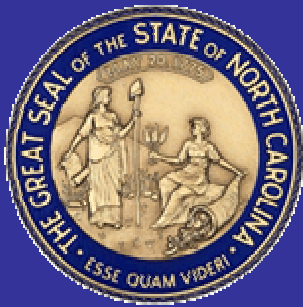


North Carolina Administrative Code

Title 15A

**Department of Environment and Natural Resources
Division of Water Quality**



Subchapter 2C

Section .0200

**Well
Construction
Standards**

**Criteria and
Standards
Applicable to
Injection Wells**

**Current Through February 1, 1997
Environmental Management Commission
Raleigh, North Carolina**

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SECTION .0200 - CRITERIA AND STANDARDS APPLICABLE TO INJECTION WELLS**.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 create a threat to human health or would otherwise render those waters unsuitable for their intended best usage. Except as provided for in G.S. 143-215.1A, the discharge of any wastes to the subsurface or groundwaters of the state 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. September 1, 1996.

.0202 SCOPE

The rules in this Section apply to all persons proposing to construct, alter, repair, or abandon any injection well, or owning, using or operating, or proposing to use or operate any well for injection.

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. September 1, 1996.

.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.

.0204 DEFINITIONS

The definition of any word or phrase used in the rules in this Section shall be the same as given in G.S. 87-85 and G.S. 143-213, except that the following words and phrases shall have the following meanings:

- (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) "Air Injection Well or Air Sparging Well" means a well that is used to inject uncontaminated air to the subsurface to promote volatilization and enhance bioremediation of contaminants in the groundwater and soil.
 - (3) "Aquifer Test Well" means a well into which uncontaminated fluid is injected in order to facilitate the assessment of local aquifer characteristics such as permeability, hydraulic conductivity, storage coefficient, or transmissivity. This includes slug tests which assess aquifer characteristics by the addition of a known volume of water to cause an instantaneous change in the water level of the well.
 - (4) "Area Permit" means a permit that regulates all injection activities within the associated Area of Review.
 - (5) "Catastrophic Collapse" means the sudden and utter failure of overlying strata caused by removal of underlying materials.
 - (6) "Closed-Loop Geothermal Injection Well System" means a system of continuous piping, part of which is installed in the subsurface, through which moves a fluid that does not exit the piping, and which is used to transfer heat energy to and from the fluid.
 - (7) "Closed-Loop Groundwater Remediation System" means a system and attendant processes used for improving the quality of contaminated groundwater by collecting or pumping groundwater, treating the groundwater to reduce the concentration of or remove contaminants, and reintroducing the treated water beneath the surface in such a manner that the treated groundwater will be recaptured by the collecting or pumping portion of the system.
 - (8) "Compliance Boundary" means a boundary as specified by 15A NCAC 2L (Classifications and Water Quality Standards Applicable To The Groundwaters of North Carolina), at and beyond which groundwater quality standards may not be exceeded.
 - (9) "Confined or Enclosed Space" means any space, having a limited means of ingress or egress, which 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" means any physical, chemical, biological or radiological substance or matter which, if injected, may cause a violation of any water quality standard under 15A NCAC 2L, may adversely affect the health of humans, or may degrade the quality of the groundwater.
 - (12) "Contamination" means foreign materials of such nature, quality, and quantity as to cause degradation of the quality of the water.
 - (13) "Director" means the Director of the Division of Water Quality.
 - (14) "Division" means the Division of Water Quality.
 - (15) "Facility, Operation, or Activity" means any injection well or system.
 - (16) "Flow Rate" means the volume per unit time of a fluid which emerges from an orifice, pump, or turbine or passes along a conduit or channel.
 - (17) "Fluid" means a material or substance which flows or moves; whether in a semisolid, liquid, sludge, gas, or any other form or state.
 - (18) "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.
 - (19) "Generator" means any person, by site location, whose act or process produces hazardous waste.

- (20) "Groundwaters" mean those waters occurring in the subsurface under saturated conditions.
- (21) "Grout" means well construction material as specified in 15A NCAC 2C .0100 (Criteria and Standards Applicable to Water Supply and Certain Other Wells).
- (22) "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 significantly contribute to an increase in mortality or an increase in serious irreversible or incapacitating reversible illness; or
 - (b) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.
- (23) "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).
- (24) "Hose Bibb or Tap" means a fluid sampling port located on or appurtenant to a well.
- (25) "Hydraulic Conductivity" means the rate at which a unit volume of fluid of a specific density, viscosity and temperature can flow through a permeable medium of unit cross section and under unit hydraulic gradient.
- (26) "Injectant" means any solid or fluid that is emplaced in the subsurface by means of an injection well.
- (27) "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.
- (28) "Injection Well" means any excavation which is cored, bored, drilled, jetted, dug, or otherwise constructed, 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.
- (29) "Injection Zone" means a geological formation, group of formations, or part of a formation receiving fluids through a well.
- (30) "Lithology" means the description of rocks or sediments on the basis of their physical and chemical characteristics.
- (31) "Major Facility" means a Class 1 or 4 well.
- (32) "Mechanical Integrity" means:
- (a) an absence of a leak in the casing, tubing, or packer of an injection well; and
 - (b) an absence of any significant fluid movement into an underground source of drinking water through vertical channels adjacent to the injection well bore.
- (33) "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.
- (34) "Owner" means any person who holds the fee or other property rights in the well being constructed. A well is real property and its construction on land shall be deemed to vest ownership in the land owner, for purposes of this Section and statutes governing

- groundwater, in the absence of contrary agreement in writing.
- (35) "Permit" means an authorization, license, or equivalent control document issued by the Director to implement the requirements of these Rules.
 - (36) "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.
 - (37) "Potable Water" means those waters which are suitable for drinking, culinary, or food processing purposes.
 - (38) "Pressure" means the total load or force per unit area acting on a surface.
 - (39) "Site" means the land or water area where any facility or activity is physically located or conducted, including adjacent land used in connection with the facility or activity.
 - (40) "Receptor" means any human, plant, animal, or structure which is, or has the potential to be, adversely 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.
 - (41) "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.
 - (42) "Thermal Waste" means a material having a temperature which is in excess of 30 degrees Fahrenheit above or below the naturally occurring temperature of the receiving groundwater, as determined by the Director.
 - (43) "Transmissivity" means the product of the hydraulic conductivity and the total saturated thickness of a porous or fractured medium.
 - (44) "Underground Sources of Drinking Water" means an aquifer or its portion:
 - (a) which supplies any public water system; or
 - (b) which contains a sufficient quantity of groundwater to supply a public water supply system; and
 - (i) currently supplies drinking water for human consumption; or
 - (ii) contains fewer than 10,000 milligrams per liter of total dissolved solids.
 - (45) "Waste" means waste as defined in G.S. 143-213(18).
 - (46) "Well head" means the upper terminal of the well including adapters, ports, valves, seals, and other attachments.
 - (47) "Well System" means two or more wells serving the same facility.

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

.0205 AREA OF REVIEW

(a) The area of review for an injection well or well field shall be a fixed radius around the well or well field of 1/4 mile (1320 feet) or greater, as determined by the Director, for the following Class 5 well types:

- (1) Type 5A7 - Heating/Cooling Water Return Well
- (2) Type 5I - In-situ Groundwater Remediation Well

- (3) Type 5L - Closed-Loop Groundwater Remediation Well
- (4) Type 5P - Air Injection Well
- (5) Type 5Q - Closed-Loop Geothermal Injection Well Systems
- (6) Type 5X30 - Aquifer Test Well

(b) In determining a fixed radius greater than 1/4 mile, the following factors shall be taken into consideration by the Director:

- (1) physical and chemical characteristics of the injected and formation fluids;
- (2) injection rate and pressure;
- (3) hydrogeology;
- (4) population and its groundwater use and dependence; and
- (5) historical practices in the area.

(c) For all other Class 5 well types which can be approved under the rules in this Section, the area of review for an injection well or well field shall be calculated using the procedure for determining the zone of endangering influence specified in 40 CFR 146.6(a).

*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.*

.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).

(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 within 24 hours (or the next business day), and in writing within five calendar days, of becoming aware of any instance of noncompliance;
- (3) Perform a complete site assessment and submit to the Division, as soon as practicable or in accordance with a schedule established by the Director, a report which shall include but not be limited to 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 significant exposure pathways;
 - (D) The horizontal and vertical extent of soil and groundwater contamination and all significant factors affecting contaminant transport; and
 - (E) Any geological and hydrogeological features influencing the movement or chemical or physical character of the contaminants.
- (4) Submit a corrective action plan and a proposed schedule for implementation to the Director, for approval. In establishing a schedule, the Director shall consider any reasonable schedule proposed by the permittee. The corrective action plan shall include but not be limited to:

- (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. September 1, 1996; March 1, 1984.

.0207 MECHANICAL INTEGRITY

- (a) An injection well shall be considered to have mechanical integrity if:
 - (1) there is no measurable leak in the casing, tubing or packer; and
 - (2) there is no measurable fluid movement into an underground source of drinking water through vertical channels adjacent to the injection well bore which would result in deterioration of the water quality in zones above or below the injection zone; and
 - (3) injection pressure is no greater than atmospheric pressure (i.e. 14.7 pounds per square inch).
- (b) If the injection pressure is to be greater than atmospheric, a demonstration of the mechanical integrity of the injection facility prior to injection shall be required unless it can be demonstrated to the Director's satisfaction that the methods and materials used in the construction of the well and injection operations shall not result in a threat to human health or a contravention of a groundwater quality standard as specified in 15A NCAC 2L. In conducting and evaluating the tests for mechanical integrity, the owner shall apply one of the following methods:
 - (1) monitoring of the annulus pressure; or
 - (2) a pressure test with liquid or gas.
- (c) When the owner reports the results of mechanical integrity tests to the Director, the owner shall include a description of the test(s) and the method(s) used. In making an evaluation of the data submitted, the Director may review monitoring or other test data available.

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; March 1, 1984.

.0208 FINANCIAL RESPONSIBILITY

The permittee shall maintain financial responsibility and resources, in the form of performance bonds or other equivalent forms of financial assurances, as approved by the Director and as specified in the permit, 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. September 1, 1996.

.0209 CLASSIFICATION OF INJECTION WELLS

(a) Class 1.

- (1) This class applies to industrial, municipal, and nuclear disposal wells that are used to inject wastes beneath the lowermost formation containing an underground source of drinking water.
- (2) The designated type code and a description of the primary function for wells of this class shall be as follows:
 - (A) Type 1H - 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) Type 1I - Industrial disposal well. These wells are used to inject non-hazardous industrial waste.
 - (C) Type 1M - Municipal disposal well. These wells are used to inject non-hazardous waste.
 - (D) Type 1N - Nuclear disposal well. These wells are used to inject nuclear waste.
 - (E) Type 1X - Other Class 1 wells.
- (3) No person shall construct, use, or operate a well of this class for injection.

(b) Class 2.

- (1) 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 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.
- (2) No person shall construct, use, or operate a well of this class for injection.

(c) Class 3.

- (1) This class applies to special process wells which are used to inject for the purpose of extraction of minerals or energy.
- (2) The designated type code and a description of the primary function for wells of this class shall be as follows:
 - (A) Type 3G - In-situ Gasification Well.
 - (B) Type 3M - Solution Mining Well. These wells are used in the solution mining of salts or potash.
 - (C) Type 3S - Sulfur Mining Well. These wells are used in the mining of sulfur by the Frasch process.
 - (D) Type 3T - Geothermal Well.
 - (E) Type 3U - Uranium mining Well.
- (3) No person shall construct, use, or operate a well of this class for injection.

(d) Class 4.

- (1) 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.
- (2) No person shall construct, use, or operate a well of this class for injection.
- (e) Class 5.
- (1) This class applies to all injection wells not included in Class 1, 2, 3, and 4.
- (2) The construction, use, or operation of the following Class 5 injection well types are prohibited. The designated type code and a description of the primary function for these wells shall be as follows:
- (A) Type 5A8 - Groundwater Aquaculture Return Flow Well. These wells inject groundwater or surface water that has been used to support aquaculture.
 - (B) Type 5D2 - Storm Water Drainage Well. These wells receive storm-water runoff from paved areas, including parking lots, streets, residential subdivisions, building roofs, or highways.
 - (C) Type 5F1 - Agricultural Drainage Well. These wells receive irrigation tailwaters, other field drainage, animal yard, feedlot, or dairy runoff.
 - (D) Type 5G30 - 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.
 - (E) Type 5H - Gaseous Hydrocarbon Storage Well. These wells are used for the storage of hydrocarbons which are gases at standard temperature and pressure.
 - (F) Type 5N24 - Radioactive Waste Disposal Well. These wells are used for all radioactive waste disposal other than Class 4 wells.
 - (G) Type 5W - 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 but is not limited to cesspools and abandoned drinking water wells.
 - (H) Type 5X13 - 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, what is injected is a radioactive waste or not. This also includes special wells used to control mine fires and acid mine drainage wells.
 - (I) Type 5X14 - Solution Mining Well. These wells are used in solution mining in conventional mines, such as stopes leaching.
 - (J) Type 5X15 - In-situ Fossil Fuel Recovery Well. These wells are used for the in-situ recovery of coal, lignite, oil shale, and tar sands.
 - (K) Type 5X17 - Air Scrubber Waste Disposal Well. These wells are used to inject wastes from air scrubbers.
 - (L) Type 5X18 - Water Softener Regeneration Brine Disposal Well. These wells are used to inject regeneration wastes from water softeners.
 - (M) Type 5X28 - Motor Vehicle Waste Disposal Well. These wells receive wastes from motor vehicle facilities and include but are not limited to 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).
- (3) 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 create a threat to human health or would otherwise render those waters unsuitable for their intended best usage. The designated type code and a description of the primary function for these wells shall be as follows:

- (A) Type 5A7 - Heating/Cooling Water Return Well. These 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.
- (B) Type 5B22 - Salinity Barrier Well. These wells inject uncontaminated water into an aquifer to prevent the intrusion of salt water into the fresh water.
- (C) Type 5I - In-situ Groundwater Remediation Well. These wells are used to inject additives for the in-situ treatment of contaminated soil or groundwater, when such additives are determined by the Division of Epidemiology to be protective of human health and permitted by the Division.
- (D) Type 5L - Closed-Loop Groundwater Remediation Well. These wells are used to inject treated groundwater as part of a closed-loop remediation system for the prevention, control, or remediation of aquifer pollution.
- (E) Type 5P - Air Injection Well. These wells are used to inject air to enhance in-situ treatment of groundwater.
- (F) Type 5QM - Closed-Loop Geothermal-Mixed-Fluid Injection Well System. These wells are used to house a subsurface system of pipe that re-circulates fluid other than potable water for heating and cooling purposes and where the fluid is isolated from the environment.
- (G) Type 5QW - Closed-Loop Geothermal-Water-Only Injection Well System. These wells are used to house a subsurface system of pipe that re-circulates potable water for heating and cooling purposes and where the fluid is isolated from the environment.
- (H) Type 5R21 - Aquifer Recharge Well. These wells are used to recharge depleted aquifers and may inject uncontaminated water of equal or better quality than the aquifer being recharged.
- (I) Type 5S23 - Subsidence Control Well. These wells are used to inject fluids into a non-oil or gas-producing zone to reduce or eliminate subsidence associated with overdraft of fresh water and not used for the purpose of oil or natural gas production.
- (J) Type 5T - Tracer Well. These wells are used to inject substances determined by the Division of Epidemiology to be protective of human health and permitted by the Division.
- (K) Type 5X25 - Experimental Technology Well. These wells are used in experimental or unproven technologies where operation is in compliance with all appropriate rules and Statutes.
- (L) Type 5X30 - Aquifer Test Well. These wells are used to inject uncontaminated fluid into an aquifer to determine aquifer characteristics.
- (M) Type 5Z - Other Wells.

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. September 1, 1996; March 1, 1984.

.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.

.0211 PERMITS

(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 Paragraph (u) of this Rule. In those instances where all individual injection wells within a well field will be essentially similar with respect to construction, operation, reporting, and abandonment, and are of the same well Type, the Director may issue an area permit for the injection operations within that same well field, facility, site, reservoir, or similar unit. 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 create a threat to human health or would otherwise render those waters unsuitable for their intended best usage unless specifically provided for by Statute or by the Rules in this Section.

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

- (1) for a corporation: by a responsible corporate officer
- (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; or
- (4) for all other persons: by the well owner.

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

(d) An application shall be submitted, in duplicate, to the Director on forms furnished by the Director and shall include the following:

- (1) For all Class 5 Well Types:
 - (A) The permit well owner's and (if different from the owner) the well operator's name, address, telephone number, and status as a federal, state, private, public, or other activity;
 - (B) The name, mailing address, telephone number, and location of the facility for which the application is submitted and a brief description of the nature of the business;
 - (C) A description of the injection activities proposed by the applicant;
 - (D) A scaled, site-specific map showing the location(s) of the following:

- (i) the proposed injection well(s);
 - (ii) all property boundaries;
 - (iii) the direction and distance from the injection well or well system to two nearby permanent reference points (such as roads, streams, and highway intersections);
 - (iv) all buildings within the property boundary;
 - (v) any other existing or abandoned wells, including water supply and monitoring wells, within the area of review of the injection well or well system;
 - (vi) 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; and
 - (vii) all surface water bodies within the area of review of the injection well or well system.
- (E) The chemical, physical, biological, and radiological characteristics of the fluid to be injected;
- (F) The proposed average and maximum daily rate and quantity of fluid to be injected;
- (G) Detailed plans and specifications of the surface and subsurface construction details of the system;
- (H) A listing of all permits or construction approvals, received or applied for by the applicant, that are related to the site or facility covered by this application including but not limited to:
- (i) Hazardous Waste Management program permits or approval under the Resource Conservation and Recovery Act (RCRA);
 - (ii) NC Division of Water Quality Non-Discharge permits;
 - (iii) Sewage Treatment and Disposal Permits issued in accordance with G.S. 130A; and
 - (iv) Other environmental permits required by state or federal law.
- (I) Up to four Standard Industrial Codes which best reflect the principal products or services provided by the facility;
- (J) Whether or not the facility is located on Indian lands;
- (K) Such other information as deemed necessary by the Director for the protection of human health and the environment.
- (2) For Type 5A7 and 5QM Wells, in addition to the information required in Subparagraph (d)(1) of this Rule, the application shall include the heating/cooling system installation contractor's name, address, and telephone number;
- (3) For Type 5I and 5L Wells, in addition to the information required in Subparagraph (d)(1) of this Rule, the application shall include:
- (A) a brief description of the contamination incident and incident number assigned by Division staff in the Department's Regional Office;
 - (B) a site specific scaled map showing the following:
 - (i) contour intervals not exceeding two feet;
 - (ii) the location of all springs, lakes, ponds, or other surface drainage features within 1000 feet of the injection well or well system;
 - (iii) potentiometric surface showing direction of groundwater movement; and
 - (iv) the horizontal and vertical extent of the contaminant plume (including isoconcentration lines and plume cross sections).

- (C) a tabulation of data on all wells within 1/4 mile of the injection well(s), excepting water supply wells serving a single-family residence, which penetrate the proposed injection zone. 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;
 - (D) a hydrogeologic description, soils description, and cross section of the subsurface to a depth that includes the known or projected depth of contamination. G.S. 89E-18 requires that any geologic plans, reports, or documents in which the performance is related to the public welfare or safeguarding of the environment be prepared by a licensed geologist or subordinate under his direction. G.S. 89E-13 requires that all drawings, reports, or documents involving geologic work which shall have been prepared or approved by a licensed geologist or a subordinate under his direction be signed and sealed by him or her. The number of borings shall be sufficient to determine the following:
 - (i) the regional geologic setting;
 - (ii) significant changes in lithology;
 - (iii) the hydraulic conductivity of the saturated zone;
 - (iv) the depth to the mean seasonal high water table; and
 - (v) a determination of transmissivity and specific yield of the aquifer to be used for injection (showing calculations used for transmissivity and specific yield).
 - (E) a detailed description of the proposed injection procedure including:
 - (i) average and maximum daily rate and quantity of fluid to be injected;
 - (ii) average and maximum injection pressure;
 - (iii) injection pressure relative to the overburden pressure of the soils and injection zone;
 - (iv) injection temperature; and
 - (v) demonstration of closed-loop recovery of injected and contaminated fluids;
 - (F) proposed concentration of any contaminant in the effluent, given any proposed pretreatment;
 - (G) plans for proposed location and construction details of groundwater monitoring well network including schedule for sampling and analytical methods.
- (4) For Types 5B22, 5R21, 5S23, 5T, 5X25, and 5Z wells, in addition to the information required in Subparagraph (d)(1) of this Rule, the application shall include:
- (A) a detailed description of all planned activities relating to the proposed injection facility including but not limited to:
 - (i) construction plans and materials;
 - (ii) operation procedures; and
 - (iii) planned injection schedule.
 - (B) a hydrogeologic description, soils description, and cross section of the subsurface to the depth of the proposed injection zone. G.S. 89E-18 requires that any geologic plans, reports, or documents in which the performance is related to the public welfare or safeguarding of the environment be prepared by a licensed geologist or subordinate under his direction. G.S. 89E-13 requires all drawings, reports, or documents involving geologic work which shall have been prepared or approved by a licensed geologist or a subordinate under his direction be signed and sealed by him or her. The

number of borings shall be sufficient to determine the following:

- (i) the regional geologic setting;
- (ii) significant changes in lithology;
- (iii) the hydraulic conductivity of the saturated zone;
- (iv) the depth to the mean seasonal high water table; and
- (v) a determination of transmissivity and specific yield of the aquifer to be used for injection (show calculations used for transmissivity and specific yield).

(C) plans for proposed location and construction details of groundwater monitoring well network including schedule for sampling and analytical methods.

(e) All applications for a new permit or renewal, modification, or transfer of an existing permit shall be filed in sufficient time prior to construction and operation or expiration, modification, or transfer to allow compliance with all legal procedures.

(f) All reports shall be signed by a person described in Paragraph (b) of this Rule or by a duly authorized agent of that person. 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. The Director shall determine which information is entitled to confidential treatment. In the event the Director determines that such information is entitled to confidential treatment, the Director shall take steps to protect such information from disclosure.

(g) The Director shall consider the cumulative effects of drilling and construction of multiple wells and operation of all proposed wells within a well field during evaluation of an area permit application.

(h) 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. Prior to granting approval for the operation of any injection well, the Director shall consider the following information when such information is required by these Rules:

- (1) all available logging and testing data on the well;
- (2) a satisfactory demonstration of mechanical integrity pursuant to these Rules;
- (3) the proposed operating procedures;
- (4) the results of the formation testing program; and
- (5) the status of corrective action on defective wells in the area of review.

(i) The Director may establish maximum injection volumes and pressures necessary to assure that:

- (1) fractures are not initiated in the confining zone;
- (2) injected fluids do not migrate outside the injection zone or area;
- (3) injected fluids do not cause or contribute to the migration of fluids beyond the compliance boundary;
- (4) formation fluids are not displaced outside the formation; and
- (5) there is compliance with operating requirements.

(j) A permit shall be issued for a period not to exceed five years from the date of issuance. On expiration of the permit, the permit shall become invalid unless application is made, at least 120 days prior to the expiration date, for an extension of the subject permit.

(k) The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance includes effective performance and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of the permit.

(l) The permit may be modified, revoked and reissued, or terminated by the Director in whole or part for actions which would adversely impact human health or the environment, such actions to include but not be limited to:

- (1) violation of any terms or conditions of the permit;
- (2) obtaining a permit by misrepresentation or failure to disclose fully all relevant facts;
- (3) refusal of the permittee to allow authorized employees of the Division upon proper presentation of credentials:
 - (A) to 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) to have access to and copy any records required to be kept under terms and conditions of the permit;
 - (C) to inspect any monitoring equipment or method required in the permit; or
 - (D) to sample any discharge from the injection facility.

(m) The filing of an application by the permittee for a permit modification, revocation and reissuance, or 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 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.

(q) 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:

- (1) the date, exact place, and time of sampling or measurements;
- (2) the individual(s) who performed the sampling or measurements;
- (3) the date(s) analyses were performed;

- (4) the individual(s) who performed the analyses;
 - (5) the analytical techniques or methods used; and
 - (6) the results of any such sampling, measurements, and analyses.
- (r) The permit shall not be transferable to any person. 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.
- (s) The permittee shall report any monitoring or other information which indicates that any contaminant may cause an endangerment to an underground source of drinking water and any noncompliance with a permit condition or malfunction of the injection system which may cause fluid migration outside the 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 exact 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.
- (t) 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.
- (u) The following injection wells are deemed to be permitted pursuant to G.S. 87-87 and it shall not be necessary for the Division to issue individual permits for construction or operation of the following Class 5 Well Types:
- (1) Type 5P - Air Injection Well which meets the following criteria:
 - (A) The air to be injected shall not exceed the ambient air quality standards set forth in 15A NCAC 2D Section .0400 and shall not contain any detectable hazardous constituents; and
 - (B) The operation of the air injection well shall not cause contaminated groundwater to migrate into an area not contaminated prior to initiation of injection activities or cause a contravention of a groundwater quality standard as specified in 15A NCAC 2L.
 - (2) Type 5QW - Closed-Loop Geothermal-Water-Only Injection Well System which recirculates potable water only and meets the following criteria:
 - (A) The construction of the system shall be completed in such a manner so as to preclude surficial contaminants from entering the borehole; and
 - (B) The person responsible for the construction of the injection well system shall submit notification, prior to construction, of construction to the Division on forms supplied by the Division.
 - (3) Type 5X30 - Aquifer Test Well which meets the following criteria:
 - (A) 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 contravention of a groundwater quality standard as specified in 15A NCAC 2L ; and
 - (B) The fluid to be injected shall be uncontaminated.
 - (4) In addition to the criteria specified in Subparagraph (u)(2) of this Rule, any test hole or boring shall be permanently abandoned by the driller in accordance with Rule .0214 of this Section within two days after drilling or two days after testing is complete, whichever is less restrictive, except when a test well is being converted to a permanent injection well, in which case conversion shall be completed within 30 days.

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. February 1, 1997; October 1, 1996; March 1, 1984.

.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.

.0213 ADDITIONAL CRITERIA AND STANDARDS APPLICABLE TO CLASS 5 WELLS

(a) Location.

- (1) For all well types, the injection well shall not be located in an area generally subject to flooding. Areas which are generally subject to flooding include those with concave slope, alluvial or colluvial soils, gullies, depressions, and drainage ways.
- (2) For Type 5I, and 5L wells where the concentration of any component of the injectant:
 - (A) exceeds the groundwater quality standards specified in 15A NCAC 2L .0202, the injection well shall not be located:
 - (i) at a point where the injectant would degrade the existing quality of the groundwater in the water-bearing unit into which the injectant is being released; or
 - (ii) at a point where, as a result of the injection activity, corrective action would be required under 15A NCAC 2L .0106.
 - (B) is less than the groundwater quality standards specified in 15A NCAC 2L .0202, the injection well shall not be located at point where the injectant would result in a contravention of any of the aforementioned groundwater quality standards in the water-bearing unit into which the injectant is being released.
- (3) For all well types, the injection well shall be located in an area which does not require a person to enter confined spaces to perform sampling and inspection activities.
- (4) For Type 5A7, 5R21, 5S23, 5X25, and 5Z wells, the minimum horizontal separation between a well that is designed for injection at atmospheric pressure and potential sources of groundwater contamination shall be as follows unless it can be demonstrated to the Director's satisfaction that a lesser separation distance will not result in a threat to human health or a contravention of a groundwater quality standard as specified in 15A NCAC 2L:
 - (A) Septic tank and drainfield..... 50 ft.
 - (B) Other subsurface ground absorption waste disposal system..... 50 ft.
 - (C) Industrial or municipal sludge-spreading or wastewater-irrigation sites..... 50 ft.

- (D) Water-tight sewage or liquid-waste collection or transfer facility..... 25 ft.
 - (E) Cesspools and privies..... 50 ft.
 - (F) Animal feedlots or manure piles..... 50 ft.
 - (G) Fertilizer, pesticide, herbicide, or other chemical storage areas..... 50 ft.
 - (H) Sanitary landfills..... 500 ft.
 - (I) Non-hazardous waste storage, treatment, or disposal lagoons..... 100 ft.
 - (J) Other non-hazardous solid waste landfills..... 100 ft.
 - (K) Animal barns..... 50 ft.
 - (L) All other potential sources of groundwater contamination..... 50 ft.
- (5) For all other well types the minimum horizontal separation between a well that is designed for injection and potential sources of groundwater contamination shall be the distance necessary to prevent migration of contaminants or a violation of groundwater standards as demonstrated by hydrogeologic computer modeling.

(b) Drilling Fluids and Additives. Drilling fluids and additives shall not contain organic materials that cause the surrounding groundwaters to become non-potable nor toxic substances, 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 well construction; or
- (3) materials approved by the Director, based on a demonstration of not adversely affecting human health or the environment.

(c) Drilling, Casing, Screens, and Testing.

- (1) In the drilling, casing, screening, and testing of injection wells the following procedures shall be utilized:
 - (A) unless otherwise excepted by this Rule, a casing shall be installed which extends from at least 12 inches above land surface to the top of the injection zone or to a depth of 20 feet whichever is shallower;
 - (B) wells with casing extending less than 12 inches above land surface and wells without casing may be approved by the Director only when the following conditions are met:
 - (i) Either:
 - (I) site-specific conditions directly related to business activities, such as vehicle traffic, would endanger the physical integrity of the well; or
 - (II) 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; and
 - (ii) for Type 5Q wells without permanent casing, the well head is completed in such a manner so as to preclude surficial contaminants from entering the well; and the vertical length of the borehole shall be grouted to a minimum depth of 20 feet below land surface with a grout, as specified in Rule .0204 of this Section, and by a method approved by the Director based on a demonstration of not adversely affecting human health or the environment; and

- (iii) for all other wells, the well head is completed in such a manner so as to preclude surficial contaminants from entering the well; and well head protection shall include:
 - (I) an accessible external sanitary seal installed around the casing and grouting;
 - (II) a sufficient vertical distance between the top of the grouting and the top of the casing to prevent any surficial fluids from entering the injection well casing; and
 - (III) a water-tight seal installed on the top of the casing;
 - (C) the methods and materials used in construction shall not threaten the physical and mechanical integrity of the well during its lifetime (i.e., it shall be designed and constructed to operate the projected life of the well) and shall be compatible with the proposed injection activities. In determining the suitability of the methods and materials to be used in the drilling, casing, screening, and testing, the Director shall consider the following:
 - (i) depth to the injection zone;
 - (ii) injection pressure, external pressure, internal pressure, and axial loading;
 - (iii) hole size;
 - (iv) size and grade of all casing (wall thickness, diameter, nominal weight, length, joint specification, and casing material);
 - (v) size and grade of all screen material (wall thickness, nominal weight, diameter, length, joint specification, and screen material);
 - (vi) corrosiveness of injected and formation fluids;
 - (vii) lithology of injection and confining zones;
 - (viii) type and grade of cement;
 - (ix) type and grade of drilling fluid and additives; and
 - (x) other applicable state and local well construction and environmental standards;
 - (D) multi-screened wells shall not connect aquifers or zones which have differences in water quality which would result in a degradation of any aquifer or zone;
 - (E) the migration of fluids outside the approved injection or recovery zone or area is not permitted;
 - (F) contaminants are not introduced into underground sources of drinking water unless specifically authorized by Statute or Rule; and
 - (G) 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 vertical migration of any contaminants downward.
- (2) In addition to the requirements of Subparagraph (c)(1) of this Rule, the testing requirements for all wells other than Type 5A7, 5QW, 5P, and 5X30 shall include but not be limited to:
- (A) Appropriate logs and other tests conducted during the drilling and construction of the wells shall be submitted to the Director within 30 days of completion of well construction. A descriptive report interpreting the results of such logs and tests shall be prepared by a knowledgeable log analyst and submitted to the Director within 30 days of completion of the tests. The logs and tests appropriate to each type of Class 5

well 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 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. In the case of area permits, the Director may authorize logs and tests of the well field as a whole, rather than of each individual well within the well field.

- (B) When the injection zone is a water-bearing formation, the following information concerning the injection zone as determined or calculated by the owner, shall be submitted to the Director within 30 days of completion of the determinations in an integrated form:
 - (i) fluid pressure;
 - (ii) fluid temperature;
 - (iii) fracture pressure;
 - (iv) other physical and chemical characteristics of the injection zone;
 - (v) physical and chemical characteristics of the formation fluids; and
 - (vi) compatibility of injected fluids with formation fluids.
 - (C) When the injection formation is not a water-bearing formation, only the information required in Parts (B)(iii) and (iv) of this Subparagraph shall be determined or calculated and submitted to the Director within 30 days of completion of the determinations.
 - (D) Monitoring wells completed in the injection zone and any of those zones adjacent to the injection zone might be affected by the injection operations. These wells shall be located in such a fashion as to detect any movement of injection fluids, process by-products, or formation fluids outside the injection area or zone. If the operation may be 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 by-products, 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:
 - (i) the population relying on the underground source of drinking water affected, or potentially affected, by the injection operation;
 - (ii) the proximity of the injection operation to points of withdrawal of drinking water;
 - (iii) the local geology and hydrology;
 - (iv) the operating pressures;
 - (v) the chemical characteristics and volume of the injected fluid, formation water, and process by-products; and
 - (vi) the density of injection wells.
 - (E) For any wells that inject at a pressure exceeding atmospheric, tests for mechanical integrity and injection capacity shall be conducted in accordance with Rule .0207 of this Section.
- (3) 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.
- (4) A hose bibb, sampling tap, or other collection equipment, as approved by the Director based on a demonstration of not adversely affecting human health or the environment, 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.
- (d) Grouting and Sand-and-Gravel-Packing.
- (1) The annular space between the casing and the borehole shall be grouted:
 - (A) with a type of cement that is non-toxic and is non-reactive with the casing or screen materials, the formation, and the injected fluids;
 - (B) by a method such that the physical and mechanical integrity of the well(s) is not threatened during its life expectancy;
 - (C) from land surface:
 - (i) to a minimum depth of 20 feet when the well is greater than 20 feet in depth; or
 - (ii) to within two feet of the top of the injection zone in those wells less than 20 feet in depth; or
 - (iii) in another configuration, as approved by the Director, upon demonstrations that such a configuration is necessitated by engineering design of the injection facility and will not adversely affect human health or the environment; and
 - (D) so that the grout shall extend 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.
 - (2) 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 area 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.
 - (C) Other. Grout may be emplaced in the annular space by gravity flow in such a way to insure complete filling of the space.
 - (3) If an outer casing is installed, it shall be grouted by either the pumping or pressure method.
 - (4) All grout mixtures shall be prepared prior to emplacement.
 - (5) The well shall be grouted within five working days after the casing is set.
 - (6) No additives which will accelerate the process of hydration shall be used in grout for thermoplastic well casing.
 - (7) In those instances where the life expectancy of the well will not exceed 90 days, the Director may consider modifications or deletion of the grouting requirements where such modifications or deletion would not have a deleterious effect upon an underground source of drinking water.
 - (8) Packing materials shall:
 - (A) be composed of quartz, granite, or similar rock material and shall be clean, of uniform size, water-washed and free from clay, silt, or other deleterious material;
 - (B) be disinfected prior to subsurface emplacement;
 - (C) be emplaced such that it shall not connect aquifers or zones which have differences in water quality that would result in the deterioration of the water qualities in any aquifer

- or zone; and
- (D) be evenly distributed around the screen and shall extend to a depth at least one foot above the top of the screen. A one foot thick seal, comprised of bentonitic clay or other sealing material approved by the Director based on a demonstration of not adversely affecting human health or the environment, shall be emplaced directly above and in contact with the packing material.
- (e) Operating.
- (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 protecting underground sources of drinking water and the well bore is prohibited.
 - (3) Provisions shall be made by the permittee for the monitoring of operating processes at the well head.
 - (4) All injection wells shall be afforded protection against damage during construction and use.
- (f) Monitoring.
- (1) Monitoring of any injection wells may be required by the Director as necessary to demonstrate adequate protection of underground sources of drinking water. 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 man-made 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 endangers an underground source of drinking water; and
 - (I) the life expectancy of the injection operations.
 - (2) Monitoring, if required by the Director, shall be in accordance with the following requirements:
 - (A) Samples and measurements, taken for the purpose of monitoring, shall be representative of the monitored activity.
 - (B) Analysis of the physical and chemical 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.
 - (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 to detect any migration of injected fluids from the injection zone.
 - (E) Continuous recording devices to monitor the injection pressure, flow, rate, and

volume of injected fluid shall be installed.

- (g) Injection Well Identification Plate.
- (1) An identification plate showing the name and registration number of the drilling contractor shall be permanently installed on the well within 24 hours after completion of the drilling.
 - (2) The identification plate shall be constructed of a durable weatherproof, rustproof metal or equivalent material.
 - (3) The identification plate shall be securely attached to the well casing, or other location approved by the Director due to its immediate proximity to another part of the injection well, where it is readily visible.
 - (4) The identification plate shall not be removed from the well by any person.
 - (5) The identification tag shall be stamped with a permanent marking within 30 days of completion of the well to show the following:
 - (A) total depth of well;
 - (B) casing depth (ft.) and inside diameter (in.);
 - (C) screened intervals of screened wells;
 - (D) gravel interval of gravel-packed wells;
 - (E) yield, in gallons per minute (gpm), or specific capacity in gallons per minute per foot of drawdown (gpm ft.-dd);
 - (F) static water level and date measured;
 - (G) drilling contractor and registration number; and
 - (H) date well completed.
- (h) Reporting. The well owner shall be responsible for submitting to the Director on forms furnished by the Director, or on an alternate approved form which provides the same information:
- (1) A record of the construction or abandonment or repairs of a well, to include: the owner's name; well location, size, and depth; casing record; method of completion or abandonment; formation log; static water level; injection apparatus; and records of any surveys, geophysical logs, tests, or water analyses, and changes in construction or in materials replaced. These records shall be submitted within 30 days of completion of specified activities or abandonment of the well, whichever occurs earliest.
 - (2) Quarterly reports on required monitoring activities, which shall include:
 - (A) the date, exact place, and time of sampling or measurements;
 - (B) the individual(s) who performed the sampling or measurements;
 - (C) the date(s) analyses are performed;
 - (D) the individual(s) who performed the analyses;
 - (E) the analytical techniques or methods used; and
 - (F) the results of such sampling, measurements or analyses.

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.

.0214 ABANDONMENT AND CHANGE-OF-STATUS OF WELLS

(a) In the event any injection or associated monitoring well is abandoned, either temporarily or permanently, the well owner shall notify the Director within 15 days and the well(s) shall be abandoned 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 abandoned wells.
 - (A) Upon temporary removal from service, or prior to being put into service, the well shall be sealed with a water-tight cap or seal compatible with the casing and installed so that it cannot be removed without the use of hand or powers tools.
 - (B) The well shall be maintained whereby it is not a source or channel of contamination to an underground source of drinking water during its temporary status.
 - (C) The well shall be repaired, to achieve compliance with the Rules in this Section, or permanently abandoned within 30 days of receipt of notice from the department, upon finding that a well is acting as a source or channel of contamination to an underground source of drinking water.
- (2) Procedures for permanently abandoned wells.
 - (A) All casing and materials may be removed prior to initiation of abandonment procedures if the Director finds such removal will not be responsible for, or contribute to, the contamination of an underground source of drinking water. Any casing not grouted in accordance with 15A NCAC 2C .0113 shall be removed or properly grouted.
 - (B) The entire depth of the well shall be sounded before it is sealed to insure freedom from obstructions that may interfere with sealing operations.
 - (C) The well shall be thoroughly disinfected, prior to sealing, if the Director determines that failure to do so could lead to the contamination of an underground source of drinking water.
 - (D) Drilled wells shall be completely filled with cement grout, which shall be introduced into the well through a pipe which extends to the bottom of the well and is raised as the well is filled. "Bored" or hand-dug wells over 24 inches in diameter may be filled with an alternative material approved by the Director based on a demonstration of not adversely affecting human health or the environment.
 - (E) In the case of gravel-packed wells in which the casing and screens have not been removed, neat-cement shall be injected into the well completely filling it from the bottom of the casing to the top.
 - (F) 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 underground sources of drinking water and in accordance with the terms and conditions of the permit.

(b) Exploratory or test wells, constructed for the purposes of obtaining information regarding an injection well site, shall be permanently abandoned in accordance with Subparagraph (2) of this Rule upon completion of their exploratory or testing status.

(c) 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.

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. February 1, 1997; October 1, 1996.

.0215 VARIANCE

(a) The Director may grant a variance from any construction or operation standards under the rules of this Section. Any variance will be in writing, and may be granted upon written application to the Director, by the person responsible for the construction of the well for which the variance is sought, 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;
- (2) that construction or operation in accordance with the standards was not technically feasible or desirable.

(b) The Director may require the variance applicant to submit such information as he 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 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) 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. September 1, 1996.

.0216 DELEGATION

(a) The Director may grant permission for well construction under G.S. 87-87.

(b) The Director may give notices and sign orders for violations under G.S. 87-91.

(c) The Director may subdelegate, to an official of the Division, the granting of a variance from any construction standard, or the approval of alternate construction methods or materials, as specified under the rules in this Section.

History Note: Authority G.S. 87-87(4); 143-215.1A; 143-215.3(a)(1); 143-215.3(a)(4);
Eff. September 1, 1996.