

NORTH CAROLINA ADMINISTRATIVE CODE

TITLE 15A

**Department of Environment, Health, and Natural Resources
Division of Environmental Management**

SUBCHAPTER 2C

WELL CONSTRUCTION STANDARDS

SECTION .0100

**Criteria and Standards Applicable to Water-Supply and
Certain other Wells**

**Current Through October 1, 2009
Environment Management Commission
Raleigh, North Carolina**

SUBCHAPTER 2C – WELL CONSTRUCTION STANDARDS

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SUBCHAPTER 2C - WELL CONSTRUCTION STANDARDS

SECTION .0100 - CRITERIA AND STANDARDS APPLICABLE TO WATER-SUPPLY AND CERTAIN OTHER TYPE WELLS

15A NCAC 02C .0101 GENERAL PROVISIONS

(a) Authorization. The North Carolina Environmental Management Commission is required, under the provisions of Chapter 87, Article 7, Section 87, General Statutes of North Carolina (short title: North Carolina Well Construction Act) to adopt appropriate rules governing the location, construction, repair, and abandonment of wells, and the installation and repair of pumps and pumping equipment.

(b) Purpose. Consistent with the duty to safeguard the public welfare, safety, health, and to protect and beneficially develop the groundwater resources of the state, it is declared to be the policy of this state to require that the location, construction, repair and abandonment of wells, and the installation of pumps and pumping equipment conform to such reasonable standards and requirements as may be necessary to protect the public welfare, safety, health, and ground water resources.

History Note: Authority G.S. 87-87;
Eff. February 1, 1976;
Amended Eff. December 1, 1992; July 1, 1988.

15A NCAC 02C .0102 DEFINITIONS

The terms used in this Subchapter shall be as defined in G.S. 87-85 and as follows, unless the context otherwise requires:

- (1) "Abandon" means to discontinue the use of and to seal a well according to the requirements of 15A NCAC 02C .0113 of this Section.
- (2) "Access port" means an opening in the well casing or well head installed for the primary purpose of determining the position of the water level in the well or to facilitate disinfection.
- (3) "Agent" means any person who by mutual and legal agreement with a well owner has authority to act in his behalf in executing applications for permits. The agent may be either general agent or a limited agent authorized to do one particular act.
- (4) "Annular Space" means the space between the casing and the walls of the borehole or outer casing, or the space between a liner pipe and well casing.
- (5) "Artesian flowing well" means any well in which groundwater flows above the land surface without the use of a pump; where the static water level or hydraulic head elevation is greater than the land surface under natural conditions.
- (6) "ASTM" means the American Society for Testing and Materials.
- (7) "Casing" means pipe or tubing constructed of materials and having dimensions and weights as specified in the rules of this Subchapter, that is installed in a borehole, during or after completion of the borehole, to support the side of the hole and thereby prevent caving, to allow completion of a well, to prevent formation material from entering the well, to prevent the loss of drilling fluids into permeable formations, and to prevent entry of contamination.
- (8) "Clay" means a substance comprised of natural, inorganic, fine-grained crystalline mineral fragments which, when mixed with water, forms a pasty, moldable mass that preserves its shape when air dried.
- (9) "Commission" means the North Carolina Environmental Management Commission or its successor, unless otherwise indicated.
- (10) "Consolidated rock" means rock that is firm and coherent, solidified or cemented, such as granite, gneiss, limestone, slate or sandstone, that has not been decomposed by weathering.
- (11) "Contaminate" or "Contamination" means the introduction of foreign materials of such nature, quality, and quantity into the groundwaters as to exceed the groundwater quality standards specified in 15A NCAC 02L (Classifications and Water Quality Standards Applicable to the Groundwaters of North Carolina).
[Note: 15A NCAC 02L .0202(b)(3) addresses where naturally occurring substances exceed the established standard.]
- (12) "Department" is as defined in G.S. 87-85(5a).
- (13) "Designed capacity" means that capacity that is equal to the yield that is specified by the well owner or his agent prior to construction of the well.
- (14) "Director" means the Director of the Division of Water Quality or the Director's delegate.
- (15) "Division" means the Division of Water Quality.

- (16) "Domestic use" means water used for drinking, bathing, or other household purposes, livestock, or gardens.
- (17) "Formation Material" means naturally occurring material generated during the drilling process that is composed of sands, silts, clays or fragments of rock and which is not in a dissolved state.
- (18) "GPM" and "GPD" mean gallons per minute and gallons per day, respectively.
- (19) "Grout" means a material approved in accordance with Rule .0107(e) of this Section for use in sealing the annular space of a well or liner or for sealing a well during abandonment.
- (20) "Liner pipe" means pipe that is installed inside a completed and cased well for the purpose of preventing the entrance of contamination into the well or for repairing ruptured, corroded or punctured casing or screens.
- (21) "Monitoring well" means any well constructed for the primary purpose of obtaining samples of groundwater or other liquids for examination or testing, or for the observation or measurement of groundwater levels. This definition excludes lysimeters, tensiometers, and other devices used to investigate the characteristics of the unsaturated zone but includes piezometers, a type of monitoring well constructed solely for the purpose of determining groundwater levels.
- (22) "Owner" means any person who holds the fee or other property rights in the well being constructed. [Note: Absent a contrary agreement in writing, the Department will presume that the well owner and the land owner are the same person.]
- (23) "Pitless adapters" or "pitless units" are devices manufactured to the standards specified under 15A NCAC 02C .0107(j)(5) for the purpose of allowing a subsurface lateral connection between a well and plumbing appurtenances.
- (24) "Public water system" means a water system as defined in 15A NCAC 18C (Rules Governing Public Water Supplies).
- (25) "Recovery well" means any well constructed for the purpose of removing contaminated groundwater or other liquids from the subsurface.
- (26) "Saline" means having a chloride concentration of more than 250 milligrams per liter.
- (27) "Secretary" means the Secretary of the Department of Environment and Natural Resources or the Secretary's delegate.
- (28) "Settleable solids" means the volume of solid particles in a well-mixed one liter sample which will settle out of suspension, in the bottom of an Imhoff Cone, after one hour.
- (29) "Site" means the land or water area where any facility, activity or situation is physically located, including adjacent or other land used in connection with the facility, activity or situation.
- (30) "Specific capacity" means the yield of the well expressed in gallons per minute per foot of draw-down of the water level (gpm/ft.-dd).
- (31) "Static water level" means the level at which the water stands in the well when the well is not being pumped and is expressed as the distance from a fixed reference point to the water level in the well.
- (32) "Suspended solids" means the weight of those solid particles in a sample which are retained by a standard glass microfiber filter, with pore openings of one and one-half microns, when dried at a temperature between 103 and 105 degrees Fahrenheit.
- (33) "Temporary well" means a well that is constructed to determine aquifer characteristics, and which will be permanently abandoned or converted to a permanent well within seven days (168 hours) of the completion of drilling of the borehole.
- (34) "Turbidity" means the cloudiness in water, due to the presence of suspended particles such as clay and silt, that may create esthetic problems or analytical difficulties for determining contamination.
- (35) "Vent" means a permanent opening in the well casing or well head, installed for the purpose of allowing changes in the water level in a well due to natural atmospheric changes or to pumping. A vent may also serve as an access port.
- (36) "Well" is as defined in G.S. 87-85(14).
- (37) "Well capacity" means the maximum quantity of water that a well will yield continuously as determined by methods outlined in 15A NCAC 02C .0110.
- (38) "Well head" means the upper terminal of the well including adapters, ports, valves, seals, and other attachments.
- (39) "Well system" means two or more wells connected to the same distribution or collection system or, if not connected to a distribution or collection system, two or more wells serving the same site.
- (40) "Yield" means the volume of water or other fluid per time that can be discharged from a well under a given set of circumstances.

History Note: Authority G.S. 87-85; 87-87; 143-214.2; 143-215.3;
Eff. February 1, 1976;
Amended Eff. September 1, 2009; April 1, 2001; December 1, 1992; July 1, 1988; March 1, 1985;
September 1, 1984.

15A NCAC 02C .0103 REGISTRATION

History Note: Authority G.S. 87-87; 143-215.3(a)(1a); 143-355(e);
Eff. February 1, 1976;
Amended Eff. April 1, 2001; December 1, 1992; July 1, 1988; April 20, 1978;
Repealed Eff. September 1, 2009.

15A NCAC 02C .0104 PUMP INSTALLATION REGISTRATION

History Note: Authority G.S. 87-87;
Eff. February 1, 1976;
Repealed Eff. July 1, 1988.

15A NCAC 02C .0105 PERMITS

(a) It is the finding of the Commission that the entire geographical area of the state is vulnerable to groundwater pollution from improperly located, constructed, operated, altered, or abandoned wells. Therefore, in order to ensure reasonable protection of the groundwater resources, prior permission from the Department shall be obtained for the construction of the types of wells enumerated in Paragraph (b) of this Rule.

(b) No person shall locate or construct any of the following wells until a permit has been issued by the Department:

- (1) any water-well or well system with a designed capacity of 100,000 gallons per day (gpd) or greater;
- (2) any well added to an existing system where the total designed capacity of such existing well system and added well will equal or exceed 100,000 gpd;
- (3) any monitoring well or monitoring well system, constructed to assess hydrogeologic conditions on property not owned by the well owner;
- (4) any recovery well;
- (5) any well with a design deviation from the standards specified under the rules of this Subchapter, including wells for which a variance is required.

(c) The Department shall issue permits for wells used for recharge or injection purposes in accordance with 15A NCAC 02C .0200.

(d) The Department shall issue permits for private drinking water wells in accordance with 15A NCAC 02C .0300, including private drinking water wells with a designed capacity greater than 100,000 gallons per day and private drinking water wells for which a variance is required.

(e) An application for any well requiring a permit pursuant to Paragraph (b) of this Rule shall be submitted by the owner or his agent. In the event that the permit applicant is not the owner of the property on which the well or well system is to be constructed, the permit application shall contain written approval from the property owner and a statement that the applicant assumes total responsibility for ensuring that the well(s) will be located, constructed, maintained and abandoned in accordance with the requirements of this Subchapter.

(f) The application shall be submitted to the Department on forms furnished by the Department, and shall include the following:

- (1) the owner's name;
- (2) the owner's mailing address and proposed well site address;
- (3) description of the well type and activity requiring a permit;
- (4) site location (map);
- (5) a map of the site, to scale, showing the locations of:
 - (A) all property boundaries, at least one of which is referenced to a minimum of two landmarks such as identified roads, intersections, streams or lakes within 500 feet of proposed well or well system;
 - (B) all existing wells, identified by type of use, within 500 feet of proposed well or well system;
 - (C) the proposed well or well system;
 - (D) any test borings within 500 feet of proposed well or well system; and

- (E) all sources of known or potential groundwater contamination (such as septic tank systems; pesticide, chemical or fuel storage areas; animal feedlots, as defined by G.S. 143-215.10B(5); landfills or other waste disposal areas) within 500 feet of the proposed well.
 - (6) the well contractor's name and state certification number, if known; and
 - (7) construction diagram of the proposed well(s) including specifications describing all materials to be used, methods of construction and means for assuring the integrity and quality of the finished well(s).
- (g) For water supply wells or well systems with a designed capacity of 100,000 gpd or greater the application shall include, in addition to the information required in Paragraph (f) of this Rule:
- (1) the number, yield and location of existing wells in the system;
 - (2) the designed capacity of the proposed well(s);
 - (3) for wells to be screened in multiple zones or aquifers, representative data on the static water level and pH, specific conductance, and concentrations of sodium, potassium, calcium, magnesium, sulfate, chloride, and carbonates from each aquifer or zone from which water is proposed to be withdrawn. The data submitted shall be sufficient to demonstrate that construction of the proposed well will satisfy the requirements of 15A NCAC 02C .0107(h)(2);
 - (4) a copy of any water use permit required pursuant to G.S. 143-215.15; and
 - (5) any other well construction information or site specific information deemed necessary by the Department for the protection of human health and the environment.
- (h) For those monitoring wells with a design deviation from the specifications of 15A NCAC 02C .0108 of this Section, in addition to the information required in Paragraph (f) of this Rule, the application shall include:
- (1) a description of the subsurface conditions sufficient to evaluate the site. Data from test borings, wells, and pumping tests may be necessary;
 - (2) a description of the quantity, character and origin of the contamination;
 - (3) justification for the necessity of the design deviation; and
 - (4) any other well construction information or site specific information deemed necessary by the Department for the protection of human health and the environment.
- (i) For those recovery wells with a design deviation from the specifications in 15A NCAC 02C .0108 of this Section, in addition to the information required in Paragraphs (f) and (h) of this Rule, the application shall describe the disposition of any fluids recovered if the disposal of those fluids will have an impact on any existing wells other than those installed for the express purpose of measuring the effectiveness of the recovery well(s).
- (j) In the event of an emergency, any well listed in Subparagraph (b)(1) through (b)(4) of this Rule may be constructed after verbal approval is provided by the Department. After-the-fact applications shall be submitted by the person responsible for drilling or owner within ten days after construction begins. The application shall include construction details of the well(s) and include the name of the person who gave verbal approval and the time and date that approval was given.
- (k) The well owner or his agent shall see that a permit is secured prior to the beginning of construction of any well for which a permit is required under the rules of this Subchapter.

History Note: Authority G.S. 87-87; 143-215.1;
 Eff. February 1, 1976;
 Amended Eff. September 1, 2009; April 1, 2001; December 1, 1992; March 1, 1985; September 1, 1984;
 April 20, 1978.

15A NCAC 02C .0106 WATER USE PERMIT

History Note: Authority G.S. 143-215.14; 143-215.15;
 Eff. February 1, 1976;
 Repealed Eff. April 20, 1978.

15A NCAC 02C .0107 STANDARDS OF CONSTRUCTION: WATER SUPPLY WELLS

- (a) Location.
- (1) A water supply well shall not be located in any area where surface water or runoff will accumulate around the well due to depressions, drainage ways, and other landscapes that will concentrate water around the well.
 - (2) The minimum horizontal separation between a water supply well and potential sources of groundwater contamination, which exist at the time the well is constructed, is as follows unless otherwise specified:

- | | | |
|-----|--|----------|
| (A) | Septic tank and drainfield, including drainfield repair area | 100 feet |
| (B) | Other subsurface ground absorption waste disposal system | 100 feet |
| (C) | Industrial or municipal residuals disposal or wastewater-irrigation sites | 100 feet |
| (D) | Sewage or liquid-waste collection or transfer facility constructed to water main standards in accordance with 15A NCAC 02T .0305(g)(2) or 15A NCAC 18A .1950(e), as applicable | 50 feet |
| (E) | Other sewage and liquid-waste collection or transfer facility | 100 feet |
| (F) | Cesspools and privies | 100 feet |
| (G) | Animal feedlots, as defined by G.S. 143-215.10B(5), or manure piles | 100 feet |
| (H) | Fertilizer, pesticide, herbicide or other chemical storage areas | 100 feet |
| (I) | Non-hazardous waste storage, treatment or disposal lagoons | 100 feet |
| (J) | Sanitary landfills, municipal solid waste landfill facilities, incinerators, construction and demolition (C&D) landfills and other disposal sites except Land Clearing and Inert Debris landfills | 500 feet |
| (K) | Land Clearing and Inert Debris (LCID) landfills | 100 feet |
| (L) | Animal barns | 100 feet |
| (M) | Building perimeters, including any attached structures | 25 feet |
| (N) | Surface water bodies which act as sources of groundwater recharge, such as ponds, lakes and reservoirs | 50 feet |
| (O) | All other surface water bodies, such as brooks, creeks, streams, rivers, sounds, bays and tidal estuaries | 25 feet |
| (P) | Chemical or petroleum fuel underground storage tank systems regulated under 15A NCAC 02N: | |
| | (i) with secondary containment | 50 feet |
| | (ii) without secondary containment | 100 feet |
| (Q) | Above ground or underground storage tanks which contain petroleum fuels used for heating equipment, boilers or furnaces, with the exception of tanks used solely for storage of propane, natural gas, or liquefied petroleum gas | 50 feet |
| (R) | All other petroleum or chemical storage tank systems | 100 feet |
| (S) | Gravesites | 50 feet |
| (T) | All other potential sources of groundwater contamination | 50 feet |
- (3) For a water supply well [as defined in G.S. 87-85(13)] on a lot serving a single-family dwelling and intended for domestic use, where lot size or other fixed conditions preclude the separation distances specified in Subparagraph (a)(2) of this Rule, the required horizontal separation distances shall be the maximum possible but shall in no case be less than the following:
- | | | |
|-----|--|---------|
| (A) | Septic tank and drainfield, including drainfield repair areas, except sapolite systems as defined in 15A NCAC 18A .1956(6) | 50 feet |
| (B) | Sewage or liquid-waste collection or transfer facility constructed to water main standards in accordance with 15A NCAC 02T .0305(g)(2) or 15A NCAC 18A .1950(e), as applicable | 25 feet |
| (C) | Animal barns | 50 feet |
- Minimum separation distances for all other potential sources of groundwater contamination shall be those specified in Subparagraph (a)(2) of this Rule.
- (4) In addition to the minimum separation distances specified in Subparagraph (a)(2) of this Rule, a well or well system with a designed capacity of 100,000 gpd or greater shall be located a sufficient distance from known or anticipated sources of groundwater contamination so as to prevent a violation of applicable groundwater quality standards, resulting from the movement of contaminants, in response to the operation of the well or well system at the proposed rate and schedule of pumping.
- (5) Wells drilled for public water supply systems regulated by the Division of Environmental Health shall meet the requirements of 15A NCAC 18C.

(b) Source of water.

- (1) The source of water for any water supply well shall not be from a water bearing zone or aquifer that is contaminated;
- (2) In designated areas described in 15A NCAC 02C .0117 of this Section, the source shall be greater than 35 feet below land surface;

- (3) In designated areas described in 15A NCAC 02C .0116 of this Section, the source may be less than 20 feet below land surface, but in no case less than 10 feet below land surface;
 - (4) For wells constructed with separation distances less than those specified in Subparagraph (a)(2) of this Rule based on lot size or other fixed conditions as specified in Subparagraph (a)(3) of this Rule, the source shall be greater than 35 feet below land surface except in areas described in Rule .0116 of this Section; and
 - (5) In all other areas the source shall be at least 20 feet below land surface.
- (c) Drilling Fluids and Additives. Drilling Fluids and Additives shall not contain organic or toxic substances or include water obtained from surface water bodies or water from a non-potable supply and may be comprised only of:
- (1) the formational material encountered during drilling; or
 - (2) materials manufactured specifically for the purpose of borehole conditioning or water well construction.
- (d) Casing.
- (1) If steel casing is used:
 - (A) The casing shall be new, seamless or electric-resistance welded galvanized or black steel pipe. Galvanizing shall be done in accordance with requirements of ASTM A53/A53M-07, which is hereby incorporated by reference, including subsequent amendments and editions, and can be obtained from ASTM International, 100 Barr Harbor Drive, PO Box C 700, West Conshohocken, PA, 19428-2959 at a cost of fifty-one dollars (\$51.00);
 - (B) The casing, threads and couplings shall meet or exceed the specifications of ASTM A53/A53M-07 or A589/589M-06, which is hereby incorporated by reference, including subsequent amendments and editions, and can be obtained from ASTM International, 100 Barr Harbor Drive, PO Box C 700, West Conshohocken, PA, 19428-2959 at a cost of \$ fifty-one dollars (\$51.00) and forty-three dollars (\$43.00), respectively;
 - (C) The wall thickness for a given diameter shall equal or exceed that specified in Table 1;

TABLE 1: MINIMUM WALL THICKNESS FOR STEEL CASING:

Nominal Diameter (inches)	Wall Thickness (inches)
For 3.5 inch or smaller pipe, schedule 40 is required	
4	0.142
5	0.156
5.5	0.164
6	0.185
8	0.250
10	0.279
12	0.330

-
- (D) Stainless steel casing, threads, and couplings shall conform in specifications to the general requirements in ASTM A530/A530M-04a, which is hereby incorporated by reference, including subsequent amendments and editions, and can be obtained from ASTM International, 100 Barr Harbor Drive, PO Box C 700, West Conshohocken, PA, 19428-2959 at a cost of thirty-seven dollars (\$37.00), and also shall conform to the specific requirements in the ASTM standard that best describes the chemical makeup of the stainless steel casing that is intended for use in the construction of the well;
 - (E) Stainless steel casing shall have a minimum wall thickness that is equivalent to standard schedule number 10S; and
 - (F) Steel casing shall be equipped with a drive shoe if the casing is driven in a consolidated rock formation. The drive shoe shall be made of forged, high carbon, tempered seamless steel and shall have a beveled, hardened cutting edge.
- (2) If Thermoplastic Casing is used:
- (A) The casing shall be new;
 - (B) The casing and joints shall meet or exceed all the specifications of ASTM F480-06b, except that the outside diameters shall not be restricted to those listed in ASTM F480-06b, which is hereby incorporated by reference, including subsequent amendments and editions, and can be obtained from ASTM International, 100 Barr Harbor Drive, PO Box C 700, West Conshohocken, PA, 19428-2959 at a cost of fifty-one dollars (\$51.00);
 - (C) The depth of installation for a given SDR or Schedule number shall not exceed that listed in Table 2 unless, upon request of the Department, written documentation from the manufacturer of the casing stating that the casing may safely be used at the depth at which it is to be installed is provided.

TABLE 2: Maximum allowable depths (in feet) of Installation of Thermoplastic Water Well Casing

Nominal Diameter (inches)	Maximum Depth (in feet) for Schedule 40	Maximum Depth (in feet) for Schedule 80
2	485	1460
3	415	1170
3.5	315	920
4	253	755
5	180	550
6	130	495
8	85	340
10	65	290
12	65	270
14	50	265
16	50	255

	Maximum Depth (in feet) for SDR 21	Maximum Depth (in feet) for SDR 17	Maximum Depth (in feet) for SDR 13.5
All Diameters	185	355	735

- (D) Thermoplastic casing with wall thickness less than that corresponding to SDR 21 or Schedule 40 shall not be used;
 - (E) For wells in which the casing will extend into consolidated rock, thermoplastic casing shall be equipped with a coupling, or other device approved by the manufacturer of the casing, that is sufficient to protect the physical integrity of the thermoplastic casing during the processes of seating and grouting the casing and subsequent drilling operations; and
 - (F) Thermoplastic casing shall not be driven by impact, but may be pushed.
- (3) In constructing any well, all water-bearing zones that contain contaminated, saline, or other non-potable water shall be cased and grouted so that contamination of overlying and underlying groundwater zones shall not occur.
- (4) Every well shall be cased so that the bottom of the casing extends to a minimum depth as follows:
- (A) Wells located within the area described in Rule .0117 of this Section shall be cased from land surface to a depth of at least 35 feet.
 - (B) Wells located within the area described in Rule .0116 of this Section shall be cased from land surface to a depth of at least 10 feet.
 - (C) Wells constructed with separation distances less than those specified in Subparagraph (a)(2) of this Rule based on lot size or other fixed conditions as specified in Subparagraph (a)(3) of this Rule shall be cased from land surface to a depth of at least 35 feet except in areas described in Rule .0116 of this Section.
 - (D) Wells located in any other area shall be cased from land surface to a depth of at least 20 feet.
- (5) The top of the casing shall be terminated at least 12 inches above land surface, regardless of the method of well construction and type of pump to be installed.
- (6) The casing in wells constructed to obtain water from a consolidated rock formation shall meet the requirements specified in Subparagraphs (d)(1) through (d)(5) of this Rule and shall be:
- (A) adequate to prevent any formational material from entering the well in excess of the levels specified in Paragraph (h) of this Rule; and
 - (B) firmly seated at least five feet into the rock.
- (7) The casing in wells constructed to obtain water from an unconsolidated rock formation (such as gravel, sand or shells) shall extend at least one foot into the top of the water-bearing formation.
- (8) Upon completion of the well, the well shall be sufficiently free of obstacles including formation material as necessary to allow for the installation and proper operation of pumps and associated equipment.
- (9) Prior to removing equipment from the site, the top of the casing shall be sealed with a water-tight cap or well seal, as defined in G.S. 87-85(16), to preclude the entrance of contaminants into the well.
- (e) Allowable Grouts.
- (1) One of the following grouts shall be used wherever grout is required by a rule of this Section. Where a particular type of grout is specified by a Rule of this Section, no other type of grout shall be used.
 - (A) Neat cement grout shall consist of a mixture of not more than six gallons of clear, potable water to one 94 pound bag of Portland cement. Up to five percent, by weight, of bentonite may be used to improve flow and reduce shrinkage. If bentonite is used, additional water may be added at a rate not to exceed 0.6 gallons of water for each pound of bentonite.
 - (B) Sand cement grout shall consist of a mixture of not more than two parts sand and one part cement and not more than six gallons of clear, potable water per 94 pound bag of Portland cement.
 - (C) Concrete grout shall consist of a mixture of not more than two parts gravel or rock cuttings to one part cement and not more than six gallons of clear, potable water per 94 pound bag of Portland cement. One hundred percent of the gravel or rock cuttings must be able to pass through a one-half inch mesh screen.

- (D) Bentonite slurry grout shall consist of a mixture of not more than 24 gallons of clear, potable water to one 50 pound bag of commercial sodium bentonite. Non-organic, non-toxic substances may be added to bentonite slurry grout mixtures to improve particle distribution and pumpability. Bentonite slurry grout may only be used in accordance with the manufacturer's written instructions.
 - (E) Bentonite chips or pellets shall consist of pre-screened sodium bentonite chips or compressed sodium bentonite pellets with largest dimension of at least one-fourth inch but not greater than one-fifth of the width of the annular space into which they are to be placed. Bentonite chips or pellets shall be hydrated in place. Bentonite chips or pellets may only be used in accordance with the manufacturer's written instructions.
 - (F) Specialty grout shall consist of a mixture of non-organic, non-toxic materials with characteristics of expansion, chemical-resistance, rate or heat of hydration, viscosity, density or temperature-sensitivity applicable to specific grouting requirements. Specialty grouts may not be used without prior approval by the Secretary. Approval of the use of specialty grouts shall be based on a demonstration that the finished grout has a permeability less than 10^{-6} centimeters per second and will not adversely impact human health or the environment.
- (2) With the exception of bentonite chips or pellets, the liquid and solid components of all grout mixtures shall be blended prior to emplacement below land surface.
 - (3) No fly ash, other coal combustion byproducts, or other wastes may be used in any grout.
- (f) Grout emplacement.
- (1) Casing shall be grouted to a minimum depth of twenty feet below land surface except that:
 - (A) In those areas designated by the Director to meet the criteria of Rule .0116 of this Section, grout shall extend to a depth of two feet above the screen or, for open end wells, to the bottom of the casing, but in no case less than 10 feet.
 - (B) In those areas designated in Rule .0117 of this Section, grout shall extend to a minimum of 35 feet below land surface.
 - (2) In addition to the grouting required by Subparagraph (f)(1) of this Rule, the casing shall be grouted as necessary to seal off all aquifers or zones that contain contaminated, saline, or other non-potable water so that contamination of overlying and underlying aquifers or zones shall not occur.
 - (3) Bentonite slurry grout may be used in that portion of the borehole that is at least three feet below land surface. That portion of the borehole from land surface to at least three feet below land surface shall be filled with a concrete or cement-type grout or bentonite chips or pellets that are hydrated in place.
 - (4) Grout shall be placed around the casing by one of the following methods:
 - (A) Pressure. Grout shall be pumped or forced under pressure through the bottom of the casing until it fills the annular space around the casing and overflows at the surface;
 - (B) Pumping. Grout shall be pumped into place through a hose or pipe extended to the bottom of the annular space which can be raised as the grout is applied. The grout hose or pipe shall remain submerged in grout during the entire application; or
 - (C) Other. Grout may be emplaced in the annular space by gravity flow in such a way to ensure complete filling of the space. Gravity flow shall not be used if water or any visible obstruction is present in the annular space within the applicable minimum grout depth specified in Subparagraph (f)(1) of this Rule at the time of grouting, with the exception that bentonite chips or pellets may be used if water is present, if designed for that purpose.
 - (5) If a Rule of this Section requires grouting of the casing to a depth greater than 20 feet below land surface, the pumping or pressure method shall be used to grout that portion of the borehole deeper than 20 feet below land surface, with the exception of bentonite chips and pellets, used in accordance with Part (f)(4)(C) of this Rule.
 - (6) If an outer casing is installed, it shall be grouted by either the pumping or pressure method.
 - (7) Bentonite chips or pellets shall be used in compliance with all manufacturer's instructions including pre-screening the material to eliminate fine-grained particles, installation rates, hydration methods, tamping, and other measures to prevent bridging.
 - (8) Bentonite grout shall not be used to seal zones of water with a chloride concentration of 1,500 milligrams per liter or greater.
 - (9) The well shall be grouted within seven days after the casing is set.

- (10) No additives which will accelerate the process of hydration shall be used in grout for thermoplastic well casing.
- (11) Where grouting is required by the provisions of this Section, the grout shall extend outward in all directions from the casing wall to a minimum thickness equal to either one-third of the diameter of the outside dimension of the casing or two inches, whichever is greater; but in no case shall a well be required to have an annular grout seal thickness greater than four inches.
- (12) For wells constructed in locations where flowing artesian conditions are encountered or expected to occur, the well shall be adequately grouted to protect the artesian aquifer, prevent erosion of overlying material and confine the flow within the casing.

(g) Well Screens.

- (1) The well, if constructed to obtain water from an unconsolidated rock formation, shall be equipped with a screen that will prevent the entrance of formation material into the well after the well has been developed and completed.
- (2) The well screen shall be of a design to permit the optimum development of the aquifer with minimum head loss consistent with the intended use of the well. The openings shall be designed to prevent clogging and shall be free of rough edges, irregularities or other defects that may accelerate or contribute to corrosion or clogging.
- (3) Multi-screen wells shall not connect aquifers or zones which have differences in water quality which would result in contamination of any aquifer or zone.

(h) Gravel and Sand-Packed Wells.

- (1) In constructing a gravel- or sand-packed well:
 - (A) The packing material shall be composed of quartz, granite, or similar mineral or rock material and shall be clean, of uniform size, water-washed and free from clay, silt, or other deleterious material.
 - (B) The size of the packing material shall be determined from a grain size analysis of the formation material and shall be of a size sufficient to prohibit the entrance of formation material into the well in concentrations above those permitted by Paragraph (i) of this Rule.
 - (C) The packing material shall be placed in the annular space around the screens and casing by a fluid circulation method to ensure accurate placement and avoid bridging.
 - (D) The packing material shall be disinfected.
- (2) The packing material shall not connect aquifers or zones which have differences in water quality that would result in contamination of any aquifer or zone.

(i) All water supply wells shall be developed by the well contractor. Development shall include removal of formation materials, mud, drilling fluids and additives such that the water contains no more than:

- (1) five milliliters per liter of settleable solids; and
- (2) 10 NTUs of turbidity as suspended solids.

Development does not require efforts to reduce or eliminate the presence of dissolved constituents which are indigenous to the ground water quality in that area.

(j) Well Head Completion.

- (1) Access Port. Every water supply well shall be equipped with a usable access port or air line, except those with a multi-pipe deep well jet pump or adapter mounted on the well casing or well head, and wells with casing two inches or less in diameter where a suction pipe is connected to a suction lift pump. The access port shall be at least one half inch inside diameter opening so that the position of the water level can be determined at any time. The port shall be installed and maintained in such manner as to prevent entrance of water or foreign material.
- (2) Well Contractor Identification Plate.
 - (A) An identification plate, showing the well contractor and certification number and the information specified in Part (j)(2)(E) of this Rule, shall be installed on the well within 72 hours after completion of the drilling.
 - (B) The identification plate shall be constructed of a durable weatherproof, rustproof metal, or other material approved by the Department as equivalent.
 - (C) The identification plate shall be permanently attached to either the aboveground portion of the well casing, surface grout pad or enclosure floor around the casing where it is readily visible and in a manner that does not obscure the information on the identification plate.
 - (D) The identification plate shall not be removed by any person.

- (E) The identification plate shall be stamped to show the:
 - (i) total depth of well;
 - (ii) casing depth (feet) and inside diameter (inches);
 - (iii) screened intervals of screened wells;
 - (iv) packing interval of gravel-or sand-packed wells;
 - (v) yield, in gallons per minute (gpm), or specific capacity in gallons per minute per foot of drawdown (gpm/ft.-dd);
 - (vi) static water level and date measured;
 - (vii) date well completed; and
 - (viii) the well construction permit number or numbers, if such a permit is required.
- (3) Pump Installation Information Plate.
 - (A) An information plate, showing the well contractor and certification number of the person installing the pump, and the information specified in Part (j)(3)(D) of this Rule, shall be permanently attached to either the aboveground portion of the well casing, surface grout pad or the enclosure floor, if present, where it is readily visible and in a manner that does not obscure the information on the identification plate within 72 hours after completion of the pump installation;
 - (B) The information plate shall be constructed of a durable waterproof, rustproof metal, or other material approved by the Department as equivalent;
 - (C) The information plate shall not be removed by any person; and
 - (D) The information plate shall be stamped or engraved to show the:
 - (i) date the pump was installed;
 - (ii) the depth of the pump intake; and
 - (iii) the horsepower rating of the pump.
- (4) Controlled flow. Every artesian flowing well shall be constructed, equipped and operated to prevent the unnecessary discharge of water. Flow shall be completely stopped unless the discharge is for beneficial use and only for the duration of that beneficial use. Flow discharge control shall be provided to conserve the groundwater resource and prevent or reduce the loss of artesian hydraulic head. Flow control may consist of valved pipe connections, watertight pump connections, receiving tank, flowing well pitless adapter, packer or other methods approved by the Department to prevent the loss of artesian hydraulic head and stop the flow of water as referenced in G.S. 87-88(d). Well owners are responsible for the operation and maintenance of the valve.
- (5) Pitless adapters or pitless units are allowed as a method of well head completion under the following conditions:
 - (A) Design, installation and performance standards are those specified in PAS-97(04), which is hereby incorporated by reference, including subsequent amendments and editions, and can be obtained from the Water System Council National Programs Office, 1101 30th Street, N.W., Suite 500, Washington, DC 20007 at no cost;
 - (B) The pitless device is compatible with the well casing;
 - (C) The top of the pitless unit extends at least 12 inches above land surface;
 - (D) The excavation surrounding the casing and pitless device is filled with grout from the top of the casing grout to the land surface; and
 - (E) The pitless device has an access port.
- (6) All openings for piping, wiring, and vents shall enter into the well at least 12 inches above land surface, except where pitless adapters or pitless units are used, and shall be adequately sealed to preclude the entrance of contaminants into the well.

*History Note: Authority G.S. 87-87; 87-88;
 Eff. February 1, 1976;
 Amended Eff. May 14, 2001; December 1, 1992; March 1, 1985; September 1, 1984; April 20, 1978;
 Temporary Amendment Eff. August 3, 2001;
 Amended Eff. September 1, 2009; August 1, 2002.*

15A NCAC 02C .0108 STANDARDS OF CONSTRUCTION: WELLS OTHER THAN WATER SUPPLY

(a) No well shall be located, constructed, operated, or repaired in any manner that may adversely impact the quality of groundwater.

- (b) Injection wells shall conform to the standards set forth in Section .0200 of this Subchapter.
- (c) Monitoring wells and recovery wells shall be located, designed, constructed, operated and abandoned with materials and by methods which are compatible with the chemical and physical properties of the contaminants involved, specific site conditions and specific subsurface conditions.
- (d) Monitoring well and recovery well boreholes shall not penetrate to a depth greater than the depth to be monitored or the depth from which contaminants are to be recovered. Any portion of the borehole that extends to a depth greater than the depth to be monitored or the depth from which contaminants are to be recovered shall be grouted completely to prevent vertical migration of contaminants.
- (e) The well shall not hydraulically connect:
- (1) separate aquifers; or
 - (2) those portions of a single aquifer where contamination occurs in separate and definable layers within the aquifer.
- (f) The well construction materials shall be compatible with the depth of the well and any contaminants to be monitored or recovered.
- (g) The well shall be constructed in such a manner that water or contaminants from the land surface cannot migrate along the borehole annulus into any packing material or well screen area.
- (h) In non-water supply wells, packing material placed around the screen shall extend at least one foot above the top of the screen. Unless the depth of the screen necessitates a thinner seal, a one foot thick seal, comprised of chip or pellet bentonite or other material approved by the Department as equivalent, shall be emplaced directly above and in contact with the packing material.
- (i) In non-water supply wells, grout shall be placed in the annular space between the outermost casing and the borehole wall from the land surface to the top of the bentonite seal above any well screen or to the bottom of the casing for open end wells. The grout shall comply with Paragraph (e) of Rule .0107 of this Section except that the upper three feet of grout shall be concrete or cement grout.
- (j) All wells shall be grouted within seven days after the casing is set. If the well penetrates any water-bearing zone that contains contaminated or saline water, the well shall be grouted within one day after the casing is set.
- (k) All non-water supply wells, including temporary wells, shall be secured with a locking well cap to ensure against unauthorized access and use.
- (l) All non-water supply wells shall be equipped with a steel outer well casing or flush-mount cover, set in concrete, and other measures sufficient to protect the well from damage by normal site activities.
- (m) Any well that would flow under natural artesian conditions shall be valved so that the flow can be regulated.
- (n) In non-water supply wells, the well casing shall be terminated no less than 12 inches above land surface unless all of the following conditions are met:
- (1) site-specific conditions directly related to business activities, such as vehicle traffic, would endanger the physical integrity of the well; and
 - (2) the well head is completed in such a manner so as to preclude surficial contaminants from entering the well.
- (o) Each non-water supply well shall have permanently affixed an identification plate. The identification plate shall be constructed of a durable, waterproof, rustproof metal or other material approved by the Department as equivalent and shall contain the following information:
- (1) well contractor name and certification number;
 - (2) date well completed;
 - (3) total depth of well;
 - (4) a warning that the well is not for water supply and that the groundwater may contain hazardous materials;
 - (5) depth(s) to the top(s) and bottom(s) of the screen(s); and
 - (6) the well identification number or name assigned by the well owner.
- (p) Each non-water supply well shall be developed such that the level of turbidity or settleable solids does not preclude accurate chemical analyses of any fluid samples collected or adversely affect the operation of any pumps or pumping equipment.
- (q) Wells constructed for the purpose of monitoring or testing for the presence of liquids associated with tanks regulated under 15A NCAC 02N (Criteria and Standards Applicable to Underground Storage Tanks) shall be constructed in accordance with 15A NCAC 02N .0504.
- (r) Wells constructed for the purpose of monitoring for the presence of vapors associated with tanks regulated under 15A NCAC 02N shall:
- (1) be constructed in such a manner as to prevent the entrance of surficial contaminants or water into or alongside the well casing; and

- (2) be provided with a lockable cap in order to reasonably ensure against unauthorized access and use.
- (s) Temporary wells and all other non-water supply wells shall be constructed in such a manner as to preclude the vertical migration of contaminants within and along the borehole channel.

*History Note: Authority G.S. 87-87; 87-88;
Eff. February 1, 1976;
Amended Eff. September 1, 2009, April 1, 2001; December 1, 1992; September 1, 1984; April 20, 1978.*

15A NCAC 02C .0109 PUMPS AND PUMPING EQUIPMENT

- (a) The pumping capacity of the pump shall be consistent with the intended use and yield characteristics of the well.
- (b) The pump and related equipment for the well shall be located to permit easy access and removal for repair and maintenance.
- (c) The base plate of a pump placed directly over the well shall be designed to form a watertight seal with the well casing or pump foundation.
- (d) In installations where the pump is not located directly over the well, the annular space between the casing and pump intake or discharge piping shall be closed with a watertight seal. .
- (e) The well head shall be equipped with a screened vent to allow for the pressure changes within the well except if a suction lift pump or single-pipe jet pump is used or artesian, flowing well conditions are encountered.
- (f) The person installing the pump in any water supply well shall install a threadless sampling tap at the wellhead for obtaining water samples except:
- (1) In the case of suction pump or offset jet pump installations the threadless sampling tap shall be installed on the return (pressure) side of the pump piping, and
 - (2) In the case of pitless adapter installations, the threadless sampling tap shall be located immediately upstream of the water storage tank.
 - (3) If the wellhead is also equipped with a threaded hose bibb in addition to the threadless sampling tap, the hose bibb shall be fitted with a backflow preventer or vacuum breaker.

The threadless sampling tap shall be turned downward, located a minimum of 12 inches above land surface, floor, or well pad, and positioned such that a water sample can be obtained without interference from any part of the wellhead.

- (g) A priming tee shall be installed at the well head in conjunction with offset jet pump installations.
- (h) Joints of any suction line installed underground between the well and pump shall be tight under system pressure.
- (i) The drop piping and electrical wiring used in connection with the pump shall meet all applicable underwriters specifications.
- (j) Only potable water shall be used for priming the pump.

*History Note: Authority G.S. 87-87; 87-88;
Eff. February 1, 1976;
Amended Eff. September 1, 2009, December 1, 1992; April 20, 1978.*

15A NCAC 02C .0110 WELL TESTS FOR YIELD

- (a) Every domestic well shall be tested for capacity by one of the following methods:
- (1) Pump Method
 - (A) select a permanent measuring point, such as the top of the casing;
 - (B) measure and record the static water level below or above the measuring point prior to starting the pump;
 - (C) measure and record the discharge rate at intervals of 10 minutes or less;
 - (D) measure and record water levels using a steel or electric tape at intervals of 10 minutes or less;
 - (E) continue the test for a period of at least one hour; and
 - (F) make measurements within an accuracy of plus or minus one inch.
 - (2) Bailer Method
 - (A) select a permanent measuring point, such as the top of the casing;
 - (B) measure and record the static water level below or above the measuring point prior to starting the bailing procedure;
 - (C) bail the water out of the well as rapidly as possible for a period of at least one hour; determine and record the bailing rate in gallons per minute at the end of the bailing period; and
 - (D) measure and record the water level immediately after stopping bailing process.

- (3) Air Rotary Drill Method
 - (A) measure and record the amount of water being injected into the well during drilling operations;
 - (B) measure and record the discharge rate in gallons per minute at intervals of one hour or less during drilling operations;
 - (C) after completion of the drilling, continue to blow the water out of the well for at least 30 minutes and measure and record the discharge rate in gallons per minute at intervals of 10 minutes or less during the period; and
 - (D) measure and record the water level immediately after discharge ceases.
 - (4) Air Lift Method. Measurements shall be made through a pipe placed in the well. The pipe shall have a minimum inside diameter of at least five-tenths of an inch and shall extend from top of the well head to a point inside the well that is below the bottom of the air line.
 - (A) Measure and record the static water level prior to starting the air compressor;
 - (B) Measure and record the discharge rate at intervals of 10 minutes or less;
 - (C) Measure and record the pumping level using a steel or electric tape at intervals of 10 minutes or less; and
 - (D) Continue the test for a period of at least one hour.
- (b) Public, Industrial and Irrigation Wells. Every industrial or irrigation well and, if required by rule adopted by the Commission for Public Health, every well serving a public water supply system upon completion, shall be tested for capacity by the following or equivalent method:
- (1) The water level in the well to be pumped and any observation wells shall be measured and recorded prior to starting the test.
 - (2) The well shall be tested by a pump of sufficient size and lift capacity to test the yield of the well, consistent with the well diameter and purpose.
 - (3) The pump shall be equipped with sufficient throttling devices to reduce the discharge rate to approximately 25 percent of the maximum capacity of the pump.
 - (4) The test shall be conducted for a period of at least 24 hours without interruption and, except for wells constructed in Coastal Plain aquifers, shall be continued for a period of at least four hours after the pumping water level stabilizes (ceases to decline). If the total water requirements for wells not serving a public water supply system are less than 100,000 gpd, the well shall be tested for a period and in a manner to show the capacity of the well, or that the capacity of the well is sufficient to meet the intended purpose.
 - (5) The pump discharge shall be set at a constant rate or rates that can be maintained throughout the testing period. If the well is tested at two or more pumping rates (a step-drawdown test), pumping at each pumping rate shall continue to the point that the pumping water level declines no more than 0.1 feet per hour for a period of at least four hours for each pumping rate, except for wells constructed to Coastal Plain aquifers. In wells constructed in Coastal Plain aquifers, pumping at each pumping rate shall continue for at least four hours.
 - (6) The pump discharge rate shall be measured by an orifice meter, flowmeter, weir, or equivalent metering device. The metering device shall have an accuracy within plus or minus five percent.
 - (7) The discharge rate of the pump and time shall be measured and recorded at intervals of 10 minutes or less during the first two hours of the pumping period for each pumping rate. If the pumping rate is relatively constant after the first two hours of pumping, discharge measurements and recording may be made at longer time intervals but not to exceed one hour.
 - (8) The water level in each well and time shall be measured and recorded at intervals of five minutes or less during the first hour of pumping and at intervals of 10 minutes or less during the second hour of pumping. After the second hour of pumping, the water level in each well shall be measured at such intervals that the lowering of the pumping water level does not exceed three inches between measurements.
 - (9) A reference point for water level measurements (preferably the top of the casing) shall be selected and recorded for the pumping well and each observation well to be measured during the test. All water level measurements shall be made from the selected reference points.
 - (10) All water level measurements shall be made with a steel or electric tape or equivalent measuring device.
 - (11) All water level measurements shall be made within an accuracy of plus or minus one inch.
 - (12) After the completion of the pumping period, measurements of the water level recovery rate in the pumped well shall be made for a period of at least two hours in the same manner as the drawdown.

History Note: Authority G.S. 87-87; 87-88;

Eff. February 1, 1976;
Amended Eff. September 1, 2009, April 1, 2001; December 1, 1992; September 1, 1984; April 20, 1978.

15A NCAC 02C .0111 DISINFECTION OF WATER SUPPLY WELLS

- (a) Any person constructing, repairing, testing, or performing maintenance, or installing a pump in a water supply well shall disinfect the well upon completion of construction, repairs, testing, maintenance, or pump installation.
- (b) Any person disinfecting a well shall perform disinfection in accordance with the following procedures:
 - (1) Chlorination.
 - (A) Hypochlorite shall be placed in the well in sufficient quantities to produce a chlorine residual of at least 100 parts per million (ppm) in the well. Stabilized chlorine tablets or hypochlorite products containing fungicides, algacides, or other disinfectants shall not be used. Chlorine test strips or other quantitative test methods shall be used to confirm the concentration of the chlorine residual. [Note: About three ounces of hypochlorite containing 65 percent to 75 percent available chlorine is needed per 100 gallons of water for at least a 100 ppm chlorine residual. As an example, a well having a diameter of six inches, has a volume of about 1.5 gallons per foot. If the well has 200 feet of water, the minimum amount of hypochlorite required would be 9 ounces. (1.5 gallons/foot x 200 feet = 300 gallons at 3 ounces per 100 gallons; 3 ounces x 3 = 9 ounces.)]
 - (B) The hypochlorite shall be placed in the well by one of the following or equivalent methods:
 - (i) Granular hypochlorite may be dropped in the top of the well and allowed to settle to the bottom; or
 - (ii) Hypochlorite solutions shall be placed in the bottom of the well by using a bailer or by pouring the solution through the drill rod, hose, or pipe placed in the bottom of the well. The solution shall be flushed out of the drill rod, hose, or pipe by using water or air.
 - (C) The water in the well shall be agitated or circulated to ensure thorough dispersion of the chlorine.
 - (D) The well casing, pump column and any other equipment above the water level in the well shall be rinsed with the chlorine solution as a part of the disinfecting process.
 - (E) The chlorine solution shall stand in the well for a period of at least 24 hours.
 - (F) The well shall be pumped until there is no detectable total chlorine residual in water pumped from the well before the well is placed in use.
 - (2) Other materials and methods of disinfection, at least as effective as those in Subparagraph (1) of this Paragraph, may be used upon prior approval by the Department.

History Note: Authority G.S. 87-87; 87-88;
Eff. February 1, 1976;
Amended Eff. September 1, 2009, April 1, 2001; December 1, 1992; July 1, 1988; September 1, 1984.

15A NCAC 02C .0112 WELL MAINTENANCE: REPAIR: GROUNDWATER RESOURCES

- (a) Every well shall be maintained by the owner in a condition whereby it will conserve and protect the groundwater resources, and whereby it will not be a source or channel of contamination or pollution to the water supply or any aquifer, or the well shall be permanently abandoned in accordance with the requirements of 15A NCAC 02C .0113(b).
- (b) Dewatering wells shall be permanently abandoned in accordance with the requirements of 15A NCAC 02C .0113(b) within 30 days of completion of the dewatering activity.
- (c) All materials used in the maintenance, replacement, or repair of any well shall meet the requirements for new installation.
- (d) Broken, punctured or otherwise defective or unserviceable casing, screens, fixtures, seals, or any part of the well head shall be repaired or replaced, or the well shall be permanently abandoned pursuant to the requirements of Rule .0113(b) of this Section.
- (e) NSF International (NSF) approved PVC pipe rated at 160 PSI may be used for liner pipe. The annular space around the liner casing shall be at least five-eighths inches and shall be completely filled with neat-cement grout or sand cement grout. The well liner shall be completely grouted within 10 working days after collection of water samples or completion of other testing to confirm proper placement of the liner or within 10 working days after the liner has been installed if no sampling or testing is performed.
- (f) No well shall be repaired or altered such that the outer casing is completed less than 12 inches above land surface. Any grout excavated or removed as a result of the well repair shall be replaced in accordance with Rule .0107(f) of this Section.
- (g) Well rehabilitation by noncontinuous chemical treatment shall be conducted using methods and materials approved by the Department based on a demonstration that the materials and methods used will not create a violation of groundwater standards

in 15A NCAC 02L or otherwise render the groundwater unsuitable for its intended best usage after completion of the rehabilitation.

*History Note: Authority G.S. 87-87; 87-88;
Eff. February 1, 1976;
Amended Eff. September 1, 2009, August 1, 2002; April 1, 2001; December 1, 1992; September 1, 1984.*

15A NCAC 02C .0113 ABANDONMENT OF WELLS

(a) Any well which is temporarily removed from service shall be temporarily abandoned in accordance with the following procedures:

- (1) The well shall be sealed with a water-tight cap or well seal, as defined in G.S. 87-85 (16), compatible with the casing and installed so that it cannot be removed without the use of hand tools or power tools.
- (2) The well shall be maintained whereby it is not a source or channel of contamination during temporary abandonment.

(b) Permanent abandonment of water supply wells other than bored or hand dug wells shall be performed in accordance with the following procedures:

- (1) All casing and screen materials may be removed prior to initiation of abandonment procedures if such removal will not cause or contribute to contamination of the groundwaters. Any casing not grouted in accordance with 15A NCAC 02C .0107(f) shall be removed or grouted in accordance with 15A NCAC 02C .0107(f).
- (2) The entire depth of the well shall be sounded before it is sealed to ensure freedom from obstructions that may interfere with sealing operations.
- (3) Except in the case of temporary wells and monitoring wells, the well shall be disinfected in accordance with Rule .0111(b)(1)(A) through .0111(b)(1)(C) of this Section.
- (4) In the case of gravel-packed wells in which the casing and screens have not been removed, neat-cement, or bentonite slurry grout shall be injected into the well completely filling it from the bottom of the casing to the top.
- (5) Wells constructed in unconsolidated formations shall be completely filled with grout by introducing it through a pipe extending to the bottom of the well which can be raised as the well is filled.
- (6) Wells constructed in consolidated rock formations or that penetrate zones of consolidated rock may be filled with grout, sand, gravel or drill cuttings opposite the zones of consolidated rock. The top of any sand, gravel or cutting fill shall terminate at least 10 feet below the top of the consolidated rock or five feet below the bottom of casing. Grout shall be placed beginning 10 feet below the top of the consolidated rock or five feet below the bottom of casing in a manner to ensure complete filling of the casing, and extend up to land surface. For any well in which the depth of casing or the depth of the bedrock is not known or cannot be confirmed, the entire length of the well shall be filled with grout up to land surface.

(c) For bored wells or hand dug water supply wells, constructed into unconsolidated material:

- (1) The well shall be disinfected in accordance with Rule .0111(b)(1)(A) through .0111(b)(1)(C) of this [Section].
- (2) All plumbing or piping in the well and any other obstructions inside the well shall be removed from the well.
- (3) The uppermost three feet of well casing shall be removed from the well.
- (4) All soil or other subsurface material present down to the top of the remaining well casing shall be removed, including the material extending to a width of at least 12 inches outside of the well casing;
- (5) The well shall be filled to the top of the remaining casing with grout, dry clay, or material excavated during construction of the well. If dry clay or material excavated during construction of the well is used, it shall be emplaced in lifts no more than five feet thick, each compacted in place prior to emplacement of the next lift.
- (6) A six-inch thick concrete grout plug shall be placed on top of the remaining casing such that it covers the entire excavated area above the top of the casing, including the area extending to a width of at least 12 inches outside the well casing.
- (7) The remainder of the well above the concrete plug shall be filled with grout or soil.

(d) All wells other than water supply wells, including temporary wells, monitoring wells or test borings:

- (1) less than 20 feet in depth and which do not penetrate the water table shall be abandoned by filling the entire well up to land surface with grout, dry clay, or material excavated during drilling of the well and then compacted in place; and
 - (2) greater than 20 feet in depth or that penetrate the water table shall be abandoned by completely filling with a bentonite or cement - type grout.
- (e) Any well which acts as a source or channel of contamination shall be repaired or permanently abandoned within 30 days of receipt of notice from the Department.
- (f) All wells shall be permanently abandoned in which the casing has not been installed or from which the casing has been removed, prior to removing drilling equipment from the site.
- (g) The owner is responsible for permanent abandonment of a well except that:
- (1) the well contractor is responsible for well abandonment if abandonment is required because the well contractor improperly locates, constructs, repairs or completes the well;
 - (2) the person who installs, repairs or removes the well pump is responsible for well abandonment if that abandonment is required because of improper well pump installation, repair or removal; or
 - (3) the well contractor (or individual) who conducts a test boring is responsible for its abandonment at the time the test boring is completed and has fulfilled its useful purpose.

*History Note: Authority G.S. 87-87; 87-88;
Eff. February 1, 1976;
Amended Eff. September 1, 2009, April 1, 2001; December 1, 1992; September 1, 1984; April 20, 1978.*

15A NCAC 02C .0114 DATA AND RECORDS REQUIRED

(a) Well Cuttings.

- (1) The well contractor shall collect and furnish samples of formation cuttings to the Division from a well the well contractor has drilled when such samples are requested by the Division prior to completion of the drilling or boring activities.
- (2) The well contractor shall obtain samples or representative cuttings for depth intervals not exceeding 10 feet. The well contractor shall also collect representative cuttings at depths of each change in formation.
- (3) The well contractor shall place samples of cuttings in containers furnished by the Division and such containers shall be filled, sealed and labeled with indelible-type markers, showing the well owner, well number if applicable, and depth interval the sample represents.
- (4) The well contractor shall place each set of samples in a container(s) showing the location, owner, well number if applicable, the well contractor's name, depth interval, and date.
- (5) The well contractor shall retain samples until delivery instructions are received from the Division or for a period of at least 60 days after the well record form (GW-1), indicating said samples are available, has been received by the Division.
- (6) If the well contractor furnishes samples to any person or agency other than the Division, this does not constitute compliance with the department's request and shall not relieve the well contractor of his or her obligation to the Division.

(b) Reports.

- (1) Any person completing or abandoning any well shall submit to the Division a record of the construction or abandonment. For water supply wells, a copy of each completion or abandonment record shall also be submitted to the health department responsible for the county in which the well is located. The record shall be on forms provided by the Division and shall include certification that construction or abandonment was completed as required by this Section, the owner's name and address, latitude and longitude of the well with a position accuracy of 100 feet or less, diameter, depth, yield, and any other information the Division may require as necessary to depict the location and construction details of the well.
- (2) The certified record of completion or abandonment shall be submitted within a period of thirty days after completion or abandonment.
- (3) The furnishing of records to any person or agency other than the Division does not constitute compliance with the reporting requirement and shall not relieve the well contractor of his or her obligation to the Division.

*History Note: Authority G.S. 87-87; 87-88;
Eff. February 1, 1976;*

Amended Eff. September 1, 2009; April 1, 2001; December 1, 1992; September 1, 1984; April 20, 1978.

15A NCAC 02C .0115 DIAGRAMS AND FORMS

*History Note: Authority G.S. 87-87;
Eff. February 1, 1976;
Amended Eff. April 20, 1978;
Repealed Eff. September 1, 1984.*

15A NCAC 02C .0116 DESIGNATED AREAS: WATER SUPPLY WELLS CASED TO LESS THAN 20 FEET

(a) In some areas the best or only source of potable water supply exists between ten and twenty feet below the surface of the land. In consideration of this, water supply wells may be cased to a depth less than twenty feet in the following areas:

- (1) in Currituck County in an area between the sound and a line beginning at the end of SR 1130 near Currituck Sound, thence north to the end of SR 1133, thence north to the end of NC 136 at the intersection with the sound;
- (2) on the Outer Banks from the northern corporate limit of Nags Head, south to Ocracoke Inlet;
- (3) all areas lying between the Intracoastal Waterway and the ocean from New River Inlet south to New Topsail Inlet; and
- (4) all areas lying between the Intracoastal Waterway and the ocean from the Cape Fear River south to the South Carolina line.

(b) The Director may designate additional areas of the state where water supply wells may be cased to a depth less than twenty feet. To designate such areas, the Director shall find:

- (1) that the only or best source of drinking water in the area exists between a depth of 10 and 20 feet below the surface of the land; and
- (2) at utilization of this source of water in the area is in the best interest of the public.

(c) In all other areas, the source of water shall be at least 20 feet below land surface, except when adequate quantities of potable water cannot be obtained below a depth of twenty feet, the source of water may be obtained from unconsolidated rock formations at depths less than twenty feet provided that:

- (1) sufficient water of acceptable quality for the intended use can be shown, to the satisfaction of the Department that it is not available to a minimum depth of fifty feet;
- (2) the proposed source of water is the maximum feasible depth above 20 feet, but in no case less than ten feet; and
- (3) the regional office of the Department is notified prior to the construction of a well obtaining water from a depth between 10 and 20 feet below land surface.

*History Note: Authority G.S. 87-87;
Eff. April 20, 1978;
Amended Eff. September 1, 2009; December 1, 1992; July 1, 1988; September 1, 1984.*

15A NCAC 02C .0117 DESIGNATED AREAS: WATER SUPPLY WELLS CASED TO MINIMUM DEPTH OF 35 FEET

Water supply wells constructed in the following areas or within 400 feet of the following areas shall be cased to a minimum depth of 35 feet:

- (1) Anson County generally west of a line beginning at the intersection of the runs of the Pee Dee River and Buffalo Creek, thence generally northeast to SR 1627, thence generally south along SR 1627 to the intersection with SR 1632, thence generally west along SR 1632 to the intersection with US 52, thence generally south along US 52 to the intersection with SR 1418, thence generally southwest along SR 1418 to the intersection of NC 218, thence south along NC 218 to the intersection with US 74, thence generally west along US 74 to the intersection of SR 1251, thence generally southwest along SR 1251 to the intersection with SR 1240, thence generally southeast along SR 1240 to the intersection with SR 1252, thence generally south along SR 1252 to the intersection with SR 1003, thence generally west along SR 1003 to the Union County line;
- (2) Cabarrus County generally east of a line beginning at the intersection of SR 1113 and the Union County line, thence generally northeast along SR 1113 to the intersection with SR 1114, thence generally east along SR 1114 to the Stanly County line, thence generally northeast along the county line to the intersection with

- SR 1100, thence generally northeast along SR 1100 to the intersection of with SR 2622, thence generally southeast along SR 2622 to the intersection with SR 2617, thence generally northeast along SR 2617 to the intersection with SR 2611, thence generally north along SR 2611 to the intersection with NC 73, thence generally east along NC 73 to the intersection with SR 2453, thence generally northeast along SR 2453 to the intersection with SR 2444, thence generally northeast along SR 2444 to the Rowan County line;
- (3) Davidson County generally east of a line starting at the intersection of the runs of Abbotts Creek and the Yadkin River in High Rock Lake, thence generally north along Abbotts Creek to NC 8 bridge, thence generally north along NC 8 to the intersection with Interstate 85, thence generally northeast along Interstate 85 to the intersection with US 64, thence generally southeast along US 64 to the Randolph County line;
 - (4) Montgomery County generally west of a line beginning at the intersection of SR 1134 with the Randolph County line, thence generally south along SR 1134 to the intersection with SR 1303, thence generally south along SR 1303 to the intersection with NC 109, thence generally southeast along NC 109 to the intersection with SR 1150, thence generally south along SR 1150 to the intersection with NC 73, thence generally southeast along NC 73 to the intersection with SR 1227, thence generally east along SR 1227 to the intersection with SR 1130, thence generally northeast along SR 1130 to the intersection with SR 1132, thence generally southeast along SR 1132 to the intersection with SR 1174, thence generally east along SR 1174 to the intersection with NC 109, thence generally north along NC 109 to the intersection with SR 1546, generally southeast along SR 1546 to the intersection of SR 1543, thence generally south along SR 1543 to the intersection with NC 731, thence generally west along NC 731 to the intersection with SR 1118, thence generally southwest along SR 1118 to the intersection with SR 1116, thence generally west along SR 1116 to the intersection with NC 109, thence generally south along NC 109 to the intersection with the Richmond County line;
 - (5) Randolph County generally west of a line beginning at the intersection of US 64 with the Davidson County line, thence generally east along US 64 to the intersection with NC 49, thence generally southwest along NC 49 to the intersection with SR 1107, thence generally south along SR 1107 to the intersection with SR 1105, thence southeast along SR 1105 to the intersection with the Montgomery County line;
 - (6) Rowan County generally east of a line beginning at the intersection of SR 2352 with the Cabarrus County line, thence generally northeast along SR 2352 to the intersection with SR 2353, thence generally north along SR 2353 to the intersection with SR 2259, thence generally northeast along SR 2259 to the intersection with SR 2142, thence north along SR 2142 to the intersection with SR 2162, thence generally northeast along SR 2162 to the intersection with the run of the Yadkin River in High Rock Lake;
 - (7) Union County generally east of a line beginning at the intersection of SR 1117 with the South Carolina-North Carolina State line, thence generally north along SR 1117 to the intersection with SR 1111, thence generally northwest along SR 1111 to the intersection with NC 75, thence generally northwest along NC 75 to the intersection with NC 16, thence generally north along NC 16 to the intersection with SR 1008, thence generally northeast along SR 1008 to the intersection with SR 1520, thence generally northeast along SR 1520 to the intersection with NC 218, thence generally east along NC 218 to the intersection with US 601, thence generally north along US 601 to the intersection with SR 1600, thence generally northeast along SR 1600 to the intersection with the Cabarrus County line;
 - (8) Stanly County -- all.

History Note: Authority G.S. 87-87;
Eff. April 20, 1978;
Amended Eff. September 1, 2009, April 1, 2001.

15A NCAC 02C .0118 VARIANCE

- (a) The Secretary may grant a variance from any construction standard under the rules of this Section. Any variance shall be in writing, and shall be granted upon oral or written application to the Secretary, by the person responsible for the construction of the well for which the variance is sought, if the Secretary finds facts to support the following conclusions:
- (1) that the use of the well will not endanger human health and welfare or the groundwater;
 - (2) that construction in accordance with the standards was not technically feasible in such a manner as to afford a reasonable water supply at a reasonable cost.
- (b) The Secretary may require the variance applicant to submit such information as the Secretary deems necessary to make a decision to grant or deny the variance. The Secretary may impose such conditions on a variance or the use of a well for which

