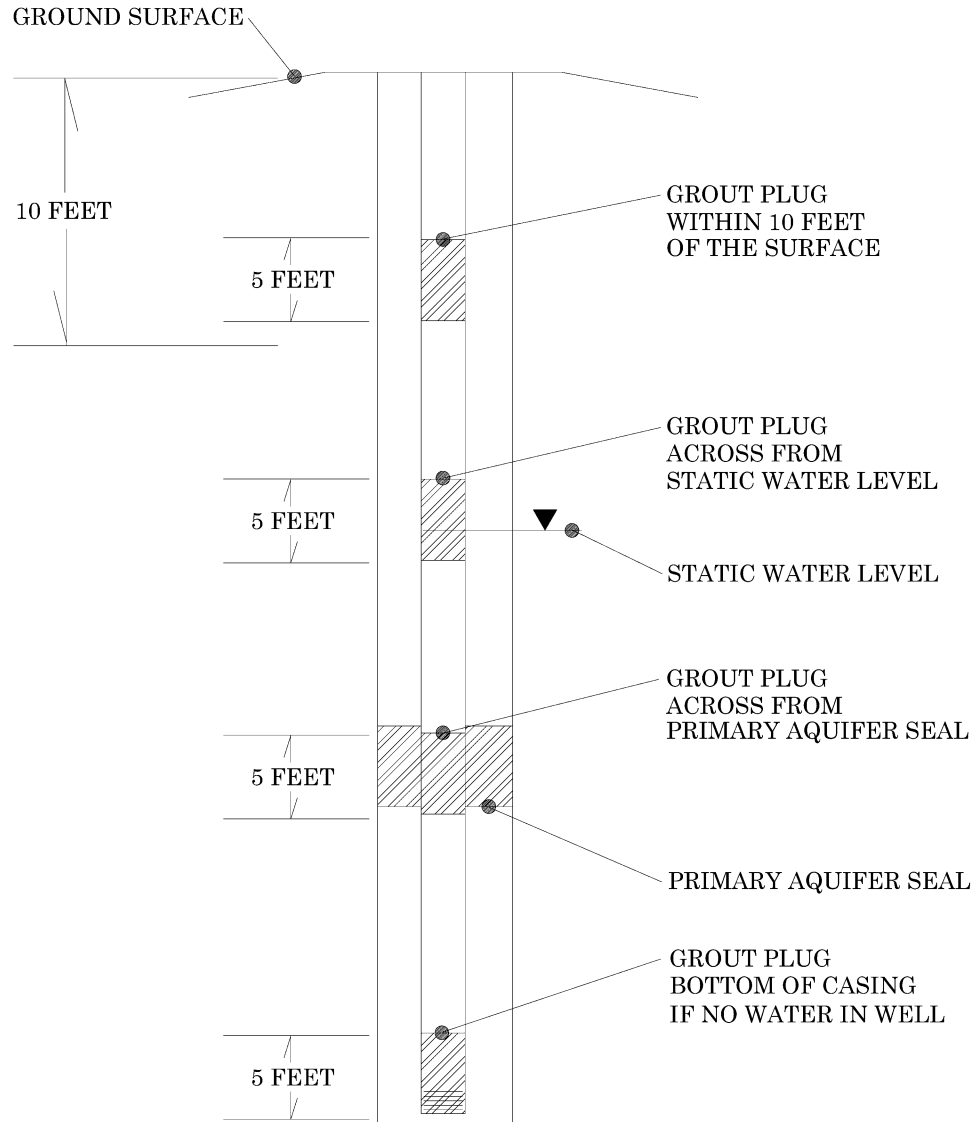
FIGURE 12
PITLESS UNITS INSTALLATION
IN A HIGH TRAFFIC AREA



This figure is only for illustrative purposes of the referenced regulation. See the regulation text for the complete standard requirements.

134 NAC CHAPTER 4 - 009.03(a)(7)

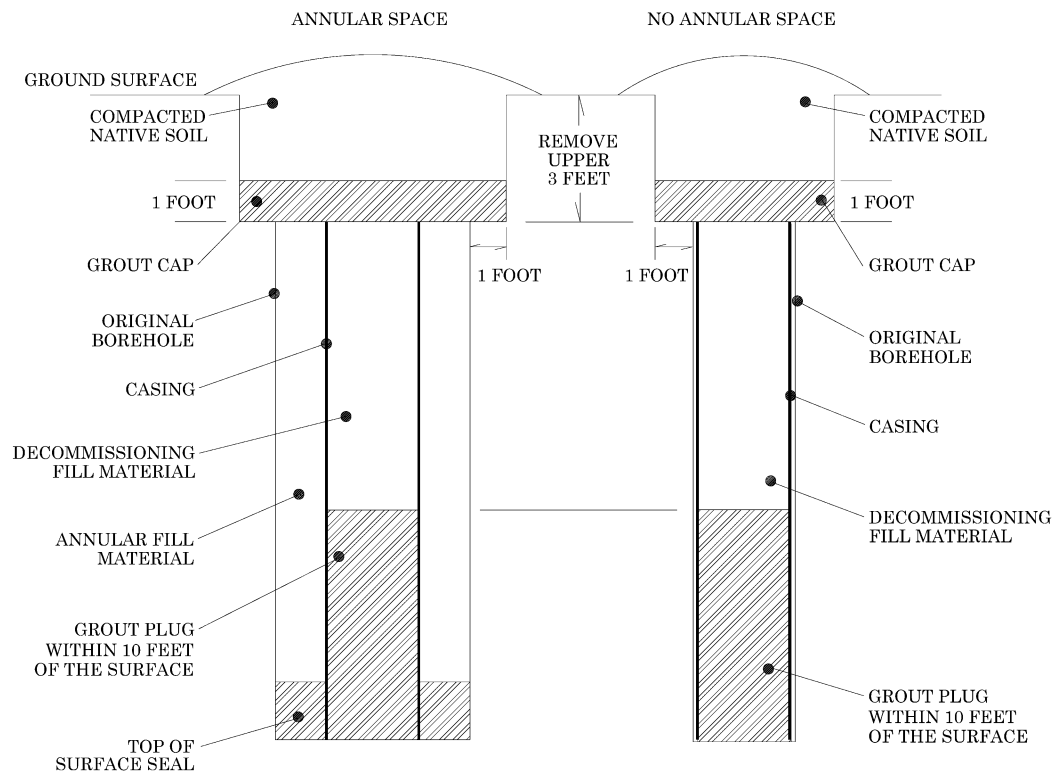
FIGURE 13
DECOMMISSIONING
POSSIBLE PLUG PLACEMENT FOR
ALL WELLS WITH ANNULAR SPACE



This figure is only for illustrative purposes of the referenced regulation. See the regulation text for the complete standard requirements.

134 NAC CHAPTER 4 - 010.07(a)

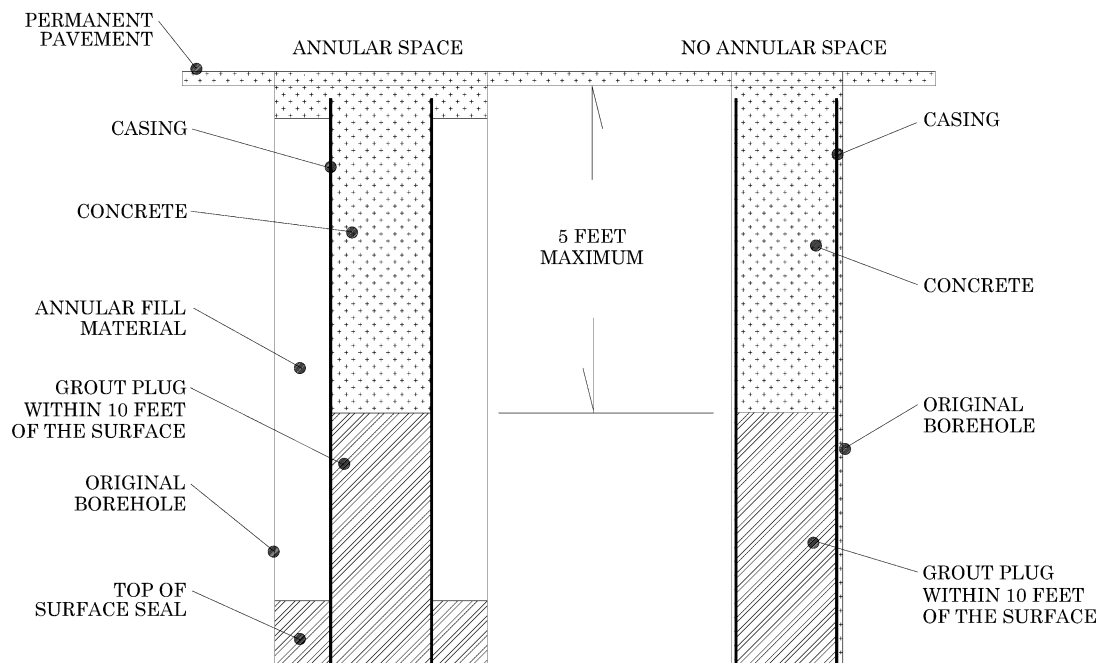
FIGURE 14A
DECOMMISSIONING
CASING REMOVAL, CAPPING, SURFACE COMPLETION



This figure is only for illustrative purposes of the referenced regulation. See the regulation text for the complete standard requirements.

134 NAC CHAPTER 4 - 010.07(b), 010.07(c), 010.07(d), 010.09(b)(3), 010.09(b)(4), 010.09(b)(5)

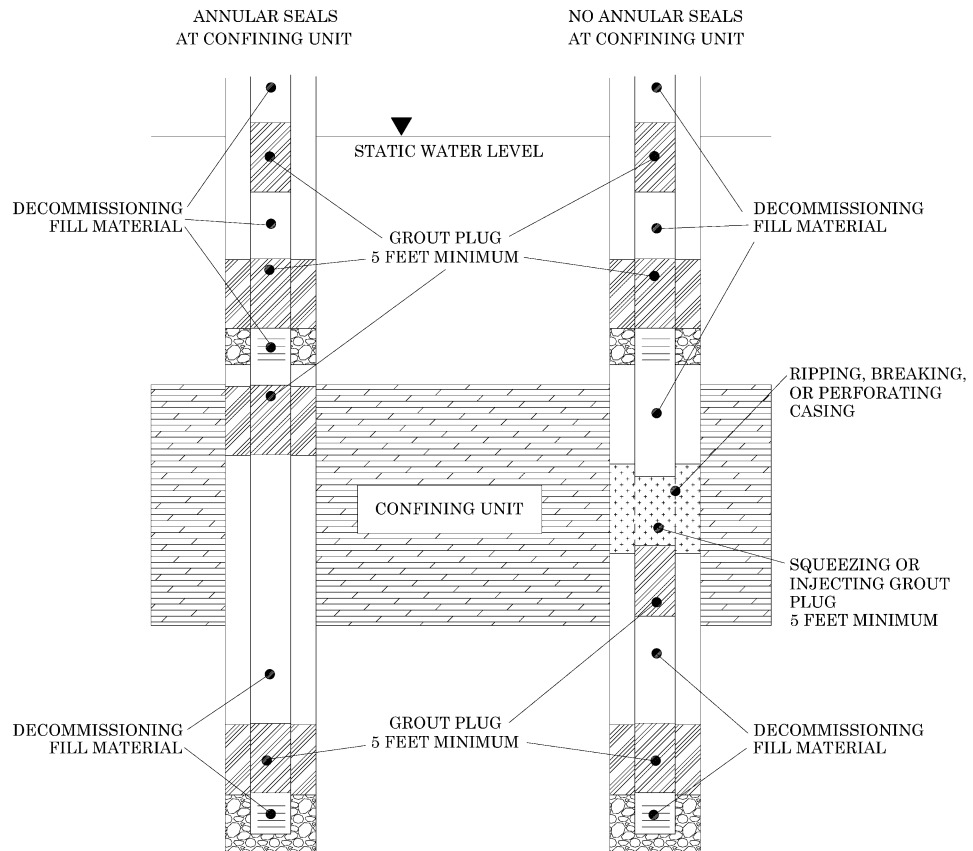
FIGURE 14B
 DECOMMISSIONING
 CASING REMOVAL, CAPPING, SURFACE COMPLETION
 WELLS SURROUNDED BY PERMANENT PAVEMENT



This figure is only for illustrative purposes of the referenced regulation. See the regulation text for the complete standard requirements.

134 NAC CHAPTER 4 - 010.07(b)(1), 010.07(c), 010.07(d), 010.09(b)(3)(i), 010.09(b)(4), 010.09(b)(5)

FIGURE 15
DECOMMISSIONING
MULTIPLE AQUIFER WELLS/FLOWING WELLS



This figure is only for illustrative purposes of the referenced regulation. See the regulation text for the complete standard requirements.

134 NAC CHAPTER 4 - 010.09(d)