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 saprolite 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
14 and larger	0.375

(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 immediatelyupstream 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, algaecides, 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 a variance is granted as he deems necessary to protect human health and welfare and the groundwater resources. The findings of fact supporting any variance under this Rule shall be in writing and made part of the variance.

(c) The Secretary shall respond in writing to a request for a variance within 30 days from the receipt of the variance request.

(d) A variance applicant who is dissatisfied with the decision of the Secretary may commence a contested case by filing a petition under G.S. 150B-23 within 60 days after receipt of the decision.

History Note: Authority G.S. 87-87; 87-88; 150B-23
Eff. April 20, 1978;
Amended Eff. September 1, 2009, April 1, 2001; December 1, 1992; September 1, 1988; September 1, 1984.

15A NCAC 02C .0119 DELEGATION

(a) The Secretary is delegated the authority to grant permission for well construction under G.S. 87-87.

(b) The Secretary is delegated the authority to give notices and sign orders for violations under G.S. 87-91.

(c) The Secretary may grant a variance from any construction standard, or the approval of alternate construction methods or materials, specified under the Rules of this Section.

History Note: Authority G.S. 143-215.3(a)(1);
Eff. March 1, 1985;
Amended Eff. October 1, 2009, December 1, 1992.

SECTION .0200 - CRITERIA AND STANDARDS APPLICABLE TO INJECTION WELLS

15A NCAC 02C .0201 PURPOSE

The rules in this Section establish classes of injection wells and set forth requirements and procedures for permitting, constructing, operating, monitoring, reporting, and abandoning approved types of injection wells and abandoning, monitoring, and reporting non-permitted wells used for the injection of wastes or any substance of a composition and concentration such that, if it were discharged to the land or waters of the state, would adversely affect human health or would otherwise render those waters unsuitable for their best intended usage. Except as provided for in G.S. 143-215.1A, the discharge of any wastes to the subsurface by means of wells is prohibited by G.S. 143-214.2(b).

History Note: Authority G.S. 87-84; 87-87; 87-88; 87-94; 87-95; 143-211; 143-214.2(b); 143-215.1A; 143-215.3(a)(1); 143-215.3(c);
Eff. August 1, 1982;
Amended Eff. May 1, 2012; September 1, 1996.

15A NCAC 02C .0202 SCOPE

The rules in this Section apply to all construction, operation, use, modification, alteration, repair, and abandonment activities of all injection wells as defined herein. These Rules do not apply to subsurface distribution systems associated with sewage treatment and disposal permits issued in accordance with G.S. 130A.

History Note: Authority G.S. 87-86; 87-87; 143-211; 143-215.1A; 143-215.3(a)(1); 143-215.3(c);
Eff. August 1, 1982;
Amended Eff. May 1, 2012; September 1, 1996.

15A NCAC 02C .0203 CONFLICT WITH OTHER LAWS, RULES, AND REGULATIONS

The provisions of any federal, state, county, or municipal laws, rules, or regulations establishing injection well standards affording greater protection to the public welfare, safety, and health and to the groundwater resources shall prevail, within the jurisdiction of such agency or municipality, over standards established by the rules in this Section.

History Note: *Authority G.S. 87-87; 87-96; 143-211; 143-215.1A; 143-215.3(a)(1); 143-215.3(c);*
Eff. August 1, 1982;
Amended Eff. September 1, 1996.

15A NCAC 02C .0204 DEFINITIONS

In addition to the terms defined in Rule .0102 of this Subchapter the following terms and phrases apply unless the context requires otherwise:

(1) "Abandonment or Plugging Record" means a systematic listing of permanent or temporary abandonment of a well and may contain a well log or description of amounts and types of abandonment material used, the method employed for abandonment, a description of formation location, formation thickness, and location of abandonment structures.

(2) "Approved", "require", "necessary", "impose", and similar terms, or other forms of such terms, mean an action of the Director or Division based on the standards or requirements of the rules of this Section unless the context requires otherwise.

(3) "Area of Review" means the area around an injection well as specified in each applicable rule.

(4) "Best intended usage" is as defined in 15A NCAC 02L .0201 for each groundwater classification.

(5) "Catastrophic Collapse" means the failure of overlying strata caused by removal of underlying materials.

(6) "Closed-Loop Geothermal Well System" means a system of continuous piping, part of which is installed in the subsurface via vertical or angled borings, through which moves a fluid that does not exit the piping, but is used to transfer heat energy between the subsurface and the fluid in association with a heating and cooling system. A variation of this type of system consists of the continuous piping emplaced into a water supply well such that the standing column of groundwater serves as the heat transfer medium.

(7) "Closed-Loop Groundwater Remediation System" is as defined in G.S. 143-215.1A.

(8) "Cluster" means two or more geothermal injection wells connected to the same manifold or header of a geothermal heating and cooling system.

(9) "Confined or Enclosed Space" means any space, having a restricted means of entry and exit and is subject to the accumulation of toxic or flammable contaminants or has an oxygen deficient atmosphere.

(10) "Confining Zone" means a geological formation, group of formations, or part of a formation that is capable of limiting fluid movement.

(11) "Contaminant" is as defined in 15A NCAC 02L .0102.

(12) "Facility, Operation, or Activity" means any injection well or system.

(13) "Flow Rate" means the volume per unit time of a fluid moving past a fixed reference point.

(14) "Fluid" means a material or substance which is capable of flowing whether in a semisolid, liquid, sludge, gas, or other form or state.

(15) "Formation Fluid" means fluid present in a formation under natural conditions. This does not include introduced fluids, such as drilling mud and grout, used to facilitate the construction or development of a well.

(16) "Generator" means any person, by site location, whose act or process produces hazardous waste.

(17) "Groundwaters" mean those waters occurring in the subsurface under saturated conditions.

(18) "Hazardous Waste" means any solid, semisolid, liquid, or contained gaseous waste or combination thereof, which because of its quantity, concentration, or physical, chemical or infectious characteristic may:

(a) cause or contribute to an increase in mortality or an increase in serious irreversible or incapacitating reversible illness; or

(b) pose a present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

(19) "Hazardous Waste Management Facility" means all contiguous land and structures and other appurtenances and improvements on the land used for treating, storing, or disposing of hazardous waste. A facility may consist of several treatment, storage, or disposal operational units (for example, one or more landfills, surface impoundments, or combination of them).

(20) "Hose Bibb or Tap" means a fluid sampling port located on or appurtenant to a well.

(21) "Hydraulic Conductivity" means the volume of water at the existing kinematic viscosity that will move in a porous medium in unit time under a unit hydraulic gradient through a unit area measured at right angles to the direction of flow.

(22) "Hydraulic or Pneumatic Fracturing" means the intentional act of injecting potable water, ambient air, or other approved fluids, which may carry a proppant, for the purpose of forming new fractures or propagating existing fractures in a geologic formation or portion thereof with the intent of increasing the formation's permeability. Hydraulic fracturing shall be used only in association with groundwater remediation injection activities and shall not result in the fracturing of any confining units or otherwise cause or contribute to the migration of contamination into uncontaminated areas.

(23) "Hydrostratigraphic" means a body of rock or unconsolidated sediment distinguished and characterized by observable hydraulic properties that relate to its ability to receive, store, transmit, and yield water.

(24) "Injectant" means any solid or fluid that is emplaced in the subsurface by means of an injection well.

(25) "Injection" means emplacement or discharge into the subsurface of a solid or fluid substance or material. This definition excludes drilling fluids, grout used in association with well construction or abandonment, and fluids used in connection with well development, rehabilitation or stimulation.

(26) "Injection Well" means any well as defined in G.S. 87-85, whose depth is greater than its largest surface dimension and which is used, or intended to be used, for the injection of fluids or solids into the subsurface or groundwaters.

(27) "Injection Zone" means a geological formation, group of formations, or part of a formation receiving solids or fluids through an injection well.

(28) "Lithology" means the description of rocks or sediments on the basis of their physical and chemical characteristics.

(29) "Lithostratigraphic" means a body of rock or unconsolidated sediment that is distinguished and characterized by observable lithologic features or its position relative to other bodies of rock or unconsolidated sediment.

(30) "Mechanical Integrity" means:

(a) an absence of a leak in the casing, tubing, or packer of an injection well; and

(b) an absence of fluid movement through vertical channels adjacent to the injection well bore.

(31) "Permit" means an authorization, license, or equivalent control document issued by the Director to implement the requirements of the rules of this Section.

(32) "Permitted by Rule" means that the injection activity is authorized by the rules of this Section and does not require the issuance of an individual permit when injection wells are constructed and operated in accordance with the rules of this Section.

(33) "Plug" means the act or process of stopping the flow of fluids into or out of a formation through a borehole or well penetrating that formation.

(34) "Potable Water" means those waters of the State which are suitable for drinking, culinary, or food processing purposes.

(35) "Pressure" means the total load or force per unit area acting on a surface.

(36) "Proppant" means a granular substance such as quartz sand or other approved material that is used to hold open cracks formed in the subsurface as a result of hydraulic or pneumatic fracturing.

(37) "Receptor" means any human, plant, animal, or structure which is, or has the potential to be, affected by the release or migration of contaminants. Any well constructed for the purpose of monitoring groundwater and contaminant concentrations shall not be considered a receptor.

(38) "Subsidence" means the lowering of the natural land surface in response to: earth movements; reduction of formation fluid pressure; removal of underlying supporting material by mining or solution of solids, either artificially or from natural causes; compaction due to wetting (hydrocompaction); oxidation of organic matter in soils; or added load on the land surface.

(39) "Subsurface Distribution System" means an assemblage of perforated pipes, drain tiles, or other similar mechanisms intended to distribute fluids or solids below the surface of the ground.

(40) "Transmissivity" means the rate at which water of the prevailing kinematic viscosity is transmitted through a unit width of an aquifer under a unit hydraulic gradient. It equals the hydraulic conductivity multiplied by the aquifer thickness.

(41) "Underground Sources of Drinking Water" means all underground waters of the State classified as existing or potential water supplies in Subchapter 02L.

(42) "Waste" is as defined in G.S. 143-213(18).
(43) "Waters" or "Waters of the State" is as defined in G.S. 143-212.

History Note: *Authority G.S. 87-85; 87-87; 143-213; 143-215.1A;*
Eff. August 1, 1982;
Amended Eff. May 1, 2012; September 1, 1996; July 1, 1988; March 1, 1984.

15A NCAC 02C .0205 AREA OF REVIEW

History Note: *Authority G.S. 87-87; 143-211; 143-215.1A; 143-215.3(a)(1); 143-215.3(c);*
Eff. August 1, 1982;
Amended Eff. September 1, 1996;
Repealed Eff. May 1, 2012.

15A NCAC 02C .0206 CORRECTIVE ACTION

(a) Injection wells not constructed in compliance with the criteria and standards specified in these Rules shall be brought into compliance with the rules in this Section or abandoned by the person(s) responsible for the construction of the well(s) within 30 calendar days of becoming aware of any instance of noncompliance.

(b) Where operation of any injection facility is not in compliance with the requirements of the rules in this Section, or where continued operation of the injection facility threatens any water quality standard or classification established under the authority of G.S. 143-214.1, the owner of the injection facility shall perform the following:

(1) stop all injection activities immediately;
(2) notify the Division orally by the close of the next business day and in writing within five calendar days of becoming aware of any instance of noncompliance;
(3) perform a site assessment and submit the site assessment to the Division within 30 calendar days of notifying the Division. The Director may approve an alternate time period based on the severity and extent of noncompliance. The site assessment report shall include a description of:
    (A) the source and cause of contamination;
    (B) any imminent hazards to public health and safety and actions taken to mitigate them;
    (C) all receptors and exposure pathways;
    (D) the horizontal and vertical extent of soil and groundwater contamination and all factors affecting contaminant transport; and
    (E) any geological and hydrogeological features influencing the movement or chemical or physical character of the contaminants; and
(4) submit a corrective action plan and a proposed schedule for implementation of the corrective action to the Director for approval. For approving the proposed plan and schedule, the Director shall consider the compliance history of the well owner, the severity and extent of noncompliance, and any other criteria necessary for the protection of human health and the environment. The corrective action plan shall include:
    (A) a description of the proposed corrective action and reasons for its selection;
    (B) specific plans, including engineering details where applicable, for restoring the groundwater quality and for restoring the integrity of the injection facility if the injection activity is to continue;
    (C) a schedule for the implementation and operation of the proposed plan; and
    (D) a monitoring plan for evaluating the effectiveness of the proposed corrective action.

History Note: *Authority G.S. 87-87; 87-88; 143-211; 143-215.1A; 143-215.3(a)(1); 143-215.3(c);*
Eff. August 1, 1982;
Amended Eff. May 1, 2012; September 1, 1996; March 1, 1984.

15A NCAC 02C .0207 MECHANICAL INTEGRITY

(a) An injection well has internal mechanical integrity when there is no leak in the casing, tubing, or packer as demonstrated by one of the following methods:

(1) monitoring of the tubing-casing annulus pressure, following an initial pressure test, with sufficient frequency to be representative as determined by the Director. This test must be performed at the well head while maintaining an annulus pressure different from atmospheric pressure;
(2) pressure testing with liquid or gas; or

(3) any other method proposed by the permittee and approved by the Director as equally effective.

(b) An injection well has external mechanical integrity when there is no fluid movement into groundwaters through vertical channels adjacent to the injection well bore as determined by one of the following methods:

(1) the results of a temperature or noise log;

(2) grouting records plus predictive calculations demonstrating that the injection pressures will not exceed the strength of the grout; or

(3) any other method proposed by the permittee and approved by the Director as equally effective.

(c) In conducting and evaluating the tests enumerated in this Section or other tests allowed by the Director, the owner or operator shall apply methods and standards generally accepted in the industry. When the well owner or operator reports the results of mechanical integrity tests, a description of the test(s) and the method(s) used shall be included. The Director shall review monitoring and other test data submitted since the previous evaluation.

(d) The Director may require additional or alternative tests if the results presented by the owner or operator under Paragraph (c) of this Rule are not satisfactory to demonstrate that an injection well has mechanical integrity.

(e) If an injection well fails to demonstrate mechanical integrity, the well owner or operator shall take corrective action as specified in Rule .0206 of this Section.

History Note: *Authority G.S. 87-87; 143-211; 143-215.1A; 143-215.3(a)(1); 143-215.3(c);*
Eff. August 1, 1982;
Amended Eff. May 1, 2012; September 1, 1996; March 1, 1984.

15A NCAC 02C .0208 FINANCIAL RESPONSIBILITY

When required by the rules of this Section, the permittee shall maintain and demonstrate financial responsibility and resources in the form of performance bonds, trust funds, surety bonds, letters of credit, financial tests, insurance or corporate guarantees, or other forms of financial assurances approved by the Director as equivalent to close, plug, and abandon the injection operation.

History Note: *Authority G.S. 87-87; 87-88; 143-211; 143-215.1A; 143-215.3(a)(1); 143-215.3(c); 40 C.F.R. Part 144.52(a)(7); 40 C.F.R. Part 145.11(a)(20);*
Eff. August 1, 1982;
Amended Eff. May 1, 2012; September 1, 1996.

15A NCAC 02C .0209 CLASSIFICATION OF INJECTION WELLS

Injection Wells are classified as follows:

(1) Class 1. No person shall construct, use, or operate an injection well of this class. This class applies to industrial, municipal, and nuclear disposal wells that are used to inject wastes beneath the lowermost formation containing underground sources of drinking water. A description of the primary function for wells of this class is as follows:

(a) Hazardous Waste Disposal Well. These wells are used by generators of hazardous wastes or owners of hazardous waste management facilities to inject hazardous waste.

(b) Industrial Disposal Well. These wells are used to inject non-hazardous industrial waste.

(c) Municipal Disposal Well. These wells are used to inject non-hazardous waste.

(d) Nuclear Disposal Well. These wells are used to inject nuclear waste.

(2) Class 2. No person shall construct, use, or operate an injection well of this class. This class applies to oil and gas production and storage related injection wells and includes wells which are used to inject fluids:

(a) which are brought to the surface in connection with natural gas storage operations or conventional oil or natural gas production;

(b) for enhanced recovery of oil or natural gas; and

(c) for storage of hydrocarbons which are liquid at standard temperature and pressure.

(3) Class 3. No person shall construct, use, or operate an injection well of this class. This class applies to wells which are used for the purpose of extraction of minerals or energy. A description of the primary function for wells of this class is as follows:

(a) In Situ Production of Uranium or Other Metals. This category includes only in-situ production from ore bodies that have not been conventionally mined. Solution mining of conventional mines such as stopes leaching is included in Class 5.

(b) Solution Mining Well. These wells are used in the solution mining of salts or potash.

(c) Sulfur Mining Well. These wells are used in the mining of sulfur by the Frasch process.

(4) Class 4. No person shall construct, use, or operate an injection well of this class. This class applies to injection wells that are used to inject hazardous wastes into or above a formation containing an underground source of drinking water and includes wells used by:

(a) generators of hazardous wastes or radioactive wastes; and

(b) owners of hazardous waste management facilities, or radioactive waste disposal sites.

(5) Class 5. This class applies to all injection wells not included in Class 1, 2, 3, 4, or 6.

(a) The construction, use, or operation of the following Class 5 injection well types is prohibited. A description of the primary function for these prohibited Class 5 wells is as follows:

(i) Agricultural Drainage Well. These wells receive irrigation tailwaters, other field drainage, animal yard, feedlot, or dairy runoff;

(ii) Air Scrubber Waste Disposal Well. These wells are used to inject wastes from air scrubbers;

(iii) Gaseous Hydrocarbon Storage Well. These wells are used for the storage of hydrocarbons which are gases at standard temperature and pressure;

(iv) Groundwater Aquaculture Return Flow Well. These wells inject groundwater or surface water that has been used to support aquaculture;

(v) In-situ Fossil Fuel Recovery Well. These wells are used for the in-situ recovery of coal, lignite, oil shale, and tar sands;

(vi) Mining, Sand, or Other Backfill Well. These wells are used to inject a mixture of fluid and sand, mill tailings, and other solids into mined out portions of subsurface mines, whether the injectant is a radioactive waste or not. This also includes wells used to control mine fires and acid mine drainage wells;

(vii) Motor Vehicle Waste Disposal Well. These wells receive wastes from motor vehicle facilities and include autobody repair shops, new and used car dealerships, specialty repair shops (e.g., transmission, muffler, and radiator repair shops and any facility that steam cleans or otherwise washes undercarriages or engine parts or does any vehicular repair work);

(viii) Sewage or Wastewater Disposal Well. These wells are used to inject sewage or wastewater from any source to the groundwaters of the State. This includes cesspools and abandoned drinking water wells;

(ix) Solution Mining Well. These wells are used in solution mining in conventional mines, such as stopes leaching;

(x) Special Drainage Well. These wells are used for disposing of water from sources other than direct precipitation. Examples of this well type include: landslide control drainage wells, water tank overflow drainage wells, swimming pool drainage wells, and lake control drainage wells; and

(xi) Water Softener Regeneration Brine Disposal Well. These wells are used to inject regeneration wastes from water softeners.

(b) The construction, use, or operation of the following Class 5 injection well types may be approved by the Director provided that the injected material does not contain any waste or any substance of a composition and concentration such that, if it were discharged to the land or waters of the state, would adversely affect human health or would otherwise render those waters unsuitable for their best intended usage:

(i) Aquifer Recharge Wells specified in Rule .0218 of this Section;

(ii) Aquifer Storage and Recovery Wells specified in Rule .0219 of this Section;

(iii) Aquifer Test Wells specified in Rule .0220 of this Section;

(iv) Experimental Technology Wells specified in Rule .0221 of this Section;

(v) Geothermal Aqueous Closed-Loop Wells specified in Rule .0222 of this Section;

(vi) Geothermal Direct Expansion Closed-Loop Wells specified in Rule .0223 of this Section;

(vii) Geothermal Heating/Cooling Water Return Wells specified in Rule .0224 of this Section;

(viii) Groundwater Remediation Wells specified in Rule .0225 of this Section;

(ix) Salinity Barrier Wells specified in Rule .0226 of this Section;

(x) Stormwater Drainage Wells specified in Rule .0227 of this Section;
(xi) Subsidence Control Wells specified in Rule .0228 of this Section;
(xii) Tracer Wells specified in Rule .0229 of this Section; and
(xiii) Other Wells specified in Rule .0230 of this Section;

(6) Class 6. No person shall construct, use, or operate an injection well of this class. This class applies to wells that are used for containment of a gaseous, liquid, or supercritical carbon dioxide stream in subsurface geologic formations.

History Note: *Authority G.S. 87-87; 87-94; 87-95; 143-211; 143-214.2(b); 143-215.1A; 143-215.3(a)(1); 143-215.3(c); 143-215.6(c);*
Eff. August 1, 1982;
Amended Eff. May 1, 2012; September 1, 1996; March 1, 1984.

15A NCAC 02C .0210 REQUIREMENTS: WELLS USED TO INJECT WASTE OR CONTAMINANTS

The owner of any well that has been used to inject wastes or contaminants, with the exception of wells permitted in accordance with this Section, shall take corrective action as specified in Rule .0206(b) of this Section.

History Note: *Authority G.S. 87-87; 87-88; 143-214.2; 143-215.1A;*
Eff. August 1, 1982;
Amended Eff. September 1, 1996; March 1, 1984.

15A NCAC 02C .0211 GENERAL PERMITTING REQUIREMENTS APPLICABLE TO ALL INJECTION WELL TYPES

(a) A permit shall be obtained from the Director prior to constructing, operating, or using any well for injection unless the well is deemed permitted in accordance with the rules of this Section. No permit shall be granted for the injection of wastes or any substance of a composition and concentration such that, if it were discharged to the land or waters of the state, would adversely affect human health or would otherwise render those waters unsuitable for their best intended usage unless specifically provided for by Statute or by the rules in this Section.

(b) In making any determination of well construction, operation, and maintenance, the Director shall make the determination based on the rules of this Section.

(c) No person shall construct, operate, maintain, convert, plug, abandon, or conduct any other injection activity in a manner that allows the movement of fluid containing any contaminant into underground sources of drinking water if the presence of that contaminant may cause a violation of any applicable groundwater quality standard specified in Subchapter 02L or may otherwise adversely affect human health. The applicant for a permit shall have the burden of showing that the requirements of this Paragraph are met.

(d) If at any time the Director learns that any injection well may cause a violation of any applicable groundwater quality standard specified in Subchapter 02L not authorized by the rules of this Section, the Director shall do one of the following:

(1) require an individual permit for injection wells that are otherwise permitted by rule;
(2) require such actions as may be necessary to prevent the violation, including corrective action as required in Rule .0206 of this Section; or
(3) take enforcement action as provided for in G.S. 87-91, G.S. 87-94, or G.S. 87-95.

(e) All permit applications shall be signed as follows:

(1) For a corporation: by a responsible corporate officer. For the purposes of this Section, a responsible corporate officer means a president, secretary, treasurer, or vice president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation. [Note: The Division does not require specific assignments or delegations of authority to responsible corporate officers. The Division will presume that these responsible corporate officers have the requisite authority to sign permit applications unless the corporation has notified the Division to the contrary. Corporate procedures governing authority to sign permit applications may provide for assignment or delegation to applicable corporate positions.];
(2) For a partnership or sole proprietorship: by a general partner or the proprietor, respectively;
(3) For a municipality, state, federal, or other public agency: by either a principal executive officer or ranking elected official;

(4) For all other persons: by the well owner; or

(5) For any other person authorized to act on behalf of the applicant: documentation shall be submitted with the permit application package that identifies the person, grants them specific signature authority, and is signed and dated by the applicant.

(f) The person signing the permit application shall certify that the data furnished on the application is accurate and that the injection well will be operated in accordance with the approved specifications and conditions of the permit.

(g) All reports shall be signed by a person described in Paragraph (e) of this Rule. All records, reports, and information required to be submitted to the Director and public comment on these records, reports, or information shall be disclosed to the public unless the person submitting the information can show that such information, if made public, would disclose methods or processes entitled to protection as trade secrets as defined in G.S. 66-152. The Director shall determine which information is entitled to confidential treatment. In the event the Director determines that such information is entitled to be treated as confidential information as defined in G.S. 132-1.2, the Director shall take steps to protect such information from disclosure.

(h) The Director shall consider the cumulative effects of drilling and construction of multiple wells and operation of all proposed wells during evaluation of permit applications.

(i) All permits shall be issued for a period not to exceed five years from the date of issuance. Permits are considered active until all permit requirements have been met and documentation has been received indicating that the wells meet one of the following conditions:

(1) The wells are temporarily or permanently abandoned in accordance with Rule .0240 of this Section;

(2) the wells have been converted to some other use; or

(3) the wells are permitted under another permit issued by the appropriate permitting authority for that activity.

(j) All facilities shall, at all times, be operated and maintained to achieve compliance with the rules of this Section. (k) The permittee shall allow the Director, or an authorized representative, upon their presentation of credentials and other documents as may be required by law, to:

(1) enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of the permit;

(2) have access to and copy, during normal business hours, any records that must be kept under the conditions of the permit;

(3) inspect, at reasonable times, any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under the permit; and

(4) sample or monitor, at reasonable times, and for the purposes of assuring permit compliances or as otherwise authorized, any substances or parameters.

(l) The permit may be modified, revoked and reissued, or terminated by the Director in whole or part for actions which would adversely affect human health or the environment. Such actions may include:

(1) violation of any terms or conditions of the permit;

(2) obtaining a permit by misrepresentation or failure to disclose fully all relevant facts; or

(3) refusal of the permittee to allow authorized employees of the Division upon proper presentation of credentials to:

(A) enter upon permittee's premises on which a system is located in which any records are required to be kept under terms and conditions of the permit;

(B) have access to and copy any records required to be kept under terms and conditions of the permit;

(C) inspect any monitoring equipment or method required in the permit; or

(D) collect any sample from the injection facility.

(m) The filing of an application by the permittee for a permit modification, revocation and reissuance, termination, or a notification of planned changes or anticipated noncompliance, shall not stay any permit condition.

(n) The permit shall not convey any property rights of any sort or any exclusive privilege.

(o) The permittee shall furnish to the Director any information which the Director may request to determine whether cause exists for modifying, revoking and reissuing or terminating the permit, or to determine compliance with the permit. The permittee shall also furnish to the Director, upon request, copies of records required by the permit to be kept.

(p) The permittee shall retain copies of records of all monitoring information, including all calibration and maintenance records, all original strip chart recordings for continuous monitoring instrumentation, and copies of all reports required by this permit, for a period of at least three years from the date of the sample, measurement, report, or application. Records of monitoring information shall include the:

(1) date, place, and time of sampling or measurements;

(2) individual(s) who performed the sampling or measurements;

(3) date(s) analyses were performed;
(4) individual(s) who performed the analyses;
(5) analytical techniques or methods used;
(6) results of any such sampling, measurements, and analyses; and
(7) description and date of any maintenance activities performed including the name and contact information of the individual(s) performing such activities.

(q) The permit shall not be transferred to any person without the submission of a permit ownership or name change request to the Director. The Director may require modification or revocation and reissuance of the permit to change the name of the permittee and incorporate such other requirements as may be appropriate.

(r) The permittee shall report any monitoring or other information that indicates noncompliance with a specific permit condition, that a contaminant may cause a violation of applicable groundwater quality standards specified in Subchapter 02L, or that a malfunction of the injection system may cause the injected fluids to migrate outside the approved injection zone or area. The information shall be provided to the Director orally within 24 hours of the occurrence and as a written submission within five days of the occurrence. The written submission shall contain a description of the noncompliance and its cause, the period of noncompliance, including dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue, and any steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

(s) The Commission may delegate, through a Memorandum of Agreement, to another state agency the authority to permit injection wells that are an integral part of a facility requiring a permit from that agency.

(t) Failure to comply with the rules of this Section or any permit issued individually or by rules of this Section may result in enforcement action as provided for in G.S. 87-91, G.S. 87-94, or G.S. 87-95.

History Note: *Authority G.S. 87-87; 87-88; 87-90; 87-94; 87-95; 89E-13; 89E-18; 143-211; 143-214.2(b); 143-215.1A; 143-215.3(a)(1); 143-215.3(c); 150B-19(4); 40 CFR Part 144.52(a)(7); 40 CFR Part 145.11(a)(20);*
Eff. August 1, 1982;
Amended Eff. May 1, 2012; February 1, 1997; October 1, 1996; March 1, 1984.

15A NCAC 02C .0212 ADDITIONAL CRITERIA AND STANDARDS: CLASS II: CLASS III

History Note: *Authority G.S. 87-87; 87-88; 143-211; 143-214.2; 143-215.3(a)(1); 143-215.3(c);*
Eff. August 1, 1982;
Repealed Eff. March 1, 1984.

15A NCAC 02C .0213 ADDITIONAL CRITERIA AND STANDARDS APPLICABLE TO CLASS 5 WELLS
15A NCAC 02C .0214 ABANDONMENT AND CHANGE-OF-STATUS

History Note: *Authority G.S. 87-87; 87-88; 87-94; 87-95; 143-211; 143-214.2(b); 143-215.1A; 143-215.3(a)(1); 143-215.3(c);*
Eff. August 1, 1982;
Amended Eff. February 1, 1997; October 1, 1996; March 1, 1984;
Repealed Eff. May 1, 2012.

15A NCAC 02C .0215 VARIANCE
15A NCAC 02C .0216 DELEGATION

History Note: *Authority G.S. 87-87(4); 87-88; 143-215.1A; 143-215.3(a)(1); 143-215.3(a)(4); 150B-23;*
Eff. September 1, 1996;
Repealed Eff. May 1, 2012.

15A NCAC 02C .0217 PERMITTING BY RULE

(a) The following injection well systems are deemed to be permitted by the rules of this Section pursuant to G.S. 87-88(a) and it shall not be necessary for the Division to issue an individual permit for the construction or operation of the following injection well systems providing that the system does not result in the violation of any assigned surface water, groundwater, or

air quality standard; there is no groundwater discharge of the injectant into surface waters; and all criteria for the specific systems are met:

(1) Aquifer Test Wells specified in Rule .0220 of this Section;
(2) Geothermal Aqueous Closed Loop Wells specified in Rule .0222 of this Section;
(3) Geothermal Direct Expansion Closed Loop Wells specified in Rule .0223 of this Section;
(4) Groundwater Remediation Wells specified in Rule .0225 of this Section; and
(5) Stormwater Drainage Wells specified in Rule .0227 of this Section.

(b) Any violation of groundwater standards not authorized by the rules of this Section shall be treated in accordance with Rule .0206 of this Section.

(c) An injection well system permitted by rule under the rules of this Section shall remain permitted by rule until such time as the Director determines that it shall not be deemed to be permitted. This determination shall be made based on compliance with the provisions of the rules of this Section.

(d) If the Director determines that an injection well system shall not be permitted by rule, the Director shall require the owner of the injection well system to obtain an individual permit.

History Note: Authority G.S. 87-87; 87-88(a);
Eff. May 1, 2012.

15A NCAC 02C .0218 AQUIFER RECHARGE WELLS

Aquifer Recharge Wells are used to recharge depleted aquifers and inject uncontaminated water of equal or better quality than the aquifer being recharged. The requirements for Aquifer Recharge Wells shall be the same as described in Rule .0219 of this Section except that the Director may impose additional requirements for the protection of human health and the environment based on site specific criteria, existing or projected environmental impacts, compliance with the provisions of the rules of this Section, or the compliance history of the facility owner.

History Note: Authority G.S. 87-87; 87-88; 87-90; 87-94; 87-95; 89E-13; 89E-18; 143-211; 143-214.2(b); 143-215.1A; 143-215.3(a)(1); 143-215.3(c); 150B-19(4); 40 CFR Part 144.52(a)(7); 40 CFR Part 145.11(a)(20);
Eff. May 1, 2012.

15A NCAC 02C .0219 AQUIFER STORAGE AND RECOVERY WELLS

(a) Aquifer Storage and Recovery Wells are used to inject potable water for the purposes of subsurface storage and for later recovery of the injected water. All Aquifer Storage and Recovery Wells require permits.

(b) Permit Applications. In addition to the permit requirements set forth in Rule .0211 of this Section, an application shall be submitted, in duplicate, to the Director on forms furnished by the Director and shall include the following:

(1) Site Description that includes the following:
  (A) the name of the well owner or person otherwise legally responsible for the injection well, his or her mailing address and telephone number, and status as a federal, state, private, public, or other entity;
  (B) the name of the property owner, if different from the well owner, their physical address, mailing address, and telephone number;
  (C) the name, mailing address, telephone number, and geographic coordinates of the facility for which the application is submitted; and
  (D) a list of all permits associated with the injection well system.
(2) Project Description. A description of what problem the project is intended to solve or what objective the project is intended to achieve and shall include the following:
  (A) history and scope of the problem or objective;
  (B) what is currently being done to solve the problem or achieve the objective;
  (C) why existing practices are insufficient to solve the problem or achieve the objective;
  (D) what other alternatives were considered to solve the problem or achieve the objective; and
  (E) how this option was determined to be the most effective or desirable to solve the problem or achieve the objective.
(3) Demonstration of Financial Responsibility as required in Rule .0208 of this Section.
(4) Injection Zone Determination. The applicant shall specify the horizontal and vertical portion of the injection zone within which the proposed injection activity shall occur based on the hydraulic properties of that portion of the injection zone specified. No violation of groundwater quality standards specified in

Subchapter 02L resulting from the injection shall occur outside the specified portion of the injection zone as detected by a monitoring plan approved by the Director.

(5) Hydrogeologic Evaluation. If required by G.S. 89E, G.S. 89C, or G.S. 89F, a licensed geologist, professional engineer, or licensed soil scientist shall prepare a hydrogeologic evaluation of the facility to a depth that includes the injection zone determined in accordance with Subparagraph (b)(4) of this Rule. A description of the hydrogeologic evaluation shall include all of the following:

(A) regional and local geology and hydrogeology;

(B) changes in lithology underlying the facility;

(C) depth to the mean seasonal high water table;

(D) hydraulic conductivity, transmissivity, and storativity of the injection zone based on tests of site-specific material, including a description of the test(s) used to determine these parameters;

(E) rate and direction of groundwater flow as determined by predictive calculations or computer modeling; and

(F) lithostratigraphic and hydrostratigraphic logs of test and injection wells.

(6) Area of Review. The area of review shall be calculated using the procedure for determining the zone of endangering influence specified in 40 CFR 146.6(a). The applicant must identify all wells within the area of review that penetrate the injection or confining zone, and repair or permanently abandon all wells that are improperly constructed or abandoned.

(7) Analyses of the injection zone(s) including:

(A) test results of the native groundwater and the proposed recharge water for the parameters listed in Subparagraph (h)(4) of this Rule;

(B) geochemical analyses of representative samples of the aquifer matrix to determine the type and quantity of reactive minerals; and

(C) evaluation of the chemical compatibility of the native groundwater, injected water, and the aquifer matrix using site specific geochemical data and hydraulic properties of the injection zones, geochemical modeling, and any other analytical tool required. The chemical compatibility evaluation shall identify potential changes in groundwater quality resulting from the injection activities within the area of review specified in Subparagraph (b)(6) of this Rule.

(8) Injection Procedure. The applicant shall submit a description of the proposed injection procedure that includes the following:

(A) the proposed average and maximum daily rate and quantity of injectant;

(B) the average maximum injection pressure expressed in units of pounds per square inch (psi);

(C) calculation of fracture pressures of confining units expressed in units of psi; and

(D) the total or estimated volume to be injected.

(9) Injection well construction details including:

(A) the number and depth of injection wells;

(B) indication of whether the injection wells are existing or proposed;

(C) depth and type of casing;

(D) depth and type of screen material;

(E) depth and type of grout; and

(F) plans and specifications of the surface and subsurface construction of each injection well or well system.

(10) Monitoring Wells. Monitoring wells shall be located so as to detect any movement of injection fluids, process byproducts, or formation fluids outside the injection zone as determined by the applicant in accordance with Subparagraph (b)(4) of this Rule. The monitoring schedule shall be consistent with the proposed injection schedule, pace of the anticipated reactions, and rate of transport of the injected fluid. The applicant shall submit a monitoring plan that includes the following:

(A) a list of monitoring parameters and analytical methods to be used;

(B) other parameters that may serve to indicate the progress of the intended reactions;

(C) a list of existing and proposed monitoring wells to be used; and

(D) a sampling schedule to monitor the proposed injection.

(11) Well Data Tabulation. A tabulation of data on all existing or abandoned wells within the area of review of the injection well(s) that penetrate the proposed injection zone, including water supply wells, monitoring wells, and wells proposed for use as injection or monitoring wells. Such data shall include a description of each well's type, depth, and record of abandonment or completion.

(12) Plan of Action. A proposed plan of action to be taken if the proposed injection operation causes fracturing of confining units, results in adverse geochemical reactions, or otherwise threatens groundwater quality.

(13) Maps and Cross-Sections. Scaled, site-specific site plans or maps depicting the location, orientation, and relationship of facility components including the following:

(A) area map based on the most recent USGS 7.5' topographic map of the area, at a scale of 1:24,000 and showing the location of the proposed injection site;

(B) topographic contour intervals showing all facility related structures, property boundaries, streams, springs, lakes, ponds, and other surface drainage features;

(C) all existing or abandoned wells within the area of review of the injection well(s), listed in the tabulation required in Subparagraph (b)(11) of this Rule, that penetrate the proposed injection zone, including water supply wells, monitoring wells, and wells proposed for use as injection wells;

(D) potentiometric surface map(s) of each hydrostratigraphic unit in the injection zone(s) that show the direction of groundwater movement, and all existing and proposed wells;

(E) cross-section(s) that show the horizontal and vertical extent of the injection zone(s), lithostratigraphic units, hydrostratigraphic units, and all existing and proposed wells, complete with casing and screen intervals; and

(F) any existing sources of potential or known groundwater contamination, including waste storage, treatment, or disposal systems within the area of review of the injection well or well system.

(14) Such other information as deemed necessary by the Director for the protection of human health and the environment.

(c) Injection Volumes. The Director may establish maximum injection volumes and pressures necessary to assure that:

(1) fractures are not initiated in the confining zone(s);

(2) injected fluids do not migrate outside the injection zone or area;

(3) injected fluids do not cause or contribute to the migration of contamination into uncontaminated areas; and

(4) there is compliance with operating requirements.

(d) Injection.

(1) Injection may not commence until construction is complete, the permittee has submitted notice of completion of construction to the Director, and the Director has inspected or otherwise reviewed the injection well and finds it in compliance with the permit conditions. If the permittee has not received notice from the Director of intent to inspect or otherwise review the injection well within 10 days after the Director receives the notice, the permittee may commence injection.

(2) Prior to granting approval for the operation, the Director shall consider the following information:

(A) all available logging and testing data on the well;

(B) a demonstration of mechanical integrity pursuant to Rule .0207 of this Section;

(C) the proposed operating procedures;

(D) the results of the formation testing program; and

(E) the status of corrective action on defective wells in the area of review.

(e) Well Construction.

(1) Wells shall not be located where:

(A) surface water or runoff will accumulate around the well due to depressions, drainage ways, or other landscapes that will concentrate water around the well;

(B) a person would be required to enter confined spaces to perform sampling and inspection activities; or

(C) injectants or formation fluids would migrate outside the approved injection zone as determined by the applicant in accordance with Subparagraph (b)(4) of this Rule.

(2) The methods and materials used in construction shall not threaten the physical or mechanical integrity of the well during its lifetime and shall be compatible with the proposed injection activities.

(3) The well shall be constructed in such a manner that surface water or contaminants from the land surface cannot migrate along the borehole annulus either during or after construction.

(4) The borehole shall not penetrate to a depth greater than the depth at which injection will occur unless the purpose of the borehole is the investigation of the geophysical and geochemical characteristics of an aquifer. Following completion of the investigation, the borehole beneath the zone of injection shall be completely grouted to prevent the migration of any contaminants.

(5) Drilling fluids and additives shall contain only potable water and may be comprised of one or more of the following:
  (A) the formation material encountered during drilling;
  (B) materials manufactured specifically for the purpose of borehole conditioning or well construction; or
  (C) materials approved by the Director, based on a demonstration of not adversely affecting human health or groundwater quality.

(6) Only grouts listed under Rule .0107 of this Subchapter shall be used with the exception that bentonite grout shall not be used:
  (A) to seal zones of water with a chloride concentration of 1,500 milligrams per liter or greater as determined by tests conducted at the time of construction; or
  (B) in areas of the State subject to saltwater intrusion that may expose the grout to water with a chloride concentration of 1,500 milligrams per liter or greater at any time during the life of the well.

(7) The annular space between the borehole and casing shall be grouted:
  (A) with a grout that is non-reactive with the casing or screen materials, the formation, or the injectant;
  (B) from land surface to the top of the gravel pack and in such a way that there is no interconnection of aquifers or zones having differences in water quality that would result in degradation of any aquifer or zone; and
  (C) so that the grout extends outward 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.

(8) Grout shall be emplaced 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 at the time of grouting.

(9) All grout mixtures shall be prepared prior to emplacement per the manufacturer's directions with the exception that bentonite chips or pellets may be emplaced by gravity flow if water is present or otherwise hydrated in place.

(10) If an outer casing is installed, it shall be grouted by either the pumping or pressure method.

(11) The well shall be grouted within seven days after the casing is set or before the drilling equipment leaves the site, whichever occurs first.

(12) No additives that will accelerate the process of hydration shall be used in grout for thermoplastic well casing.

(13) A casing shall be installed that extends from at least 12 inches above land surface to the top of the injection zone.

(14) Wells with casing extending less than 12 inches above land surface may be approved by the Director only when one of the following conditions is met:
  (A) site specific conditions directly related to business activities, such as vehicle traffic, would endanger the physical integrity of the well; or
  (B) it is not operationally feasible for the well head to be completed 12 inches above land surface due to the engineering design requirements of the system.

(15) Multi-screened wells shall not connect aquifers or zones having differences in water quality which would result in a degradation of any aquifer or zone.

(16) Prior to removing the 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, to preclude contaminants from entering the well.

(17) Packing materials for gravel and sand packed wells shall be:
  (A) composed of quartz, granite, or other hard, non-reactive rock material;

(B) clean, of uniform size, water-washed and free from clay, silt, or other deleterious material;
(C) disinfected prior to subsurface emplacement;
(D) emplaced such that it shall not connect aquifers or zones having differences in water quality that would result in the deterioration of the water qualities in any aquifer or zone;
(E) evenly distributed around the screen and shall extend to a depth at least one foot above the top of the screen. A minimum one-foot thick seal, comprised of bentonite clay or other sealing material approved by the Director, shall be emplaced directly above and in contact with the packing material.

(18) Each injection well shall have a well identification plate that meets the criteria specified in Rule .0107 of this Subchapter.

(19) A hose bibb, sampling tap, or other collection equipment approved by the Director shall be installed on the line entering the injection well such that a sample of the injectant can be obtained immediately prior to its entering the injection well.

(20) If applicable, all piping, wiring, and vents shall enter the well through the top of the casing unless otherwise approved by the Director based on a design demonstrated to preclude surficial contaminants from entering the well.

(21) The well head shall be completed in such a manner so as to preclude surficial contaminants from entering the well and well head protection shall include:
(A) an accessible external sanitary seal installed around the casing and grouting; and
(B) a water-tight cap or seal compatible with the casing and installed so that it cannot be removed without the use of hand or power tools.

(f) Testing.

(1) Appropriate logs and other tests conducted during the drilling and construction of the wells shall be submitted to the Director after completion of well construction. A descriptive report interpreting the results of such logs and tests shall be prepared by a log analyst and submitted to the Director after completion of the tests. The appropriateness of the logs and tests shall be determined by the Director based on the intended function, depth, construction, and other characteristics of the well; availability of similar data in the area of the drilling site; and the need for additional information that may arise from time to time as the construction of the well progresses. At a minimum, such logs and tests shall include:
(A) lithostratigraphic logs of the entire borehole;
(B) hydrosratigraphic logs of the entire borehole; and
(C) deviation checks conducted on all holes where pilot holes and reaming are used, and at sufficiently frequent intervals to assure that vertical avenues for fluid migration in the form of diverging holes are not created during drilling.

(2) When the injection zone is a water-bearing formation, the following information concerning the injection zone as determined by the applicant in accordance with Subparagraph (b)(4) of this Rule shall be submitted to the Director after completion of the determinations in an integrated form which includes the following:
(A) fluid pressure;
(B) fluid temperature;
(C) fracture pressure;
(D) other physical and chemical characteristics of the injection zone;
(E) physical and chemical characteristics of the formation fluids; and
(F) compatibility of injected fluids with formation fluids.

(3) When the injection formation is not a water bearing formation, only the fracture pressure and other physical and chemical characteristics of the injection zone shall be determined or calculated and submitted to the Director after completion of the determinations.

(4) Tests for mechanical integrity shall be conducted prior to operation and every 10 years thereafter in accordance with Rule .0207 of this Section. The Director may require more frequent mechanical integrity testing as set out in Rule .0207 of this Section.

(g) Operation and Maintenance.

(1) Pressure at the well head shall be limited to a maximum which will ensure that the pressure in the injection zone does not initiate new fractures or propagate existing fractures in the injection zone, initiate fractures in the confining zone, or cause the migration of injected or formation fluids outside the injection zone or area.

(2) Injection between the outermost casing and the well borehole is prohibited.

(3) Monitoring of the operating processes at the well head shall be provided for by the well owner, as well as protection against damage during construction and use.

(h) Monitoring.

(1) Monitoring shall be required by the Director to demonstrate protection of the groundwaters of the State.

(2) In determining the type, density, frequency, and scope of monitoring, the Director shall consider the following:

(A) physical and chemical characteristics of the injection zone;

(B) physical and chemical characteristics of the injected fluid(s);

(C) volume and rate of discharge of the injected fluid(s);

(D) compatibility of the injected fluid(s) with the formation fluid(s);

(E) the number, type and location of all wells, mines, surface bodies of water, and structures within the area of review;

(F) proposed injection procedures;

(G) expected changes in pressure, formation fluid displacement, and direction of movement of injected fluid;

(H) proposals of corrective action to be taken in the event that a failure in any phase of injection operations that renders the groundwaters unsuitable for their best intended usage as defined in 15A NCAC 02L .0202; and

(I) the life expectancy of the injection operations.

(3) Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.

(4) The following analytical parameters shall be included:

(A) disinfectants and disinfection byproducts;

(B) radium, radionuclides, and gross alpha radiation;

(C) Reduction Potential (Eh), pH, Total Dissolved Solids (TDS), Biological Oxygen Demand (BOD), Total Oxygen Demand (TOD), Chemical Oxygen Demand (COD), temperature, conductivity, dissolved oxygen;

(D) coliform, Escherichia coli (E. Coli), Giardia, Cryptosporidium;

(E) parameters deemed appropriate by the Director based on the source water, injection zone formation materials, native groundwater, or any other reason deemed necessary to protect groundwater, human health, or the environment; and

(F) other parameters for which National Primary and Secondary Drinking Water Standards have been established.

(5) Analysis of the physical, chemical, biological, or radiological characteristics of the injected fluid shall be made monthly or more frequently, as necessary, in order to provide representative data for characterization of the injectant.

(6) Continuous recording devices to monitor the injection pressure, flow, rate, and volume of injected fluid shall be installed.

(7) Monitoring wells associated with the injection site shall be monitored quarterly or on a schedule determined by the Director to detect any migration of injected fluids from the injection zone.

(8) Monitoring wells completed in the injection zone and any of those zones adjacent to the injection zone may be affected by the injection operations. If affected, the Director may require additional monitor wells located to detect any movement of injection fluids, process byproducts, or formation fluids outside the injection zone as determined by the applicant in accordance with Subparagraph (b)(4) of this Rule. If the operation is affected by subsidence or catastrophic collapse, the monitoring wells shall be located so that they will not be physically affected and shall be of an adequate number to detect movement of injected fluids, process byproducts, or formation fluids outside the injection zone or area. In determining the number, location and spacing of monitoring wells, the following criteria shall be considered by the Director:

(A) the population relying on the groundwater resource affected, or potentially affected, by the injection operation;

(B) the proximity of the injection operation to points of withdrawal of groundwater;

(C) the local geology and hydrology;

(D) the operating pressures;

(E) the chemical characteristics and volume of the injected fluid, formation water, and process by products; and

(F) the density of injection wells.

(i) Reporting.

(1) A record of the construction, abandonment, or repairs of the injection well shall be submitted to the Director within 30 days of completion of the specified activities.

(2) All sampling results shall be reported to the Division quarterly, or on a frequency determined by the Director, and based on the reaction rates, injection rates, likelihood of secondary impacts, and site-specific hydrogeologic information.

(3) The results of tests required in Paragraph (f) of this Rule shall be submitted to the Director within 30 days of the completion of the test. Results may be submitted within an alternate timeframe approved by the Director.

(j) Public Notice. Public notice of intent to issue permits for applications submitted pursuant to this rule shall be given prior to permit issuance.

(1) Such notice shall:

(A) be posted on the Division website and given in press releases via media outlets having coverage within the area of review;

(B) provide 30 days for public comments to be submitted to the Director; and

(C) include a description of details of the project, such as the permit applicant; the location, number, and depth of injection wells; and the injectant type, source, and volume.

(2) After the public comment period has ended the Director shall:

(A) consider the comments submitted and determine if a public hearing is warranted;

(B) determine if the draft permit shall be issued, modified, or denied; and

(C) post notice on the Division website as of the final permitting action, which shall include the issued permit or the reason for denial if the permit was denied.

(3) In determining if a public hearing is warranted, the Director's consideration shall include the following:

(A) requests by property owners within the area of review;

(B) potential harm to the public by not having a public hearing;

(C) potential harm to the applicant due to the delay in having a public hearing; and

(D) the likelihood of obtaining new information regarding the proposed injection.

History Note: Authority G.S. 87-87; 87-88; 87-90; 87-94; 87-95; 89E-13; 89E-18; 143-211; 143-214.2(b); 143-215.1A; 143-215.3(a)(1); 143-215.3(c); 150B-19(4); 40 CFR Part 144.52(a)(7); 40 CFR Part 145.11(a)(20); Eff. May 1, 2012.

15A NCAC 02C .0220 AQUIFER TEST WELLS

(a) Aquifer Test Wells are used to inject uncontaminated fluid into an aquifer to determine the aquifer characteristics.

(b) Injection wells of this type are permitted by rule when constructed and operated in accordance with this Rule.

(c) Only potable water may be injected through this type of injection well.

(d) Tests for mechanical integrity shall be conducted in accordance with Rule .0207 of this Section.

(e) Injection wells of this type shall be constructed in accordance with the well construction standards applicable to monitoring wells specified in Rule .0108 of this Subchapter;

(f) The operation of the aquifer test well shall not cause contaminated groundwater to migrate into an area not contaminated prior to initiation of injection activities or cause a violation of applicable groundwater quality standards as specified in Subchapter 02L.

(g) Within 30 days of a change of status of the well, the owner/operator shall provide the following information:

(1) facility name, address, and location indicated by either:

(A) latitude and longitude with reference datum, position accuracy, and method of collection; or

(B) a facility site map with property boundaries;

(2) name, telephone number, and mailing address of legal contact;

(3) ownership of facility as a private individual or organization, or a federal, state, county, or other public entity;

(4) number of injection wells and their construction details; and

(5) well status as proposed, active, inactive, temporarily abandoned, or permanently abandoned.

(h) A record of the construction, abandonment, or repairs of the injection well shall be submitted to the Director within 30 days of completion of the specified activities.

History Note: *Authority G.S. 87-87; 87-88; 87-90; 87-94; 87-95; 89E-13; 89E-18; 143-211; 143-214.2(b); 143-215.1A; 143-215.3(a)(1); 143-215.3(c); 150B-19(4); 40 CFR Part 144.52(a)(7); 40 CFR Part 145.11(a)(20); Eff. May 1, 2012.*

15A NCAC 02C .0221 EXPERIMENTAL TECHNOLOGY WELLS

Experimental Technology Wells are used in experimental or unproven technologies where operation is in compliance with all appropriate rules and statutes. Rule requirements for Experimental Technology Wells shall be evaluated and treated as one of the injection well types in Rule .0209(5)(b) of this Section that the Director determines most closely resembles the equivalent hydrogeologic complexity and potential to adversely affect groundwater quality. The Director may impose additional requirements for the protection of human health and the environment based on site specific criteria, existing or projected environmental impacts, compliance with the provisions of the rules of this Section, or the compliance history of the facility owner.

History Note: *Authority G.S. 87-87; 87-88; 87-90; 87-94; 87-95; 89E-13; 89E-18; 143-211; 143-214.2(b); 143-215.1A; 143-215.3(a)(1); 143-215.3(c); 150B-19(4); 40 CFR Part 144.52(a)(7); 40 CFR Part 145.11(a)(20); Eff. May 1, 2012.*

15A NCAC 02C .0222 GEOTHERMAL AQUEOUS CLOSED-LOOP WELLS

(a) Geothermal Aqueous Closed-Loop Wells are used to house a subsurface system of closed-loop pipe that circulates potable water only or a mixture of potable water and performance-enhancing additives such as antifreeze, corrosion inhibitors, or scale inhibitors for heating and cooling purposes. Only additives that the Department of Health and Human Services' Division of Public Health determines not to adversely affect human health shall be used.

(b) Permitted by Rule. All Aqueous Closed-Loop Geothermal Wells are permitted by rule when constructed and operated in accordance with the rules of this Section.

(c) Individual Permits. If an individual permit is required pursuant to Rule .0217 of this Section, then an application for permit renewal shall be made at least 120 days prior to the expiration date of the permit.

(d) Notification. In addition to the requirements set forth in Rule .0211 of this Section, notification for systems designed to serve a single family residence shall be submitted at least two business days prior to construction and at least 30 days for all other installations. The notification shall be submitted to the Director and to the county health department. The notification shall be on forms supplied by the Director and shall include:

(1) the well owner's name, address, telephone number, email address (if available), and status as a federal, state, private, public, or other activity. If the well operator is different from the owner then the same information shall be provided for the well operator.

(2) the physical location of the well facility;

(3) a description of the proposed injection activities;

(4) a scaled, site-specific map showing the following:

(A) any water supply well and surface water body; septic system including drainfield, waste application area, and repair area; and any other potential sources of contamination listed in Subparagraph (e)(5) of this Rule within 250 feet of the proposed injection well(s);

(B) property boundaries within 250 feet of the parcel on which the proposed wells are located; and

(C) an arrow orienting the site to one of the cardinal directions;

(5) the types and concentrations of additives, if any, to be used in the closed-loop geothermal well system. All proposed additives not already approved for use at the time of application submittal shall be subject to a health risk evaluation. Only approved additives shall be used in any closed loop geothermal well system;

(6) plans and specifications of the surface and subsurface construction details of the system;

(7) the heating/cooling system installation contractor's name and certification number, address, email address (if available), and telephone number;

(8) description of how the items identified in Part (d)(4)(A) of this Rule will be protected during well construction; and

(9) such other information as deemed necessary by the Director for the protection of human health and the environment.

(e) Well Construction.

(1) Only tubing that meets the specifications in Chapter 12 of the North Carolina Mechanical Code shall be used.

(2) Drilling fluids and water produced during well construction shall be managed in such a way as to prevent direct discharges to surface waters as well as violations of groundwater and surface water quality standards. Plans for such preventive measures shall be retained onsite for use throughout the construction process.

(3) The well shall be constructed in such a manner that surface water or contaminants from the land surface cannot migrate along the borehole annulus at any time during or after construction.

(4) The well shall be located such that:

(A) the injection well is not in an area where surface water or runoff will accumulate around the well due to depressions, drainage ways, or other landscape features that will concentrate water around the well; and

(B) the injection well is not in an area that requires a person to enter confined spaces to perform sampling and inspection activities.

(5) The minimum horizontal separation from potential sources of groundwater contamination that exist at the time the well(s) are constructed shall be as follows, unless it can be demonstrated to the Director's satisfaction that a lesser separation distance will not adversely affect human health or cause a violation of a groundwater quality standard as specified in Subchapter 02L:

(A)	Building perimeters, including any attached structures	15 feet
(B)	Septic systems including drainfield, waste application area, and repair area	50 feet
(C)	Sewage or liquid-waste collection or transfer facilities constructed to water main standards in accordance with 15A NCAC 02T .0305(g)(2) or Rule .1950(e) of Subchapter 18A, as applicable	15 feet
(D)	Sewage or liquid-waste collection or transfer facilities not constructed to water main standards in accordance with 15A NCAC 02T .0305(g)(2) or 15A NCAC 18A .1950(e), as applicable	25 feet
(E)	Chemical or petroleum fuel underground storage tank systems regulated under 15A NCAC 02N with secondary containment	50 feet
(F)	Chemical or petroleum fuel underground storage tank systems regulated under 15A NCAC 02N without secondary containment	100 feet
(G)	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
(H)	Land-based or subsurface waste storage or disposal systems	50 feet
(I)	Gravesites	50 feet
(J)	Any other potential sources of contamination	50 feet

(6) The methods and materials used in construction shall not threaten the physical and mechanical integrity of the well and any tubing during its lifetime and shall be compatible with the proposed injection activities.

(7) Drilling fluids and additives shall contain only potable water and may be comprised of one or more of the following:

(A) the formation material encountered during drilling;

(B) materials manufactured specifically for the purpose of borehole conditioning or well construction; or

(C) materials approved by the Director, based on a demonstration of not adversely affecting human health or the environment.

(8) Allowable grouts listed under Rule .0107 of this Subchapter shall be used with the exception that bentonite chips or pellets shall not be used.

(9) Bentonite grout shall not be used:

(A) to seal zones of water with a chloride concentration of 1,500 milligrams per liter or greater as determined by tests conducted at the time of construction, or

(B) in areas of the State subject to saltwater intrusion that may expose the grout to water with a chloride concentration of 1,500 milligrams per liter or greater at any time during the life of the well.

(10) No additives that will accelerate the process of hydration shall be used in grout for thermoplastic well casing.

(11) Grout shall be placed the entire length of the well boring from the bottom of the boring to land surface or, if completed below land surface, to the well header or manifold connection.

(12) The grout shall be emplaced 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 borehole or 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 borehole or 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 borehole or 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 borehole or annular space at the time of grouting.

(13) If temporary outer casing is installed, it shall be removed during grouting of the borehole in such a way that maintains the integrity of the borehole and uniform grout coverage around the geothermal tubing.

(14) If a permanent outer casing is installed:

(A) The space between the interior wall of the casing and the geothermal tubing shall be grouted the entire length of the well boring from the bottom of the boring to land surface or, if completed below land surface, to the well header or manifold connection;

(B) The annular space between the casing and the borehole shall be grouted with a grout that is non-reactive with the casing or the formation;

(C) Grout shall extend outward in all directions from the casing wall to borehole wall and have a minimum thickness equal to either one-third of the diameter of the outside dimension of the casing or two inches, whichever is greater; and

(D) In no case shall a well be required to have an annular grout seal thickness greater than four inches.

(15) Grout emplacement shall not threaten the physical or mechanical integrity of the well.

(16) The well shall be grouted within seven days after drilling is complete or before the drilling equipment leaves the site, whichever occurs first.

(17) Prior to removing the 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, to preclude contaminants from entering the well.

(18) Well head completion shall be conducted in such a manner so as to preclude surficial contaminants from entering the well.

(f) Well Location. The location of each well boring and appurtenant underground piping leading to the heat exchanger(s) shall be identifiable such that they may be located, repaired, and abandoned as necessary after construction.

(1) The as-built locations of each well boring, header pit, and appurtenant underground piping shall be recorded on a scaled site-specific facility map, which shall be retained onsite and distributed as specified in Subparagraph (i)(1) of this Rule.

(2) Each well boring and header pit shall be located by a North Carolina registered land surveyor, a GPS receiver, or by triangulation from at least two permanent features on the site, such as building foundation corners or property boundary iron pins.

(3) Well boring and appurtenant underground piping locations shall be identifiable in the field by tracer wire and warning tape, concrete monuments, or any other method approved by the Director upon a demonstration that such a method provides a reliable and accurate method of detection.

(4) If tracer wire and warning tape are used, then tracer wire consisting of copper wire of at least 14 gauge shall be placed adjacent to all horizontal piping during pipe installation, and warning tape shall be installed directly above the horizontal piping approximately 12 inches below final grade.

(5) If concrete monuments are used, then each monument shall be located directly above each individual well, at the perimeter corners of each well field, or in the center of each well cluster. Each concrete monument shall be permanently affixed with an identification plate constructed of durable, weatherproof, rustproof metal or other material approved by the Director as equivalent, which shall be stamped with the following information:

(A) well contractor name and certification number;

(B) number and depth of the boring(s);

(C) grout depth interval;

(D) well construction completion date; and

(E) identification as a geothermal well/well field.

(g) Testing.

(1) Closed loop tubing shall pass a pressure test on-site prior to installation into the borehole. Any closed loop tubing that fails the pressure test shall either not be used or have the leaks located and repaired plus pass a subsequent pressure test prior to installation.

(2) The closed loop well system shall pass a pressure test after installation and prior to operation. Any pressure fluctuation other than that due to thermal expansion and contraction of the testing medium shall be considered a failed test. Any leaks shall be located and repaired prior to operating the system.

(h) Operation.

(1) The well shall be afforded protection against damage during construction and use.

(2) The well shall be operated and maintained in accordance with the manufacturer's specifications throughout its operating life.

(i) Monitoring and Reporting.

(1) The well owner shall submit the as-built well locations as documented in accordance with Paragraph (f) of this Rule to the Director and applicable county health department. The well owner shall also record these documents with the register of deeds of the county in which the facility is located.

(2) Upon sale or transfer of the property, the owner shall give a copy of these records to the new property owner(s).

(3) The Director may require any monitoring necessary to demonstrate protection of waters of the state to the level of the applicable groundwater standards.

(4) The permitee shall report any leaks to the Division during the lifetime of the well.

(5) A record of the construction, abandonment, or repairs of the injection well shall be submitted to the Director within 30 days of completion of the specified activities.

History Note: *Authority G.S. 87-87; 87-88; 87-90; 87-94; 87-95; 89E-13; 89E-18; 143-211; 143-214.2(b); 143-215.1A; 143-215.3(a)(1); 143-215.3(c); 150B-19(4); 40 CFR Part 144.52(a)(7); 40 CFR Part 145.11(a)(20); Eff. May 1, 2012.*

15A NCAC 02C .0223 GEOTHERMAL DIRECT EXPANSION CLOSED-LOOP WELLS

(a) Geothermal Direct Expansion Closed-Loop Wells are used to house a subsurface system of closed-loop pipe that circulates refrigerant gas for heating and cooling purposes. Only gasses that the Department of Health and Human Services' Division of Public Health determines not to adversely affect human health shall be used.

(b) Permitted by Rule. All Direct Expansion Closed-Loop Geothermal Wells are permitted by rule when constructed and operated in accordance with the rules of this Section.

(c) Individual Permits. If an individual permit is required pursuant to Rule .0217 of this Section, then an application for permit renewal shall be made at least 120 days prior to the expiration date of the permit.

(d) Notification. In addition to the requirements set forth in Rule .0211 of this Section, notification for systems designed to serve a single family residence shall be submitted at least two business days prior to construction and at least 30 days for all other installations. The notification shall be submitted to the Director and to the county health department. The notification shall be on forms supplied by the Director and shall include:

(1) the well owner's name, address, telephone number, email address (if available), and status as a federal, state, private, public, or other activity. If the well operator is different from the owner then the same information shall be provided for the well operator.

(2) the physical location of the well;

(3) a description of the proposed injection activities;

(4) a scaled, site specific map showing the following:

(A) any water supply well and surface water body; septic system including drainfield, waste application area, and repair area; and any other potential sources of contamination listed in Subparagraph (e)(6) of this Rule within 250 feet of the proposed injection well(s);

(B) property boundaries within 250 feet of the parcel on which the proposed wells are located; and

(C) an arrow orienting the site to one of the cardinal directions;

(5) the type of gas to be used in the closed-loop geothermal well system. All proposed gases not already approved for use at the time of application submittal shall be subject to a health risk evaluation. Only approved gases shall be used in any closed loop geothermal well system;

(6) plans and specifications of the surface and subsurface construction details of the system;

(7) the heating/cooling system installation contractor's name and certification number, address, email address (if available), and telephone number;

(8) description of how the items identified in Part (d)(4)(A) of this Rule will be protected during well construction; and

(9) such other information as deemed necessary by the Director for the protection of human health and the environment.

(e) Well Construction.

(1) Only tubing that meets the specifications in Chapter 12 of the North Carolina Mechanical Code shall be used.

(2) All systems shall be constructed with cathodic protection unless testing conducted in accordance with Paragraph (g) of this Rule indicates that all pH test results are within the range of 5.5 to 11.0 standard units.

(3) Drilling fluids and water produced during well construction shall be managed in such a way as to prevent direct discharges to surface waters as well as violations of groundwater and surface water quality standards. Plans for such preventive measures shall be retained onsite for use throughout the construction process.

(4) The well shall be constructed in such a manner that surface water or contaminants from the land surface cannot migrate along the borehole annulus at any time during or after construction.

(5) The well shall be located such that:

(A) the injection well is not in an area where surface water or runoff will accumulate around the well due to depressions, drainage ways, or other landscape features that will concentrate water around the well; and

(B) the injection well is not in an area that requires a person to enter confined spaces to perform sampling and inspection activities.

(6) The minimum separation distance of the entire length of the borehole from potential sources of groundwater contamination that exist at the time the well(s) are constructed shall be as follows, unless it can be demonstrated to the Director's satisfaction that a lesser separation distance will not adversely affect human health or cause a violation of a groundwater quality standard as specified in Subchapter 02L:

(A) Building perimeters, including any attached structures 15 feet

(B) Septic systems including drainfield, waste application area, and repair area 50 feet

(C) Sewage or liquid-waste collection or transfer facilities constructed to water main standards in accordance with 15A NCAC 02T .0305(g)(2) or 15A NCAC 18A .1950(e), as applicable 15 feet

(D) Sewage or liquid-waste collection or transfer facilities not constructed to water main standards in accordance with 15A NCAC 02T .0305(g)(2) or 15A NCAC 18A .1950(e), as applicable 25 feet

(E) Chemical or petroleum fuel underground storage tank systems regulated under 15A NCAC 02N with secondary containment 50 feet

(F) Chemical or petroleum fuel underground storage tank systems regulated under 15A NCAC 02N without secondary containment 100 feet

(G) 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

(H) Land-based or subsurface waste storage or disposal systems 50 feet

(I) Gravesites 50 feet

(J) Any other potential sources of contamination 50 feet

(7) Angled boreholes shall not be drilled in the direction of underground petroleum or chemical storage tanks unless it can be demonstrated to the satisfaction of the Director that doing so will not adversely affect human health or cause a violation of a groundwater quality standard as specified in Subchapter 02L.

(8) The methods and materials used in construction shall not threaten the physical and mechanical integrity of the well during its lifetime and shall be compatible with the proposed injection activities.

(9) Drilling fluids and additives shall contain only potable water and may be comprised of one or more of the following:

(A) the formation material encountered during drilling;

(B) materials manufactured specifically for the purpose of borehole conditioning or well construction; or

(C) materials approved by the Director, based on a demonstration of not adversely affecting human health or the environment.

(10) Allowable grouts listed under Rule .0107 of this Subchapter shall be used with the exception that bentonite chips or pellets shall not be used.

(11) Bentonite grout shall not be used:

(A) to seal zones of water with a chloride concentration of 1,500 milligrams per liter or greater as determined by tests conducted at the time of construction, or

(B) in areas of the State subject to saltwater intrusion that may expose the grout to water with a chloride concentration of 1,500 milligrams per liter or greater at any time during the life of the well.

(12) No additives that will accelerate the process of hydration shall be used in grout for thermoplastic well casing.

(13) Grout shall be placed the entire length of the well boring from the bottom of the boring to land surface or, if completed below land surface, to the well header or manifold connection.

(14) The grout shall be emplaced 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 borehole or annular area space 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 borehole or 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 borehole or 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 borehole or annular space at the time of grouting.

(15) If temporary outer casing is installed, it shall be removed during grouting of the borehole in such a way that maintains the integrity of the borehole and uniform grout coverage around the geothermal tubing.

(16) If a permanent outer casing is installed:

(A) The space between the interior wall of the casing and the geothermal tubing shall be grouted the entire length of the well boring from the bottom of the boring to land surface or, if completed below land surface, to the well header or manifold connection.

(B) The annular space between the casing and the borehole shall be grouted with a grout that is non-reactive with the casing or the formation.

(C) Grout shall extend outward in all directions from the casing wall to borehole wall and have a minimum thickness equal to either one-third of the diameter of the outside dimension of the casing or two inches, whichever is greater; and

(D) In no case shall a well be required to have an annular grout seal thickness greater than four inches.

(17) Grout emplacement shall not threaten the physical or mechanical integrity of the well.

(18) The well shall be grouted within seven days after drilling is complete or before the drilling equipment leaves the site, whichever occurs first.

(19) Prior to removing the 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, to preclude contaminants from entering the well.

(20) Well head completion shall be conducted in such a manner so as to preclude surficial contaminants from entering the well.

(f) Well Location. The location of each well boring and appurtenant underground piping leading to the heat exchanger(s) shall be identifiable such that they may be located, repaired, and abandoned as necessary after construction.

(1) The as-built locations of each well boring, header pit, and appurtenant underground piping shall be recorded on a scaled site-specific facility map, which shall be retained onsite and distributed as specified in Subparagraph (i)(1) of this Rule.

(2) Each well boring and header pit shall be located by a North Carolina registered land surveyor, a GPS receiver, or by triangulation from at least two permanent features on the site, such as building foundation corners or property boundary iron pins.

(3) Well boring and appurtenant underground piping locations shall be identifiable in the field by tracer wire and warning tape, concrete monuments, or any other method approved by the Director upon a demonstration that such a method provides a reliable and accurate method of detection.

(4) If tracer wire and warning tape are used, then tracer wire consisting of copper wire of at least 14 gauge shall be placed adjacent to all horizontal piping during pipe installation, and warning tape shall be installed directly above the horizontal piping approximately 12 inches below final grade.

(5) If concrete monuments are used, then each monument shall be located directly above each individual well, at the perimeter corners of each well field, or in the center of each well cluster. Each concrete monument shall be permanently affixed with an identification plate constructed of durable, weatherproof, rustproof metal or other material approved by the Director as equivalent, which shall be stamped with the following information:
(A) well contractor name and certification number;
(B) number and depth of the boring(s);
(C) grout depth interval;
(D) well construction completion date; and
(E) identification as a geothermal well/well field.

(g) Testing.
(1) Closed loop tubing shall pass a pressure test on-site prior to installation into the borehole. Any closed loop tubing that fails the pressure test shall either not be used or have the leaks located and repaired plus pass a subsequent pressure test prior to installation.
(2) The closed loop well system shall pass a pressure test after installation and prior to operation. Any pressure fluctuation other than that due to thermal expansion and contraction of the testing medium shall be considered a failed test. Any leaks shall be located and repaired prior to operating the system.
(3) When not providing cathodic protection as specified in Subparagraph (e)(2) of this Rule drilling cuttings shall be tested for pH at a frequency of at least every 10 feet of boring length using a pH meter that has been calibrated prior to use according to the manufacturer's instructions.

(h) Operation.
(1) The well shall be afforded protection against damage during construction and use.
(2) The well shall be operated and maintained in accordance with the manufacturer's specifications throughout its operating life. Cathodic protection, if required, shall be maintained at all times in accordance with the manufacturer's specifications throughout the operating life of the well(s).

(i) Monitoring and Reporting.
(1) The well owner shall submit the as-built well locations as documented in accordance with Paragraph (f) of this Rule to the Director and applicable county health department. The well owner shall also record these documents with the register of deeds of the county in which the facility is located.
(2) Upon sale or transfer of the property, the owner shall give a copy of these records to the new property owner(s).
(3) The Director may require any monitoring necessary to demonstrate protection of waters of the state to the level of the applicable groundwater standards.
(4) The permitee shall report any leaks to the Division during the lifetime of the well.
(5) A record of the construction, abandonment, or repairs of the injection well shall be submitted to the Director within 30 days of completion of the specified activities.

History Note: *Authority G.S. 87-87; 87-88; 87-90; 87-94; 87-95; 89E-13; 89E-18; 143-211; 143-214.2(b); 143-215.1A; 143-215.3(a)(1); 143-215.3(c); 150B-19(4); 40 CFR Part 144.52(a)(7); 40 CFR Part 145.11(a)(20); Eff. May 1, 2012.*

15A NCAC 02C .0224 GEOTHERMAL HEATING/COOLING WATER RETURN WELLS

(a) Geothermal Heating/Cooling Water Return Wells reinject groundwater used to provide heating or cooling for structures. These wells may be approved by the Director only if the temperature of the injection fluid is not in excess of 30 degrees Fahrenheit above or below the naturally occurring temperature of the receiving groundwater. This includes wells using a geothermal fluid source. All Geothermal Heating/Cooling Water Return Wells require a permit.

(b) Permit Applications. In addition to the permit requirements set forth in Rule .0211 of this Section, an application shall be submitted, in duplicate, to the Director on forms furnished by the Director and shall include the following:
(1) the well owner's name, address, telephone number, email address (if available), and status as a federal, state, private, public, or other activity. If the well operator is different from the owner then the same information shall be provided for the well operator.
(2) the physical address of the location of the well site if different than the well owner's mailing address;
(3) a description of the injection activities proposed by the applicant;
(4) a scaled, site-specific map showing at a minimum, the following:

(A) any water supply well and surface water body; septic system including drainfield, waste application area, and repair area; and any other potential sources of contamination listed under Rule .0107 of this Subchapter within 250 feet of the proposed injection well(s);

(B) property boundaries within 250 feet of the parcel on which the proposed wells are located; and

(C) an arrow orienting the site to one of the cardinal directions;

(5) the proposed average and maximum daily injection rate, volume, pressure, temperature, and quantity of fluid to be injected;

(6) plans and specifications of the surface and subsurface construction details of the system including a schematic of the injection and source well(s) construction;

(7) the heating/cooling system installation contractor's name, address, email address (if available), and telephone number; and

(8) such other information as deemed necessary by the Director for the protection of human health and the environment.

(c) Permit Renewals. Application for permit renewal shall be made at least 120 days prior to the expiration date of the permit.

(d) Well Construction.

(1) The water supply well shall be constructed in accordance with the requirements of Rule .0107 of this Subchapter.

(2) If a separate injection well is used then it shall also be constructed in accordance with the requirements of Rule .0107 of this Subchapter except that the entire length of the casing shall be grouted from the top of the gravel pack to the land surface in such a way that there is no interconnection of aquifers or zones having differences in water quality that would result in degradation of any aquifer or zone.

(3) For open-end wells, the casing shall be grouted from the bottom of the casing to the land surface in such a way that there is no interconnection of aquifers or zones having differences in water quality that would result in degradation of any aquifer or zone.

(4) The injection well system shall be constructed such that a sampling tap or other collection equipment approved by the Director provides a functional source of water when the system is operational. Such equipment shall provide the means to collect a water sample immediately after emerging from the water supply well and immediately prior to injection into the return well.

(e) Operation and Maintenance.

(1) Pressure at the well head shall be limited to a maximum which will ensure that the pressure in the injection zone does not initiate new fractures or propagate existing fractures in the injection zone, initiate fractures in the confining zone, or cause the migration of injected or formation fluids outside the injection zone or area.

(2) Injection between the outermost casing and the well borehole is prohibited.

(3) Monitoring of the operating processes shall be provided for by the well owner, as well as protection against damage during construction and use.

(f) Monitoring and Reporting.

(1) Monitoring of any well may be required by the Director as necessary to demonstrate adequate protection of waters of the state to the level of applicable groundwater standards.

(2) The well owner shall retain copies of records of any site maps showing the location of the injection wells, and any testing, calibration, or monitoring information done on-site. Upon sale or transfer of the property, the owner shall give a copy of these records to the new property owner(s).

(3) The permittee shall record the number and location of the wells with the register of deeds in the county in which the facility is located.

(4) A record of the construction, abandonment, or repairs of the injection well shall be submitted to the Director within 30 days of completion of the specified activities.

History Note: *Authority G.S. 87-87; 87-88; 87-90; 87-94; 87-95; 89E-13; 89E-18; 143-211; 143-214.2(b); 143-215.1A; 143-215.3(a)(1); 143-215.3(c); 150B-19(4); 40 CFR Part 144.52(a)(7); 40 CFR Part 145.11(a)(20); Eff. May 1, 2012.*

15A NCAC 02C .0225 GROUNDWATER REMEDIATION WELLS

(a) Groundwater Remediation Wells are used to inject additives, treated groundwater, or ambient air for the treatment of contaminated soil or groundwater. Only additives that the Department of Health and Human Services' Division of Public Health determines not to adversely affect human health shall be approved for injection. When on-site contaminated

groundwater is used, the groundwater remediation injection wells shall be permitted in accordance with 15A NCAC 02T .1600.

(b) Permitted by Rule. The following are permitted by rule pursuant to Rule .0217 of this Section when constructed and operated in accordance with the rules of this Section, all criteria for the specific injection system are met, hydraulic or pneumatic fracturing are not conducted, and the injection wells or injection activities do not result in the violation of any groundwater or surface water standard outside the injection zone:

(1) Passive Injection Systems. Injection wells that use in-well delivery systems to diffuse injectants into the subsurface;

(2) Small-scale Injection Operations. Injection wells used to remediate contaminant plumes located within a land surface area not to exceed 10,000 square feet;

(3) Pilot Tests. Preliminary studies conducted for the purpose of evaluating the technical feasibility of a remediation strategy in order to develop a full scale remediation plan for future implementation, and where the surface area of the injection zone wells are located within an area that does not exceed five percent of the land surface above the known extent of groundwater contamination. Pilot tests may involve multiple injection wells, injection events, and injectants within the specified area. An individual permit shall be required to conduct more than one pilot test on any separate groundwater contaminant plume;

(4) Air Injection Wells. Injection wells used to inject ambient air to enhance in-situ treatment of groundwater.

(A) The air to be injected shall not exceed the ambient air quality standards set forth in 15A NCAC 02D .0400 and shall not contain petroleum or any other constituent that would cause a violation of groundwater standards specified in Subchapter 02L; and

(B) Injection wells of this type shall be constructed in accordance with the well construction standards applicable to monitoring wells specified in Rule .0108 of this Subchapter.

(c) Notification for Groundwater Remediation Wells described in Subparagraphs (b)(1) through (b)(3) of this Rule. Notification shall be submitted to the Director two weeks prior to injection on forms supplied by the Director. Such notification shall include the following:

(1) name and contact information of the well owner;

(2) name and contact information of the person who can answer technical questions about the proposed injection system if different from the well owner;

(3) geographic coordinates of the injection well or well field;

(4) maps of the injection zone relative to the known extent of contamination such as:

(A) contaminant plume map(s) with isoconcentration lines that show the horizontal extent of the contaminant plume in soil and groundwater, existing and proposed monitoring wells, and existing and proposed injection wells; and

(B) cross-section(s) to the known or projected depth of contamination that show the horizontal and vertical extent of the contaminant plume in soil and groundwater, changes in lithology, existing and proposed monitoring wells, and existing and proposed injection wells;

(5) purpose, scope, and goals of the proposed injection activity;

(6) name, volume, concentration, and Material Safety Data Sheet of each injectant;

(7) schedule of injection well construction and injection activities;

(8) plans and specifications of each injection well or well system, which include:

(A) the number and depth of injection wells;

(B) indication whether the injection wells are existing or proposed;

(C) well contractor name and certification number; and

(D) indication of whether the injection wells are permanent wells, "direct push" temporary injection wells, or are subsurface distribution systems; and

(9) description of monitoring plan capable of determining if violations of groundwater quality standards specified in Subchapter 02L result from the injection activity.

(d) Notification for Air Injection Wells described in Subparagraph (b)(4) of this Rule shall be submitted to the Director two weeks prior to injection on forms supplied by the Director. Such notification shall include the following:

(1) facility name, address, and location indicated by either:

(A) latitude and longitude with reference datum, position accuracy, and method of collection; or

(B) a facility site map with property boundaries;

(2) name, telephone number, and mailing address of legal contact;

(3) ownership of facility as a private individual or organization, or a federal, state, county, or other public entity;

(4) number of injection wells and their construction details; and

(5) operating status as proposed, active, inactive, temporarily abandoned, or permanently abandoned.

(e) Permit Applications for all Groundwater Remediation Wells not Permitted by Rule. In addition to the permit requirements set forth in Rule .0211 of this Section, an application shall be submitted, in duplicate, to the Director on forms furnished by the Director and shall include the following:

(1) site description and incident information that include the following:

(A) name of the well owner or person otherwise legally responsible for the injection wells, mailing address, telephone number, and status as a federal, state, private, public, or other entity;

(B) name of the property owner, if different from the well owner, physical address, mailing address, and telephone number;

(C) name, mailing address, telephone number, and geographic coordinates of the facility for which the application is submitted and a brief description of the nature of the business;

(D) a description of the contamination incident including the source, type, cause, and release date(s) of the contamination; a list of all contaminants in the affected soil or groundwater; the presence and thickness of free product; and the maximum contaminant concentrations detected in the affected soil and groundwater;

(E) the state agency responsible for management of the contamination incident, including the incident tracking number, and the incident manager's name and telephone number; and

(F) a list of all permits issued for the facility or contamination incident, including: Hazardous Waste Management program permits or approval under the Resource Conservation and Recovery Act (RCRA), waste disposal permits issued in accordance with G.S. 143-215.1, Sewage Treatment and Disposal Permits issued in accordance with G.S. 130A, and any other environmental permits required by state or federal law.

(2) Injection Zone Determination. The applicant shall specify the horizontal and vertical portion of the injection zone within which the proposed injection activity shall occur based on the hydraulic properties of that portion of the injection zone specified. No violation of groundwater quality standards specified in Subchapter 02L resulting from the injection shall occur outside the specified portion of the injection zone as detected by a monitoring plan approved by the Division.

(3) Hydrogeologic Evaluation. If required by G.S. 89E, G.S. 89C, or G.S. 89F, a licensed geologist, professional engineer, or licensed soil scientist shall prepare a hydrogeologic evaluation of the facility to a depth that includes the injection zone determined in accordance with Subparagraph (e)(2) of this Rule. The hydrogeologic description shall include all of the following:

(A) regional and local geology and hydrogeology;

(B) changes in lithology underlying the facility;

(C) depth to bedrock;

(D) depth to the mean seasonal high water table;

(E) hydraulic conductivity, transmissivity, and storativity, of the injection zone based on tests of site-specific material, including a description of the test(s) used to determine these parameters;

(F) rate and direction of groundwater flow as determined by predictive calculations or computer modeling; and

(G) lithostratigraphic and hydrostratigraphic logs of test and injection wells.

(4) Area of Review. The area of review shall be calculated using the procedure for determining the zone of endangering influence specified in 40 CFR 146.6(a). The applicant must identify all wells within the area of review that penetrate the injection or confining zone, and repair or permanently abandon all wells that are improperly constructed or abandoned.

(5) Injectant Information. The applicant shall submit the following information for each proposed injectant:

(A) injectant name and manufacturer, concentration at the point of injection, and percentage if present in a mixture with other injectants;

(B) the chemical, physical, biological, or radiological characteristics necessary to evaluate the potential to adversely affect human health or groundwater quality;

(C) the source of fluids used to dilute, carry, or otherwise distribute the injectant throughout the injection zone as determined in accordance with Subparagraph (e)(2) of this Rule. If any well within the area of review of the injection facility is to be used as the fluid source, then the

following information shall be submitted: location/ID number, depth of source, formation, rock/sediment type, and a chemical analysis of the water from the source well, including analyses for all contaminants suspected or historically recognized in soil or groundwater on the site;

(D) a description of the rationale for selecting the injectants and concentrations proposed for injection, including an explanation or calculations of how the proposed injectant volumes and concentrations were determined;

(E) a description of the reactions between the injectants and the contaminants present including specific breakdown products or intermediate compounds that may be formed by the injection;

(F) a summary of results if modeling or testing was performed to investigate the injectant's potential or susceptibility for biological, chemical, or physical change in the subsurface; and

(G) an evaluation concerning the development of byproducts of the injection process, including increases in the concentrations of naturally occurring substances. Such an evaluation shall include the identification of the specific byproducts of the injection process, projected concentrations of byproducts, and areas of migration as determined through modeling or other predictive calculations.

(6) Injection Procedure. The applicant shall submit a detailed description of the proposed injection procedure that includes the following:

(A) the proposed average and maximum daily rate and quantity of injectant;

(B) the average maximum injection pressure expressed in units of pounds per square inch (psi); and

(C) the total or estimated total volume to be injected.

(7) Fracturing Plan. If hydraulic or pneumatic fracturing is proposed, then the applicant shall submit a detailed description of the fracturing plan that includes the following:

(A) Material Safety Data Sheets of fracturing media including information on any proppants used;

(B) a map of fracturing well locations relative to the known extent of groundwater contamination plus all buildings, wells, septic systems, underground storage tanks, and underground utilities located within the Area of Review as described in Subparagraph (e)(4) of this Rule;

(C) a demonstration that buildings, wells, septic systems, underground storage tanks, and underground utilities will not be adversely affected by the fracturing process;

(D) injection rate and volume;

(E) orientation of bedding planes, joints, and fracture sets of the fracture zone;

(F) performance monitoring plan for determining the fracture well radius of influence; and

(G) if conducted, the results of geophysical testing or pilot demonstration of fracture behavior conducted in an uncontaminated area of the site.

(8) Injection well construction details including:

(A) number and depth of injection wells;

(B) number and depth of borings if using multi-level or "nested" well systems;

(C) indication whether the injection wells are existing or proposed;

(D) depth and type of casing;

(E) depth and type of screen material;

(F) depth and type of grout;

(G) indication whether the injection wells are permanent or temporary "direct push" points; and

(H) plans and specifications of the surface and subsurface construction details of each injection well or well system.

(9) Monitoring Wells. Monitoring wells shall be of sufficient quantity and location as determined by the Director so as to detect any movement of injection fluids, injection process byproducts or formation fluids outside the injection zone as determined by the applicant in accordance with Subparagraph (e)(2) of this Rule. The monitoring schedule shall be consistent with the proposed injection schedule, pace of the anticipated reactions, and rate of transport of the injectants and contaminants. The applicant shall submit a monitoring plan that includes the following:

(A) target contaminants plus secondary or intermediate contaminants that may result from the injection;

(B) other parameters that may serve to indicate the progress of the intended reactions;

(C) a list of existing and proposed monitoring wells to be used; and

(D) a sampling schedule to monitor the proposed injection.

(10) Well Data Tabulation. A tabulation of data on all existing or abandoned wells within the area of review of the injection well(s) that penetrate the proposed injection zone, including monitoring wells and wells proposed for use as injection wells. Such data shall include a description of each well's type, depth, record of abandonment or completion, and any additional information the Director may require.

(11) Maps and Cross-Sections. Scaled, site-specific site plans or maps depicting the location, orientation, and relationship of facility components including the following:

(A) area map based on the most recent USGS 7.5' topographic map of the area, at a scale of 1:24,000 and showing the location of the proposed injection site;

(B) topographic contour intervals showing all facility related structures, property boundaries, streams, springs, lakes, ponds, and other surface drainage features;

(C) all existing or abandoned wells within the area of review of the injection well(s), listed in the tabulation required in Subparagraph (e)(10) of this Rule, that penetrate the proposed injection zone, including, water supply wells, monitoring wells, and wells proposed for use as injection wells;

(D) potentiometric surface map(s) that show the direction of groundwater movement, existing and proposed wells;

(E) contaminant plume map(s) with isoconcentration lines that show the horizontal extent of the contaminant plume in soil and groundwater, and existing and proposed wells;

(F) cross-section(s) to the known or projected depth of contamination that show the horizontal and vertical extent of the contaminant plume in soil and groundwater, major changes in lithology, and existing and proposed wells; and

(G) any existing sources of potential or known groundwater contamination, including waste storage, treatment, or disposal systems within the area of review of the injection well or well system.

(12) Such other information as deemed necessary by the director for the protection of human health and the environment.

(f) Injection Volumes. The Director may establish maximum injection volumes and pressures necessary to assure that:

(1) fractures are not initiated in the confining zone of the injection zone determined in accordance with Subparagraph (e)(2) of this Rule;

(2) injected fluids do not migrate outside the injection zone or area;

(3) injected fluids and fractures do not cause or contribute to the migration of contamination into uncontaminated areas; and

(4) there is compliance with operating requirements.

(g) Well Construction.

(1) Wells shall not be located where:

(A) surface water or runoff will accumulate around the well due to depressions, drainage ways, or other landscapes that will concentrate water around the well;

(B) a person would be required to enter confined spaces to perform sampling and inspection activities; and

(C) injectants or formation fluids would migrate outside the approved injection zone as determined by the applicant in accordance with Subparagraph (e)(2) of this Rule.

(2) Wells used for hydraulic or pneumatic fracturing shall be located within the extent of known groundwater contamination but no closer than 75 feet to this boundary unless it can be demonstrated to the satisfaction of the Director that a lesser separation distance will not adversely affect human health or cause a violation of a groundwater quality standard as specified in Subchapter 02L, such as through the use of directional fracturing.

(3) The methods and materials used in construction shall not threaten the physical and mechanical integrity of the well during its lifetime and shall be compatible with the proposed injection activities.

(4) The well shall be constructed in such a manner that surface water or contaminants from the land surface cannot migrate along the borehole annulus either during or after construction.

(5) The borehole shall not penetrate to a depth greater than the depth at which injection will occur unless the purpose of the borehole is the investigation of the geophysical and geochemical characteristics of an aquifer. Following completion of the investigation the borehole beneath the zone of injection shall be grouted completely to prevent the migration of any contaminants.

(6) For "direct-push" temporary injection wells constructed without permanent or temporary casing, injection and well abandonment activities shall be conducted within the same working day as when the borehole is constructed.

(7) Drilling fluids and additives shall contain only potable water and may be comprised of one or more of the following:

- (A) the formation material encountered during drilling;
- (B) materials manufactured specifically for the purpose of borehole conditioning or well construction; and
- (C) materials approved by the Director, based on a demonstration of not adversely affecting human health or groundwater quality.

(8) Only allowable grout listed under Rule .0107 of this Subchapter shall be used with the exception that bentonite grout shall not be used:

- (A) to seal zones of water with a chloride concentration of 1,500 milligrams per liter or greater as determined by tests conducted at the time of construction, or
- (B) in areas of the State subject to saltwater intrusion that may expose the grout to water with a chloride concentration of 1,500 milligrams per liter or greater at any time during the life of the well.

(9) The annular space between the borehole and casing shall be grouted:

- (A) with a grout that is non-reactive with the casing or screen materials, the formation, or the injectant;
- (B) from the top of the gravel pack to land surface and in such a way that there is no interconnection of aquifers or zones having differences in water quality that would result in degradation of any aquifer or zone; and
- (C) so that the grout extends outward 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.

(10) Grout shall be emplaced 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 at the time of grouting.

(11) All grout mixtures shall be prepared prior to emplacement per the manufacturer's directions with the exception that bentonite chips or pellets may be emplaced by gravity flow if water is present or otherwise hydrated in place.

(12) If an outer casing is installed, it shall be grouted by either the pumping or pressure method.

(13) The well shall be grouted within seven days after the casing is set or before the drilling equipment leaves the site, whichever occurs first.

(14) No additives that will accelerate the process of hydration shall be used in grout for thermoplastic well casing.

(15) A casing shall be installed that extends from at least 12 inches above land surface to the top of the injection zone.

(16) Wells with casing extending less than 12 inches above land surface and wells without casing may be approved by the Director only when one of the following conditions is met:

- (A) site specific conditions directly related to business activities, such as vehicle traffic, would endanger the physical integrity of the well; or
- (B) it is not operationally feasible for the well head to be completed 12 inches above land surface due to the engineering design requirements of the system.

(17) Multi-screened wells shall not connect aquifers or zones having differences in water quality which would result in a degradation of any aquifer or zone.

(18) Prior to removing the 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, to preclude contaminants from entering the well.

(19) Packing materials for gravel and sand packed wells shall be:

(A) composed of quartz, granite, or other hard, non-reactive rock material;

(B) clean, of uniform size, water-washed and free from clay, silt, or other deleterious material;

(C) disinfected prior to subsurface emplacement;

(D) emplaced such that it shall not connect aquifers or zones having differences in water quality that would result in the deterioration of the water qualities in any aquifer or zone; and

(E) evenly distributed around the screen and shall extend to a depth at least one foot above the top of the screen. A minimum one foot thick seal comprised of bentonite clay or other sealing material approved by the Director shall be emplaced directly above and in contact with the packing material.

(20) All permanent injection wells shall have a well identification plate that meets the criteria specified in Rule .0107 of this Subchapter.

(21) A hose bibb, sampling tap, or other collection equipment approved by the Director shall be installed on the line entering the injection well such that a sample of the injectant can be obtained immediately prior to its entering the injection well.

(22) If applicable, all piping, wiring, and vents shall enter the well through the top of the casing unless otherwise approved by the Director based on a design demonstrated to preclude surficial contaminants from entering the well.

(23) The well head shall be completed in such a manner so as to preclude surficial contaminants from entering the well and well head protection shall include:

(A) an accessible external sanitary seal installed around the casing and grouting; and

(B) a water-tight cap or seal compatible with the casing and installed so that it cannot be removed without the use of hand or power tools.

(24) For subsurface distribution systems the following shall apply:

(A) for systems designed to be constructed within seven feet of the land surface and above the seasonal high water table, the distribution system design volume, injection volume, and injection rate shall be based on the hydraulic conductivity of the geologic material having the lowest permeability as determined by appropriate *in situ* or laboratory test methods; and

(B) the land surface directly above all systems shall be covered with pavement or compacted soil or other suitable material to prevent stormwater or other fluids on the land surface from infiltrating into the subsurface distribution system.

(h) Mechanical Integrity. All permanent injection wells require tests for mechanical integrity, which shall be conducted in accordance with Rule .0207 of this Section.

(i) Operation and Maintenance.

(1) Unless permitted by this rule, pressure at the well head shall be limited to a maximum which will ensure that the pressure in the injection zone does not initiate new fractures or propagate existing fractures in the injection zone, initiate fractures in the confining zone, or cause the migration of injected or formation fluids outside the injection zone or area.

(2) Injection between the outermost casing and the well borehole is prohibited.

(3) Monitoring of the operating processes at the well head shall be provided for by the well owner, as well as protection against damage during construction and use.

(j) Monitoring.

(1) Monitoring of the injection well may be required by the Director to protect groundwaters of the State.

(A) Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.

(B) Analysis of the physical, chemical, biological, or radiological characteristics of the injectant shall be made monthly or more frequently, as approved by the Director, in order to provide representative data for characterization of the injectant.

(C) Monitoring of injection pressure, flow rate, and cumulative volume shall occur according to a schedule determined necessary by the Director.

(D) Monitoring wells associated with the injection site shall be monitored quarterly or on a schedule determined by the Director to detect any migration of injected fluids from the injection zone.

(2) In determining the type, density, frequency, and scope of monitoring, the Director shall consider the following:

(A) physical and chemical characteristics of the injection zone;

(B) physical and chemical characteristics of the injected fluid(s);

(C) volume and rate of discharge of the injected fluid(s);

(D) compatibility of the injected fluid(s) with the formation fluid(s);

(E) the number, type and location of all wells, mines, surface bodies of water, and structures within the area of review;

(F) proposed injection procedures;

(G) expected changes in pressure, formation fluid displacement, and direction of movement of injected fluid;

(H) proposals of corrective action to be taken in the event that a failure in any phase of injection operations that renders the groundwaters unsuitable for their best intended usage as defined in Rule .0202 of Subchapter 02L; and

(I) the life expectancy of the injection operations.

(3) Monitoring wells completed in the injection zone and any of those zones adjacent to the injection zone may be affected by the injection operations. If affected, the Director may require additional monitor wells located to detect any movement of injection fluids, injection process byproducts, or formation fluids outside the injection zone as determined by the applicant in accordance with Subparagraph (e)(2) of this Rule. If the operation is affected by subsidence or catastrophic collapse, the monitoring wells shall be located so that they will not be physically affected and shall be of an adequate number to detect movement of injected fluids, process byproducts, or formation fluids outside the injection zone or area. In determining the number, location and spacing of monitoring wells, the following criteria shall be considered by the Director:

(A) the population relying on the groundwater resource affected, or potentially affected, by the injection operation;

(B) the proximity of the injection operation to points of withdrawal of groundwater;

(C) the local geology and hydrology;

(D) the operating pressures;

(E) the chemical characteristics and volume of the injected fluid, formation water, and process byproducts; and

(F) the density of injection wells.

(k) Reporting.

(1) For all injection wells, the well owner shall be responsible for submitting to the Director on forms furnished by the Director, or on an alternate approved form that provides the same information:

(A) a record of the construction, abandonment, or repairs of the injection well within 30 days of completion of the specified activities;

(B) the Injection Event Record within 30 days of completing each injection; and

(2) For injection wells requiring an individual permit, the following shall apply:

(A) The well owner shall be responsible for submitting to the Director on forms furnished by the Director or on an alternate approved form, hydraulic or pneumatic fracturing performance monitoring results;

(B) All sampling results shall be reported by the well owner to the Division quarterly or on a frequency determined by the Director based on the reaction rates, injection rates, likelihood of secondary impacts, and site-specific hydrogeologic information; and

(C) A Final Project Evaluation report shall be submitted within nine months after completing all injection-related activities associated with the permit or produce a project interim evaluation before submitting a renewal application for the permit. This document shall assess the injection projects findings in a written summary. The final project evaluation shall also contain monitoring well sampling data, contaminant plume maps and potentiometric surface maps.

History Note: *Authority G.S. 87-87; 87-88; 87-90; 87-94; 87-95; 89E-13; 89E-18; 143-211; 143-214.2(b); 143-215.1A; 143-215.3(a)(1); 143-215.3(c); 150B-19(4); 40 CFR Part 144.52(a)(7); 40 CFR Part 145.11(a)(20); Eff. May 1, 2012.*

15A NCAC 02C .0226 SALINITY BARRIER WELLS

Salinity Barrier Wells inject uncontaminated water into an aquifer to prevent the intrusion of salt water into the fresh water. The requirements for Salinity Barrier Wells shall be the same as in Rule .0219 of this Section except that the Director may impose additional requirements for the protection of human health and the environment based on site specific criteria, existing or projected environmental impacts, compliance with the provisions of the rules of this Section, or the compliance history of the facility owner.

History Note: Authority G.S. 87-87; 87-88; 87-90; 87-94; 87-95; 89E-13; 89E-18; 143-211; 143-214.2(b); 143-215.1A; 143-215.3(a)(1); 143-215.3(c); 150B-19(4); 40 CFR Part 144.52(a)(7); 40 CFR Part 145.11(a)(20); Eff. May 1, 2012.

15A NCAC 02C .0227 STORMWATER DRAINAGE WELLS

(a) Stormwater Drainage Wells receive the flow of water that results from precipitation occurring immediately following rainfall or a snowmelt event.

(b) The following Stormwater Drainage Wells are permitted by rule pursuant to Rule .0217 of this Section:

(1) systems designed in accordance with stormwater controls required by federal laws and regulations, state statutes and rules, or local controls adopted consistent with these federal or state requirements; and

(2) roof-top runoff infiltration systems.

(c) Nothing in this Rule shall be construed as to allow untreated stormwater to be emplaced directly into any aquifer or to otherwise result in the violation of any groundwater quality standard as specified in Subchapter 02L.

(d) Reporting. Within 30 days of a change of status of the well, the owner/operator shall provide the following information:

(1) facility name, address, and location indicated by either:

(A) latitude and longitude with reference datum, position accuracy, and method of collection; or

(B) a facility site map with property boundaries;

(2) name, telephone number, and mailing address of legal contact;

(3) ownership of facility as a private individual or organization, or a federal, state, county, or other public entity;

(4) number of injection wells; and

(5) well status as proposed, active, inactive, temporarily abandoned, or permanently abandoned.

History Note: Authority G.S. 87-87; 87-88; 87-90; 87-94; 87-95; 89E-13; 89E-18; 143-211; 143-214.2(b); 143-215.1A; 143-215.3(a)(1); 143-215.3(c); 150B-19(4); 40 CFR Part 144.52(a)(7); 40 CFR Part 145.11(a)(20); Eff. May 1, 2012.

15A NCAC 02C .0228 SUBSIDENCE CONTROL WELLS

Subsidence Control Wells are used to inject uncontaminated fluids [to reduce or eliminate subsidence associated with overdraft of fresh water or other activities not related to oil or natural gas production. The requirements for Subsidence Control Wells shall be the same as described in Rule .0219 of this Section except that the Director may impose additional requirements for the protection of human health and the environment based on site specific criteria, existing or projected environmental impacts, compliance with the provisions of the rules of this Section, or the compliance history of the facility owner.

History Note: Authority G.S. 87-87; 87-88; 87-90; 87-94; 87-95; 89E-13; 89E-18; 143-211; 143-214.2(b); 143-215.1A; 143-215.3(a)(1); 143-215.3(c); 150B-19(4); 40 CFR Part 144.52(a)(7); 40 CFR Part 145.11(a)(20); Eff. May 1, 2012.

15A NCAC 02C .0229 TRACER WELLS

Tracer Wells are used to inject substances for the purpose of determining hydrogeologic properties of aquifers. The requirements for Tracer Wells shall be the same as described in Rule .0225 of this Section except that the Director may impose additional requirements for the protection of human health and the environment based on site specific criteria, existing or projected environmental impacts, compliance with the provisions of the rules of this Section, or the compliance history of the facility owner.

History Note: Authority G.S. 87-87; 87-88; 87-90; 87-94; 87-95; 89E-13; 89E-18; 143-211; 143-214.2(b); 143-215.1A; 143-215.3(a)(1); 143-215.3(c); 150B-19(4); 40 CFR Part 144.52(a)(7); 40 CFR Part 145.11(a)(20);

Eff. May 1, 2012.

15A NCAC 02C .0230 OTHER WELLS

Rule requirements for Other Wells shall be evaluated and treated as one of the injection well types in Rule .0209(5)(b) of this Section that the Director determines most closely resembles the equivalent hydrogeologic complexity and potential to adversely affect groundwater quality. The Director may impose additional requirements for the protection of human health and the environment based on site specific criteria, existing or projected environmental impacts, compliance with the provisions of the rules of this Section, or the compliance history of the facility owner. The Director may permit by rule the emplacement or discharge of a fluid or solid into the subsurface for any activity that meets the definition of an "injection well" that the Director determines not to have the potential to adversely affect groundwater quality and does not fall under other rules in this Section.

History Note: *Authority G.S. 87-87; 87-88; 87-90; 87-94; 87-95; 89E-13; 89E-18; 143-211; 143-214.2(b); 143-215.1A; 143-215.3(a)(1); 143-215.3(c); 150B-19(4); 40 CFR Part 144.52(a)(7); 40 CFR Part 145.11(a)(20); Eff. May 1, 2012.*

15A NCAC 02C .0240 ABANDONMENT AND CHANGE-OF-STATUS OF WELLS

(a) The well(s) shall be abandoned by the well owner in accordance with one of the following procedures or other alternatives approved by the Director based on a demonstration of not adversely affecting human health or the environment:

(1) Procedures for temporarily or permanently abandoning wells other than closed-loop geothermal wells shall be the same as described in Rule .0113 of this Subchapter.

(2) For temporarily abandoning a closed-loop geothermal well, the well shall be maintained whereby it is not a source or channel of contamination during the period of abandonment.

(3) Procedures for permanently abandoning closed-loop geothermal wells shall be as follows:

(A) all casing, tubing or piping, and associated materials shall be removed prior to initiation of abandonment procedures if such removal will not cause or contribute to contamination of groundwater;

(B) the boring shall be filled from bottom to top with grout through a hose or pipe which extends to the bottom of the well and is raised as the well is filled;

(C) for tubing with an inner diameter of one-half inch or greater, the entire vertical length of the inner tubing shall be grouted;

(D) for tubing with an inner diameter less than one-half inch, the tubing shall be refilled with potable water and capped or sealed at a depth not less than two feet below land surface in the event that the inner tubing cannot feasibly be grouted; and

(E) any protective or surface casing not grouted in accordance with the requirements set forth in this Section shall be removed and grouted in accordance with the requirements set forth in this Section.

(4) In those cases when, as a result of the injection operations, a subsurface cavity has been created, the well shall be abandoned in such a manner that will prevent the movement of fluids into or between aquifers and in accordance with the terms and conditions of the permit.

(b) Any well which acts as a source or channel of contamination shall be brought into compliance with the standards and criteria of these rules, repaired, or permanently abandoned. Repair or permanent abandonment shall be completed within 15 days of the discovery of the violation.

(c) Exploratory or test wells, constructed for the purposes of obtaining information regarding an injection well site, shall be permanently abandoned in accordance with Rule .0113 of this Subchapter within two days after drilling or two days after testing is complete, whichever is less restrictive. An exception would be when a test well is being converted to a permanent injection well, in which case conversion shall be completed within 30 days.

(d) An injection well shall be permanently abandoned by the drilling contractor before removing his equipment from the site if the well casing has not been installed or has been removed from the well bore.

(e) The well owner is responsible for permanent abandonment of a well except when the well contractor is responsible due to improper location, construction, repair, or completion of the well.

History Note: *Authority G.S. 87-87; 87-88; 143-211; 143-215.1A; 143-215.3(a)(1); 143-215.3(c); Eff. May 1, 2012.*

15A NCAC 02C .0241 VARIANCE

(a) The Director may grant a variance from any construction or operation standards under the rules of this Section. Any variance shall be in writing by the person responsible for construction of the well for which the variance is sought. The Director shall grant the variance if the Director finds facts to support the following conclusions:

(1) that the use of the well will not endanger human health and welfare or the groundwater; and

(2) that construction or operation in accordance with the standards was not technically feasible or the proposed construction provides equal or better protection of the groundwater.

(b) The Director may require the variance applicant to submit such information as the Director deems necessary to make a decision to grant or deny the variance. The Director may impose such conditions on a variance or the use of a well for which a variance is granted as the Director deems necessary to protect human health and welfare and the groundwater resources. The findings of fact supporting any variance under this rule shall be in writing and made part of the variance.

(c) The Director shall respond in writing to a request for a variance within 30 days from the receipt of the variance request.

(d) For variances requested as a part of a permit application, the Director may include approval as a permit condition.

(e) A variance applicant who is dissatisfied with the decision of the Director may commence a contested case by filing a petition under G.S. 150B-23 within 60 days after receipt of the decision.

History Note: Authority G.S. 87-87(4); 87-88; 143-215.1A; 143-215.3(a)(4); 150B-23; Eff. May 1, 2012.

15A NCAC 02C .0242 DELEGATION

(a) The Director is delegated the authority to grant permission for well construction under G.S. 87-87.

(b) The Director is delegated the authority to give notices and sign orders for violations under G.S. 87-91.

(c) The Director may grant a variance from any construction standard, or the approval of alternate construction methods or materials, as specified under the rules of this Section.

History Note: Authority G.S. 87-87(4); 143-215.1A; 143-215.3(a)(1); 143-215.3(a)(4); Eff. May 1, 2012.

SECTION .0300 - PERMITTING AND INSPECTION OF PRIVATE DRINKING WATER WELLS

15A NCAC 02C .0301 SCOPE AND PURPOSE

(a) The purpose of the rules of this Section is to set out standards for permitting and inspection of private drinking water wells as defined in G.S 87-85 by local health departments pursuant to G.S. 87-97.

(b) The rules of 15A NCAC 02C .0100 are applicable to private drinking water wells. In addition to the provisions in 15A NCAC 02C .0100, the following shall apply:

(1) The well owner shall not place potential sources of groundwater contamination closer to the well than the separation distances specified in 15A NCAC 02C .0107(a)(2) or .0107(a)(3), as applicable;

(2) In addition to the provisions in 15A NCAC 02C .0109 PUMPS AND PUMPING EQUIPMENT, the builder, well contractor, pump installer, or homeowner, as applicable, shall provide assistance when necessary to gain access for inspection of the well, pumps, and pumping equipment; and

(3) In addition to the requirements of 15A NCAC 02C .0113 ABANDONMENT OF WELLS, 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 local health department. The person abandoning the well shall provide a minimum 24-hour notice to the local health department prior to commencement of permanent abandonment procedures.

History Note: Authority G.S. 87-87; 87-97; Eff. July 1, 2008.

15A NCAC 02C .0302 DEFINITIONS

The definitions in G.S. 87-85 and 15A NCAC 02C .0102 apply throughout this Section. In addition, the following definitions apply throughout this Section:

(1) "Addition" means any structure that is constructed, altered or placed on property that contains one or more wells. This would not include replacement of existing equipment within the existing footprint of a structure and addresses only those situations for which a building permit is required.

(2) "Board of Health" means the County Board of Health or successor entity.

(3) "Certificate of Completion" means a certification by the Department that a private drinking water well has been constructed or repaired in compliance with the construction permit or repair permit.

(4) "Construction of wells" means all acts necessary to construct wells for any intended purpose or use, including the location and excavation of the well, placement of casings, screens and fittings, development and testing.

(5) "Construction permit" means a well construction permit issued by the Department authorizing or allowing the construction of any private drinking water well as defined in the rules of this Section.

(6) "Department of Environment and Natural Resources" or "Department" means the North Carolina Department of Environment and Natural Resources. The term also means the authorized representative of the Department. For the purposes of any notices required pursuant to the rules of this Section, notice shall be mailed to "Division of Environmental Health, On-Site Water Protection Section, North Carolina Department of Environment and Natural Resources," 1642 Mail Service Center, Raleigh, NC 27699-1642.

(7) "Local Health Department" means the county or district health department or its successor.

(8) "Person" means all persons, including individuals, firms, partnerships, associations, public or private institutions, municipalities or political subdivisions, governmental agencies, or private or public corporations organized or existing under the laws of this State or any other state or country.

(9) "Plat" means a property survey prepared by a registered land surveyor, drawn to a scale of one inch equals no more than 60 feet, that includes: the specific location of all structures and proposed structures and appurtenances, including but not limited to decks, porches, pools, driveways, out buildings, existing and proposed wastewater systems, existing and proposed wells, springs, water lines, surface waters or designated wetlands, easements, including utility easements, and existing or proposed chemical or petroleum storage tanks above or below ground. "Plat" also means, for subdivision lots approved by the local planning authority and recorded with the county register of deeds, a copy of the recorded subdivisions plat that is accompanied by a site plan that is drawn to scale.

(10) "Pumps" and "pumping equipment" means any equipment or materials utilized or intended for use in withdrawing or obtaining ground-water including well seals.

(11) "Repair" means work involved in deepening, reaming, sealing, installing or changing casing depths, perforating, screening, or cleaning, acidizing or redevelopment of a well excavation, or any other work which results in breaking or opening the well seal.

(12) "Repair permit" means a well repair permit issued by the Department authorizing or allowing the repair of any private drinking water well as defined in the rules of this Section.

(13) "Site plan" means a drawing not necessarily drawn to scale that shows the existing and proposed property lines with dimensions, and the specific location of all structures and proposed structures and appurtenances, including decks, porches, pools, driveways, out buildings, existing and proposed wastewater systems, existing and proposed wells, springs, water lines, surface waters or designated wetlands, easements, including utility easements, and existing or proposed chemical or petroleum storage tanks above or below ground.

(14) "Water supply system" means pump and pipe used in connection with or pertaining to the operation of a private drinking water well including pumps, distribution service piping, pressure tanks and fittings.

(15) "Well contractor activity" means the construction, installation, repair, alteration or abandonment of any well.

(16) "Well Contractor" means any person in trade or business who undertakes to perform a well contractor activity or who undertakes to personally supervise or personally manage the performance of a well contractor activity on the person's own behalf or for any person, firm, or corporation in accordance with the well contractor certification requirements of 15A NCAC 27.

(17) "Well seal" means an approved arrangement or device used to cap a well or to establish and maintain a junction between the casing or curbing of a well and the piping or equipment installed therein, the purpose or function of which is to prevent pollutants from entering the well at the upper terminal.

History Note: *Authority G.S. 87-87; 87-97;*
Eff. July 1, 2008.

15A NCAC 02C .0303 APPLICATION FOR CONSTRUCTION PERMIT

An application for a permit to construct, repair, or abandon a private drinking water well shall be submitted to the local health department for the county where the well is to be located by a property owner or the property owner's agent. The application shall include:

(1) Name, address and phone number of the proposed well property owner or owner's agent;
(2) Signature of owner or agent;
(3) Address and parcel identification number of the property where the proposed well is to be located;
(4) A plat or site plan as defined in the rules of this Section;
(5) Intended use(s) of the property;
(6) Other information deemed necessary by the Department to determine the location of the property and any site characteristics such as existing or permitted sewage disposal systems, easements or rights of way, existing wells or springs, surface water or designated wetlands, chemical or petroleum storage tanks, landfills, waste storage, known underground contamination and any other characteristics or activities on the property or adjacent properties that could impact groundwater quality or suitability of the site for well construction;
(7) Any current or pending restrictions regarding groundwater use as specified in G.S. 87-88(a); and
(8) Any variances regarding well construction or location issued under 15A NCAC 02C .0118.

History Note: *Authority G.S. 87-87; 87-97;*
Eff. July 1, 2008.

15A NCAC 02C .0304 PERMITTING

(a) No person shall construct a private drinking water well without first obtaining a well construction permit from the Department. No person shall repair a private drinking water well without first obtaining a well repair permit except a well repair permit is not required for maintenance or pump repair or replacement. Disinfection in accordance with 15A NCAC 02C .0113 is a maintenance activity that does not require a repair permit.

(b) Before issuing a well construction permit, the Department shall conduct a field investigation to evaluate the topography, landscape position, available space and potential sources of groundwater contamination on or around the site on which a private drinking water well is to be located. The Department shall issue a private water well construction permit after determining the site can be permitted for a well meeting the rules of this Section. Notwithstanding the above, the Department shall not issue a construction permit for a well in violation of restrictions regarding groundwater use established pursuant to G.S. 87-88(a). The construction permit shall include a site plan showing the location of potential sources of contamination and area(s) suitable for well construction. The Department shall issue a written notice of denial of a construction permit if it determines a private drinking water well cannot be constructed in compliance with the rules of this Section. The notice of denial shall include reference to specific laws or rules that cannot be met and shall be provided to the applicant.

(c) A well construction permit is valid for a period of five years except that the Department may revoke a permit at any time if it determines that there has been a material change in any fact or circumstance upon which the permit is issued. The validity of a construction permit or a repair permit is not affected by a change in ownership of the site on which a private drinking water well is proposed to be located. Well construction permits issued under local well ordinances prior to the effective date of these Rules remain valid for the term of those permits unless those permits are suspended or revoked. The Department may suspend or revoke any permits issued upon a determination that the rules of this Section have been violated.

(d) If there is an improperly abandoned well(s) on the site, the construction permit shall be conditioned upon repair or abandonment of any improperly abandoned well(s) in accordance with the rules of 15A NCAC 02C .0100.

History Note: *Authority G.S. 87-87; 87-97;*
Eff. July 1, 2008.

15A NCAC 02C .0305 GROUT INSPECTION: CERTIFICATION

(a) The well contractor shall contact the local health department to schedule a grout inspection before grouting a private drinking water well. Contact shall include the location, permit number and anticipated time for grouting each private drinking water well and the appointment shall be scheduled by the end of the business day before the grouting is to occur except where the local health department has made provisions for scheduling inspections at night or on the same day of the inspection.

(b) Upon completion of a grout inspection, the Department shall provide a written certification on the well permit that a grout inspection was completed and that the grouting is in compliance with the rules of 15A NCAC 02C .0100. When a local health department is unable to conduct a grout inspection within one hour of the scheduled time, the well contractor may grout a well without a grout inspection by the Department. The well contractor shall provide a written certification to the local health

department that the well has been grouted in compliance with the rules of 15A NCAC 02C .0100. A completed Well Construction Record form GW-1 indicating the well was grouted in compliance with the rules of this Section shall serve as the well contractor's grout certification. For purposes of issuing a certificate of completion, the well contractor's grout certification shall be accepted by the Department as evidence the grout complies with the rules of this Section if the local health department:

(1) was contacted by the well contractor to schedule a grout inspection;
(2) was unable to inspect the grouting of the well within one hour following the scheduled time; and
(3) upon final inspection, finds no evidence to indicate the well grout does not comply with the rules of this Section.

History Note: Authority G.S. 87-87; 87-97;
Eff. July 1, 2008.

15A NCAC 02C .0306 WELL COMPLETION AND CERTIFICATION

(a) After receiving a permit to construct a private drinking water well, the property owner or his agent shall notify the health department prior to well construction if any of the following occur:

(1) The separation criteria specified in 15A NCAC 02C .0107 cannot be met;
(2) The residence or other structure is located other than indicated on the permit;
(3) The use of the structure is changed from the use specified on the permit;
(4) The septic system needs to be changed from the location indicated on the permit;
(5) Landscaping changes have been made that may affect the integrity of the well;
(6) There are current or pending restrictions regarding groundwater use as specified in G.S. 87-88(a);
(7) The water source for any well intended for domestic use is adjacent to any water-bearing zone suspected or known to be contaminated; or
(8) Any other changes occur in the information provided in the application for the well permit.

(b) The well contractor shall maintain a copy of the well construction permit or repair permit on the job site at all times during the construction, repair or abandonment of the well. The well contractor shall meet all the conditions of the permit.

(c) Upon completion of construction of a private drinking water well, the Department shall complete an "as built" drawing of the well location. The well contractor shall submit a copy of Residential Well Construction Record to the local health department. Upon completion of construction or repair of a private drinking water well for which a permit is required, the Department shall inspect the well and issue a Certificate of Completion. Prior to the issuance of a Certificate of Completion, the Department shall: verify that the well was constructed in the designated area and according to the well construction permit and the rules of this Subchapter. The Department shall inspect the grout around the casing, inspect the well head after the well seal is in place and obtain a well construction record from the Certified Well Contractor. No person shall place a private drinking water well into service without first having obtained a Certificate of Completion.

History Note: Authority G.S. 87-87; 87-97;
Eff. July 1, 2008.

15A NCAC 02C .0307 WELL DATA AND RECORDS

(a) Any person completing, abandoning or repairing any well shall submit a record of the construction, abandonment or repair to the local health department and the Division of Water Quality within 30 days of completion of construction, abandonment or repair. The record shall be on a form provided by the Department.

(b) The local health department shall maintain a registry of all permitted private drinking water wells, specifying the well location and the water quality test results until the well is permanently abandoned in accordance with this Subchapter.

History Note: Authority G.S. 87-87; 87-97;
Eff. July 1, 2008.

15A NCAC 02C .0308 APPEAL PROCEDURE

Appeals concerning permit decisions or actions by the Department to enforce the rules of this Section shall be conducted according to the procedures established in G.S. 150B, the Administrative Procedures Act.

History Note: Authority G.S. 87-87;
Eff. July 1, 2008.