ARTICLE 43-05
GEOLOGIC STORAGE OF CARBON DIOXIDE

Chapter
43-05-01 Geologic Storage of Carbon Dioxide

CHAPTER 43-05-01
GEOLOGIC STORAGE OF CARBON DIOXIDE

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43-05-01-01. Definitions.

The terms used throughout this chapter have the same meaning as in chapter 43-02-03 and North Dakota Century Code chapter 38-08 except:

1. "Abandoned well" means a well whose use has been permanently discontinued or which is in a state of disrepair such that it cannot be used for its intended purpose or for observation purposes.

2. "Activity" means any activity related to the geological storage of carbon dioxide subject to regulation under this chapter and North Dakota Century Code chapter 38-22.

3. "Aquifer" means a geologic formation, group of formations, or part of a formation that is capable of yielding a significant amount of water to a well, spring, or other point of discharge.

4. "Area of review" means the region surrounding the geologic sequestration project where underground sources of drinking water may be endangered by the injection activity.

5. "Bond rating" means a rating assigned to any long-term senior secured indebtedness issued by or on behalf of the storage operator, including any indebtedness issued by any governmental authority with respect to which the storage operator is obligor.

6. "Carbon dioxide plume" means the extent underground, in three dimensions, of an injected carbon dioxide stream.

7. "Carbon dioxide stream" means carbon dioxide that has been captured from an emission source (e.g., a coal-burning power plant), plus incidental associated substances derived from the source materials and the capture process, and any substances added to the stream to enable or improve the injection process. This does not apply to any carbon dioxide stream that meets the definition of a hazardous waste.

8. "Casing" means a pipe or tubing of varying diameter and weight, which is installed into a well to maintain the structural integrity of that well.

9. "Cementing" means the operation whereby a cement slurry is pumped into a drilled hole and forced behind the casing.

10. "Closure period" means that period from permanent cessation of carbon dioxide injection until the commission issues a certificate of project completion.

11. "Confining zone" means a geologic formation, group of formations, or part of a formation stratigraphically overlying the injection zone that acts as a barrier to fluid movement. For injection wells operating under an injection depth waiver, confining zone means a geologic formation, group of formations, or part of a formation stratigraphically overlying and underlying the injection zone.

12. "Contaminant" means any physical, chemical, biological, or radiological substance or matter in water.

13. "Corrective action" means the use of commission-approved methods to ensure that wells within the area of review do not serve as conduits for the movement of fluids into underground sources of drinking water.

14. "Draft permit" means a document prepared under section 43-05-01-07.2 indicating the commission's tentative decision to issue a storage facility permit or modify, revoke and reissue, or terminate an existing storage facility permit.

15. "Exempted aquifer" means an "aquifer" or its portion that meets the criteria in the definition of "underground sources of drinking water" but which has been exempted according to the procedures in section 43-05-01-02.4.

16. "Facility area" means the areal extent of the storage reservoir.

17. "Fault" means a surface or zone of rock fracture along which there has been displacement.

18. "Flow lines" means pipelines transporting carbon dioxide from the carbon dioxide injection facilities to the wellhead.

19. "Fluid" means any material or substance which flows or moves, whether in a semisolid, liquid, sludge, gas, or any other form or state.

20. "Formation" means a body of rock characterized by a degree of lithologic homogeneity which is prevailingly, but not necessarily, tabular and is mappable on the earth's surface or traceable in the subsurface.

21. "Formation fluid" means fluid present in a formation under natural conditions as opposed to introduced fluids.

22. "Formation fracture pressure" means the pressure, measured in pounds per square inch, which, if applied to a subsurface formation, will cause that formation to fracture.

23. "Geologic sequestration" means the geologic storage of a gaseous, liquid, or supercritical carbon dioxide stream in a storage reservoir. This term does not apply to carbon dioxide capture or transport.

24. "Geologic sequestration project" means an injection well or wells used to emplace a carbon dioxide stream beneath the lowermost formation containing underground sources of drinking water; or, wells used for geologic sequestration that have been granted a waiver of the injection depth requirements; or, wells used for geologic sequestration that have received an expansion to the areal extent of an existing enhanced oil or gas recovery aquifer exemption. It includes the subsurface three-dimensional extent of the carbon dioxide plume, as well as the associated pressure front.

25. "Ground water" means water occurring beneath the surface of the ground that fills available openings in rock or soil materials such that they may be considered saturated.

26. "Injection well" means a nonexperimental well used to inject carbon dioxide into or withdraw carbon dioxide from a reservoir.

27. "Injection zone" means a geologic formation, group of formations, or part of a formation that is of sufficient areal extent, thickness, porosity, and permeability to receive carbon dioxide through a well or wells associated with a geologic sequestration project.

28. "Mechanical integrity" means the absence of significant leakage within an injection well's tubing, casing, or packer (internal mechanical integrity), or outside of the casing (external mechanical integrity).

29. "Minerals" means coal, oil, and natural gas.

30. "Model" means a representation or simulation of a phenomenon or process that is difficult to observe directly or that occurs over long timeframes. Models that support geologic sequestration can predict the flow of carbon dioxide within the subsurface, accounting for the properties and fluid content of the subsurface formations and the effects of injection parameters.

31. "Operational period" means the period during which injection occurs.

32. "Packer" means a device lowered into a well, which can be expanded or compressed to produce a fluid-tight seal.

33. "Person" means an individual, association, partnership, corporation, municipality, state, federal, or tribal agency, or an agency or employee thereof.

34. "Plug" or "plugging" means the act or process of sealing the flow of fluid into or out of a formation through a borehole or "well" penetrating that formation.

35. "Postclosure period" means that period after the commission has issued a certificate of project completion.

36. "Postinjection site care" means appropriate monitoring and other actions, including corrective action, needed following cessation of injection to ensure that underground sources of drinking water are not endangered. Postinjection site care may occur in the closure or postclosure periods.

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

38. "Pressure front" means the zone of elevated pressure and displaced fluids created by the injection of carbon dioxide into the subsurface. The pressure front of a carbon dioxide plume refers to a zone where there is a pressure differential sufficient to cause the movement of injected fluids or formation fluids into underground sources of drinking water.

39. "Project completion" means the point in time, as determined by the commission at which the certificate of project completion is issued and the storage operator is released from all regulatory requirements associated with the storage facility.

40. "Stratum" (strata plural) means a single sedimentary bed or layer, regardless of thickness, that consists of generally the same kind of rock material.

41. "Subsurface observation well" means a well used to observe subsurface phenomena, including the presence of carbon dioxide, pressure fluctuations, fluid levels and flow, temperature, and in situ water chemistry.

42. "Surface casing" means the first string of well casing to be installed in the well.

43. "Transmissive fault or fracture" means a fault or fracture that has sufficient permeability and vertical extent to allow fluids to move between formations.

44. "Trapping" means the physical and geochemical processes by which injected carbon dioxide is sequestered in the subsurface. Physical trapping occurs when buoyant carbon dioxide rises in the formation until it reaches impermeable strata that inhibits further upward and lateral migration or is immoblized in pore spaces due to capillary forces. Geochemical trapping occurs when chemical reactions between the injected carbon dioxide and natural occurring minerals in the formation lead to the precipitation of solid carbonate minerals or dissolution in formation fluids.

45. "Underground source of drinking water" means an aquifer or any portion of an aquifer that supplies drinking water for human consumption, or in which the ground water contains fewer than ten thousand milligrams per liter total dissolved solids and is not an exempted aquifer as determined by the commission under section 43-02-05-03.

46. "Well" means a bored, drilled or driven shaft, or a dug hole, whose depth is greater than the largest surface dimension; or an improved sinkhole; or a subsurface fluid distribution system.

History: Effective April 1, 2010; amended effective April 1, 2013.
General Authority: NDCC 28-32-02
Law Implemented: NDCC 38-22

43-05-01-02. Scope of chapter.

This chapter governs the geologic storage of carbon dioxide. This chapter does not apply to applications filed with the commission proposing to use carbon dioxide for an enhanced oil or gas recovery project, rather such applications will be processed under chapter 43-02-05.

History: Effective April 1, 2010; amended effective April 1, 2013.
General Authority: NDCC 28-32-02
Law Implemented: NDCC 38-22

43-05-01-02.1. Application of rules for geologic storage of carbon dioxide.

In addition to the provisions in this chapter, injection wells utilized for geologic storage are subject to the provisions of chapters 43-02-03 and 43-02-05 when applicable.

History: Effective April 1, 2013.
General Authority: NDCC 28-32-02
Law Implemented: NDCC 38-22

43-05-01-02.2. Injection into underground source of drinking water prohibited.

Underground injection of carbon dioxide for geologic storage that causes or allows movement of fluid into an underground source of drinking water is prohibited, unless the underground source of drinking water is an exempted aquifer under section 43-02-05-03.

No storage operator shall construct, operate, maintain, convert, plug, abandon, or conduct any 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 endanger underground sources of drinking water or may adversely affect the health of persons. The applicant must show that the objectives of this section are fulfilled.

Notwithstanding any other provision of this section, the commission may take emergency action upon receipt of information that a contaminant which is present in or likely to enter a public water system or underground source of drinking water may present an imminent and substantial endangerment to the health of persons.

History: Effective April 1, 2013.
General Authority: NDCC 28-32-02
Law Implemented: NDCC 38-22

43-05-01-02.3. Transitioning from enhanced oil or gas recovery to geologic sequestration.

A storage operator injecting carbon dioxide for the primary purpose of geologic sequestration into an oil and gas reservoir shall apply for and obtain storage facility and injection well permits when there is an increased risk to underground sources of drinking water compared to enhanced oil or gas recovery operations. In determining if there is an increased risk to underground sources of drinking water, the commission shall consider the following factors:

1. Increase in reservoir pressure within the injection zone;

2. Increase in carbon dioxide injection rates;

3. Decrease in reservoir production rates;

4. Distance between the injection zone and underground sources of drinking water;

5. Suitability of the enhanced oil or gas recovery area of review delineation;

6. Quality of abandoned well plugs within the area of review;

7. The storage operator's plan for recovery of carbon dioxide at the cessation of injection;

8. The source and properties of injected carbon dioxide; and

9. Any additional site-specific factors as determined by the commission.

History: Effective April 1, 2013.
General Authority: NDCC 28-32-02
Law Implemented: NDCC 38-22

43-05-01-02.4. Exempted aquifers and expansions of areal extent of existing aquifer exemptions.

1. The commission may identify by narrative description, illustrations, maps, or other means and shall implement these rules to protect as underground sources of drinking water, all aquifers and parts of aquifers that meet the definition of "underground source of drinking water". Even if an aquifer has not been specifically identified by the commission, it is an underground source of drinking water if it meets the definition of "underground source of drinking water". Other than United States environmental protection agency-approved aquifer exemption expansions, new aquifer exemptions shall not be issued for injection wells.

2. The commission shall identify, by narrative description, illustrations, maps, or other means, and describe in geographic and geometric terms, such as vertical and lateral limits and gradient, which are clear and definite, all aquifers or parts of aquifers that the commission proposes to designate as exempted aquifers using the criteria in section 43-02-05-03. No designation of an exempted aquifer submitted as part of the underground injection control program is final until approved by the United States environmental protection agency administrator as part of the underground injection control program.

3. A storage operator of enhanced oil or gas recovery wells may apply to the commission for approval to expand the areal extent of an aquifer exemption already in place for an enhanced oil or gas recovery well for the exclusive purpose of carbon dioxide injection for geologic sequestration. Such applications are considered a revision to the applicable federal underground injection control program or a substantial program revision to an approved state underground injection control program and are not final until approved by the United States environmental protection agency.

   a. A storage operator's application must define by narrative description, illustrations, maps, or other means and describe in geographic or geometric terms, such as vertical and lateral limits and gradient that are clear and definite, all aquifers or parts thereof that are requested to be designated as exempted under section 43-02-05-03.

   b. In evaluating an application, the commission shall determine that it meets the criteria for exemptions in section 43-02-05-03. In making the determination, the commission shall consider:

      (1) Current and potential future use of the underground sources of drinking water to be exempted as drinking water resources;

      (2) The predicted extent of the injected carbon dioxide plume, and any mobilized fluids that may result in degradation of water quality, over the lifetime of the geologic sequestration project, as informed by computational modeling performed pursuant to subdivision a of subsection 2 of section 43-05-01-05.1, in order to ensure that the proposed injection operation will not at any time endanger underground sources of drinking water, including nonexempted portions of the injection formation;

(3) Whether the areal extent of the expanded aquifer exemption is sufficient to account for any possible revisions to the computational model during reevaluation of the area of review; and

(4) Information submitted to support a waiver request made by the applicant under section 43-05-01-11.6, if appropriate.

History: Effective April 1, 2013.
General Authority: NDCC 28-32-02
Law Implemented: NDCC 38-22

43-05-01-02.5. Prohibition of unauthorized injection.

Any underground injection of carbon dioxide for the purpose of geologic storage, except into a well authorized by permit issued under this chapter, is prohibited. The construction of any well required to have a permit is prohibited until the permit authorizing construction of the well has been issued.

History: Effective April 1, 2013.
General Authority: NDCC 28-32-02
Law Implemented: NDCC 38-22

43-05-01-02.6. Existing well conversion.

Storage operators seeking to convert an existing well to an injection well for the purpose of geologic storage of carbon dioxide must demonstrate to the commission that the well is constructed in a manner that will ensure the protection of underground sources of drinking water.

History: Effective April 1, 2013.
General Authority: NDCC 28-32-02
Law Implemented: NDCC 38-22

43-05-01-03. Books and records to be kept to substantiate reports.

All owners, operators, drilling contractors, drillers, service companies, or other persons engaged in drilling, completing, operating, or servicing storage facilities shall make and keep appropriate books and records until project completion, covering their operations in North Dakota from which they may be able to make and substantiate the reports required by this chapter.

History: Effective April 1, 2010; amended effective April 1, 2013.
General Authority: NDCC 28-32-02
Law Implemented: NDCC 38-22

43-05-01-04. Access to records.

The industrial commission and the commission's authorized agents shall have access to all storage facility records wherever located. All owners, operators, drilling contractors, drillers, service companies, or other persons engaged in drilling, completing, operating, or servicing storage facilities shall permit the industrial commission, or its authorized agents, to come upon any lease, property, well, or drilling rig operated or controlled by them, complying with state safety rules and to inspect the records and operation of wells and to conduct sampling and testing. Any information so obtained shall be public information. If requested, copies of storage facility records must be filed with the commission.

History: Effective April 1, 2010.
General Authority: NDCC 28-32-02
Law Implemented: NDCC 38-22

43-05-01-05. Storage facility permit.

1. An application for a permit must include the following:

   a. A site map showing the boundaries of the storage reservoir and the location of all proposed wells, proposed cathodic protection boreholes, and surface facilities within the carbon dioxide storage facility area;

   b. A technical evaluation of the proposed storage facility, including the following:

      (1) The name, description, and average depth of the storage reservoirs;

      (2) A geologic and hydrogeologic evaluation of the facility area, including an evaluation of all existing information on all geologic strata overlying the storage reservoir, including the immediate caprock containment characteristics and all subsurface zones to be used for monitoring. The evaluation must include any available geophysical data and assessments of any regional tectonic activity, local seismicity and regional or local fault zones, and a comprehensive description of local and regional structural or stratigraphic features. The evaluation must describe the storage reservoir's mechanisms of geologic confinement, including rock properties, regional pressure gradients, structural features, and adsorption characteristics with regard to the ability of that confinement to prevent migration of carbon dioxide beyond the proposed storage reservoir. The evaluation must also identify any productive existing or potential mineral zones occurring within the facility area and any underground sources of drinking water in the facility area and within one mile [1.61 kilometers] of its outside boundary. The evaluation must include exhibits and plan view maps showing the following:

         (a) All wells, including water, oil, and natural gas exploration and development wells, and other manmade subsurface structures and activities, including coal mines, within the facility area and within one mile [1.61 kilometers] of its outside boundary;

         (b) All manmade surface structures that are intended for temporary or permanent human occupancy within the facility area and within one mile [1.61 kilometers] of its outside boundary;

         (c) Any regional or local faulting;

         (d) An isopach map of the storage reservoirs;

         (e) An isopach map of the primary and any secondary containment barrier for the storage reservoir;

         (f) A structure map of the top and base of the storage reservoirs;

         (g) Identification of all structural spill points or stratigraphic discontinuities controlling the isolation of stored carbon dioxide and associated fluids within the storage reservoir;

         (h) Evaluation of the pressure front and the potential impact on underground sources of drinking water, if any;

         (i) Structural and stratigraphic cross sections that describe the geologic conditions at the storage reservoir;

(j) The location, orientation, and properties of known or suspected faults and fractures that may transect the confining zone in the area of review, and a determination that they would not interfere with containment;

(k) Data on the depth, areal extent, thickness, mineralogy, porosity, permeability, and capillary pressure of the injection and confining zone, including facies changes based on field data, which may include geologic cores, outcrop data, seismic surveys, well logs, and names and lithologic descriptions;

(l) Geomechanical information on fractures, stress, ductility, rock strength, and in situ fluid pressures within the confining zone. The confining zone must be free of transmissive faults or fractures and of sufficient areal extent and integrity to contain the injected carbon dioxide stream;

(m) Information on the seismic history, including the presence and depth of seismic sources and a determination that the seismicity would not interfere with containment;

(n) Geologic and topographic maps and cross sections illustrating regional geology, hydrogeology, and the geologic structure of the facility area; and

(o) Identify and characterize additional strata overlying the storage reservoir that will prevent vertical fluid movement, are free of transmissive faults or fractures, allow for pressure dissipation, and provide additional opportunities for monitoring, mitigation, and remediation.

(3) A review of the data of public record, conducted by a geologist or engineer, for all wells within the facility area, which penetrate the storage reservoir or primary or secondary seals overlying the reservoir, and all wells within the facility area and within one mile [1.61 kilometers], or any other distances deemed necessary by the commission, of the facility area boundary. The review must include the following:

(a) A determination that all abandoned wells have been plugged and all operating wells have been constructed in a manner that prevents the carbon dioxide or associated fluids from escaping from the storage reservoir;

(b) A description of each well's type, construction, date drilled, location, depth, record of plugging, and completion;

(c) Maps and stratigraphic cross sections indicating the general vertical and lateral limits of all underground sources of drinking water, water wells, and springs within the area of review; their positions relative to the injection zone; and the direction of water movement, where known;

(d) Maps and cross sections of the area of review;

(e) A map of the area of review showing the number or name and location of all injection wells, producing wells, abandoned wells, plugged wells or dry holes, deep stratigraphic boreholes, state-approved or United States environmental protection agency-approved subsurface cleanup sites, surface bodies of water, springs, mines (surface and subsurface), quarries, water wells, other pertinent surface features, including structures intended for human occupancy, state, county, or Indian country boundary lines, and roads;

(f) A list of contracts, submitted to the commission, when the area of review extends across state jurisdiction boundary lines;

(g) Baseline geochemical data on subsurface formations, including all underground sources of drinking water in the area of review; and

(h) Any additional information the commission may require.

(4) The proposed calculated average and maximum daily injection rates, daily volume, and the total anticipated volume of the carbon dioxide stream using a method acceptable to and filed with the commission;

(5) The proposed average and maximum bottom hole injection pressure to be utilized at the reservoir. The maximum allowed injection pressure, measured in pounds per square inch gauge, shall be approved by the commission and specified in the permit. In approving a maximum injection pressure limit, the commission shall consider the results of well tests and other studies that assess the risks of tensile failure and shear failure. The commission shall approve limits that, with a reasonable degree of certainty, will avoid initiating a new fracture or propagating an existing fracture in the confining zone or cause the movement of injection or formation fluids into an underground source of drinking water;

(6) The proposed preoperational formation testing program to obtain an analysis of the chemical and physical characteristics of the injection zone and confining zone pursuant to section 43-05-01-11.2;

(7) The proposed stimulation program, a description of stimulation fluids to be used, and a determination that stimulation will not interfere with containment; and

(8) The proposed procedure to outline steps necessary to conduct injection operations.

c. The extent of the pore space that will be occupied by carbon dioxide as determined by utilizing all appropriate geologic and reservoir engineering information and reservoir analysis, which must include various computational models for reservoir characterization, and the projected response of the carbon dioxide plume and storage capacity of the storage reservoir. The computational model must be based on detailed geologic data collected to characterize the injection zones, confining zones, and any additional zones;

d. An emergency and remedial response plan pursuant to section 43-05-01-13;

e. A detailed worker safety plan that addresses carbon dioxide safety training and safe working procedures at the storage facility pursuant to section 43-05-01-13;

f. A corrosion monitoring and prevention plan for all wells and surface facilities pursuant to section 43-05-01-15;

g. A leak detection and monitoring plan for all wells and surface facilities pursuant to section 43-05-01-14. The plan must:

(1) Identify the potential for release to the atmosphere;

(2) Identify potential degradation of ground water resources with particular emphasis on underground sources of drinking water; and

(3) Identify potential migration of carbon dioxide into any mineral zone in the facility area;

h. A leak detection and monitoring plan to monitor any movement of the carbon dioxide outside of the storage reservoir. This may include the collection of baseline information of carbon dioxide background concentrations in ground water, surface soils, and chemical

composition of in situ waters within the facility area and the storage reservoir and within one mile [1.61 kilometers] of the facility area's outside boundary. Provisions in the plan will be dictated by the site characteristics as documented by materials submitted in support of the permit application but must:

(1) Identify the potential for release to the atmosphere;

(2) Identify potential degradation of ground water resources with particular emphasis on underground sources of drinking water; and

(3) Identify potential migration of carbon dioxide into any mineral zone in the facility area;

i. The proposed well casing and cementing program detailing compliance with section 43-05-01-09;

j. An area of review and corrective action plan that meets the requirements pursuant to section 43-05-01-05.1;

k. The storage operator shall comply with the financial responsibility requirements pursuant to section 43-05-01-09.1;

l. A testing and monitoring plan pursuant to section 43-05-01-11.4;

m. A plugging plan that meets requirements pursuant to section 43-05-01-11.5;

n. A postinjection site care and facility closure plan pursuant to section 43-05-01-19; and

o. Any other information that the commission requires.

2. Any person filing a permit application or an application to amend an existing permit shall pay a processing fee. The fee will be based on actual processing costs, including computer data processing costs, incurred by the commission.

a. A record of all application processing costs incurred must be maintained by the commission.

b. Promptly after receiving an application, the commission shall prepare and submit to the applicant an estimate of the processing fee and a payment billing schedule.

c. After the commission's work on the application has concluded, a final statement will be sent to the applicant. The full processing fee must be paid before the commission issues its final decision on an application.

d. The applicant must pay the processing fee regardless of whether a permit is issued or denied, or the application withdrawn.

3. The commission has one year from the date an application is deemed complete to issue a final decision regarding the application.

History: Effective April 1, 2010; amended effective April 1, 2013.
General Authority: NDCC 28-32-02
Law Implemented: NDCC 38-22

43-05-01-05.1. Area of review and corrective action.

1. The storage operator shall prepare, maintain, and comply with a plan to delineate the area of review for a proposed geologic sequestration project, periodically reevaluate the delineation,

and perform corrective action that meets the requirements of this section and is acceptable to the commission. The requirement to maintain and implement a commission-approved plan is directly enforceable regardless of whether the requirement is a condition of the permit. As a part of the storage facility permit application, the storage operator shall submit an area of review and corrective action plan that includes the following:

a. The method for delineating the area of review, including the model to be used, assumptions that will be made, and the site characterization data on which the model will be based;

b. A description of:

(1) The reevaluation date, not to exceed five years, at which time the storage operator shall reevaluate the area of review;

(2) The monitoring and operational conditions that would warrant a reevaluation of the area of review prior to the next scheduled reevaluation date;

(3) How monitoring and operational data (e.g., injection rate and pressure) will be used to inform an area of review reevaluation; and

(4) How corrective action will be conducted to meet the requirements of this section, including what corrective action will be performed prior to injection and what, if any, portions of the area of review will have corrective action addressed on a phased basis and how the phasing will be determined; how corrective action will be adjusted if there are changes in the area of review; and how site access will be guaranteed for future corrective action.

2. The storage operator shall perform the following actions to delineate the area of review and identify all wells that require corrective action:

a. Predict, using existing site characterization, monitoring and operational data, and computational modeling, the projected lateral and vertical migration of the carbon dioxide plume and its associated pressure front in the subsurface from the commencement of injection activities until the plume movement ceases, or until the end of a fixed time period as determined by the commission. The model must:

(1) Be based on detailed geologic data collected to characterize the injection zone, confining zone, and any additional zones; and anticipated operating data, including injection pressures, rates, and total volumes over the proposed life of the geologic sequestration project;

(2) Take into account any geologic heterogeneities, other discontinuities, data quality, and their possible impact on model predictions; and

(3) Consider potential migration through faults, fractures, and artificial penetrations.

b. Using methods approved by the commission, identify all penetrations, including active and abandoned wells and underground mines, in the area of review that may penetrate the confining zone. Provide a description of each well's type, construction, date drilled, location, depth, record of plugging and completion, and any additional information the commission may require; and

c. Determine which abandoned wells have been plugged or operating wells have been constructed in the area of review in a manner that prevents the movement of the injected carbon dioxide or other fluids that may endanger underground sources of drinking water, including use of materials compatible with the carbon dioxide stream.

3. The storage operator shall perform corrective action on all wells in the area of review that are determined to need corrective action, using methods designed to prevent the movement of fluid into or between underground sources of drinking water, including use of materials compatible with the carbon dioxide stream, where appropriate.

4. At the reevaluation date, not to exceed five years, as specified in the area of review and corrective action plan, or when monitoring and operational conditions warrant, the storage operator shall:

   a. Reevaluate the area of review in the same manner specified in subdivision a of subsection 2;

   b. Identify all wells in the reevaluated area of review that require corrective action in the same manner specified in subsection 2;

   c. Perform corrective action on wells requiring corrective action in the reevaluated area of review in the same manner specified in subsection 3; and

   d. Submit an amended area of review and corrective action plan or demonstrate to the commission through monitoring data and modeling results that no amendment to the plan is needed. Any amendments to the plan are subject to the commission's approval, must be incorporated into the permit, and are subject to the permit modification requirements.

5. The emergency and remedial response plan and the demonstration of financial responsibility must account for the area of review, regardless of whether or not corrective action in the area of review is phased.

6. All modeling inputs and data used to support area of review delineations and reevaluations must be retained until project completion. Upon project completion, the storage operator shall deliver the records to the commission.

History: Effective April 1, 2013.
General Authority: NDCC 28-32-02
Law Implemented: NDCC 38-22

43-05-01-06. Storage facility permit transfer.

1. **Notification.** The storage operator and proposed transferee shall notify the commission in writing of any proposed permit transfer. The notice must contain the following:

   a. The name and address of the person to whom the permit is to be transferred.

   b. The name of the permit subject to transfer and location of the storage facility and a description of the land within the facility area.

   c. The date that the storage operator desires the proposed transfer to occur.

   d. A demonstration of financial assurance as required by section 43-05-01-09.1.

2. **Transfers by modification.** A storage facility permit may be transferred by the storage operator to a new storage operator only if the storage facility permit is modified, or revoked and reissued, or a minor modification made, to identify the new storage operator and incorporate such other requirements as may be necessary under state and federal laws.

3. **Commission review.** The commission shall review the proposed transfer to ensure that the purposes of North Dakota Century Code chapter 38-22 are not compromised but are promoted. For good cause, the commission may deny a transfer request, delay acting on it, and place conditions on its approval.

4. **Commission approval required.** A permit transfer can occur only upon the commission's written order. The transferor of a permit shall receive notice from the commission that the approved new storage operator has demonstrated financial responsibility for the storage facility.

History: Effective April 1, 2010; amended effective April 1, 2013.
General Authority: NDCC 28-32-02
Law Implemented: NDCC 38-22

43-05-01-07. Amending storage facility permit.

Repealed effective April 1, 2013.

43-05-01-07.1. Permitting.

1. Application for a permit under this chapter:

   a. Any person who is required to have a permit shall complete, sign, and submit a permit application to the commission.

   b. When the owner and storage operator are different, it is the storage operator's duty to obtain a permit.

   c. The commission shall not begin processing a permit until the applicant has fully complied with the application requirements for that permit.

   d. The application must be complete before the permit is issued. An application for a permit is complete when the commission receives an application form and any supplemental information which are completed to the commission's satisfaction.

2. All permit applications, reports, or information submitted to the commission must comply with the following signature and certification requirements:

   a. All permit applications must be signed as follows:

      (1) For a corporation by a principal executive officer of at lease the level of vice president;

      (2) For a partnership or sole proprietorship by a general partner or the proprietor, respectively; or

      (3) For a municipality, state, federal, or other public agency by either a principal executive officer or ranking elected official.

   b. All reports required by permits and other information requested by the commission must be signed by a person described in subdivision a, or by a duly authorized representative of that person. A person is a duly authorized representative only if:

      (1) The authorization is made in writing by a person described in subdivision a;

      (2) The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or well field, superintendent, or position of equivalent responsibility. A duly authorized representative may thus be either a named individual or any individual occupying a named position; and

      (3) The written authorization is submitted to the commission.

c. If an authorization under subdivision b is no longer accurate because a different individual or position has responsibility for the overall operation of the storage facility, a new authorization pursuant to subdivision b must be submitted to the commission prior to or together with any reports, information, or applications to be signed by an authorized representative.

d. Any person signing a document under subdivision a or b shall make certification under penalty of law that that person has personally examined and is familiar with the information submitted in the document and all attachments and that, based on inquiry of those individuals immediately responsible for obtaining the information, the person believes that the information is true, accurate, and complete. Further, the person shall certify awareness that there are significant penalties for submitting false information, including the possibility of a fine and imprisonment.

3. Applicants shall provide the following information to the commission:

a. The activities conducted by the applicant which require it to obtain a storage facility permit or other federal, state, or local permits;

b. Name, mailing address, and location of the storage facility for which the application is submitted;

c. Up to four standard industrial classification codes which best reflect the principal products or services provided by the facility;

d. The storage operator's name, address, telephone number, ownership status, and status as federal, state, private, public, or other entity;

e. Whether the storage facility is located on Indian lands, historic or archaeological sites; and

f. A listing of all environmental permits, construction approvals, or any other relevant permit received or applied for from the commission or any other federal, state, or local regulatory agency.

4. Applicants shall retain records of all data used to complete permit applications and supplemental information until project completion. Upon project completion, the storage operator shall deliver any records required in this section to the commission.

5. Storage operators applying to drill a new injection well shall submit an application within a reasonable time before construction is expected to begin.

History: Effective April 1, 2013.
General Authority: NDCC 28-32-02
Law Implemented: NDCC 38-22

43-05-01-07.2. Draft permits and fact sheets.

1. Draft permits.

a. When a storage facility permit application is complete, the commission shall either prepare a draft permit or deny the application.

b. Before preparing the draft permit, the commission shall consult the state department of health.

c. The draft permit must contain the permit conditions required under sections 43-05-01-07.3 and 43-05-01-07.4.

2. Fact sheets.

   a. A fact sheet must be prepared for each draft permit.

   b. The fact sheet and draft permit must be sent to the applicant and, upon request, to any other person.

   c. The fact sheet must include:

      (1) A brief description of the type of facility or activity which is the subject of the draft permit;

      (2) The quantity and quality of the carbon dioxide which is proposed to be injected and stored;

      (3) A brief summary of the basis for the draft permit conditions, including references to applicable statutory or regulatory provisions;

      (4) The reasons why any requested variances or alternatives to required standards do or do not appear justified;

      (5) A description of the procedures for reaching a final decision on the draft permit, including:

         (a) The beginning and ending dates of the comment period;

         (b) The address where comments will be received;

         (c) The date, time, and location of the storage facility permit hearing; and

         (d) Any other procedures by which the public may participate in the final decision.

      (6) The name and telephone number of a person to contact for additional information.

History: Effective April 1, 2013.
General Authority: NDCC 28-32-02
Law Implemented: NDCC 38-22

43-05-01-07.3. Permit conditions.

The following conditions apply to all storage facility permits:

1. The storage operator shall comply with all conditions of the permit. Any noncompliance with the permit constitutes a violation and is grounds for enforcement action, including permit termination, revocation, or modification pursuant to section 43-05-01-12.

2. In an administrative action, it shall not be a defense that it would have been necessary for the storage operator to halt or reduce the permitted activity in order to maintain compliance with the conditions of the permit.

3. The storage operator shall take all reasonable steps to minimize or correct any adverse impact on the environment resulting from noncompliance with the storage facility permit.

4. The storage operator shall develop and implement an emergency and remedial response plan pursuant to section 43-05-01-13.

5. The storage operator shall at all times properly operate and maintain all storage facilities which are installed or used by the storage operator to achieve compliance with the conditions of the storage facility permit. Proper operation and maintenance includes effective

performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of the storage facility permit.

6. The permit may be modified, revoked and reissued, or terminated pursuant to section 43-05-01-12. The filing of a request by the storage operator for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance, does not stay any permit condition.

7. The injection well permit or the permit to operate an injection well does not convey any property rights of any sort or any exclusive privilege.

8. The storage operator shall furnish to the commission, within a time specified by the commission, any information which the commission may request to determine whether cause exists for modifying, revoking and reissuing, or terminating the permit, or to determine compliance with the permit. The storage operator shall also furnish to the commission, upon request, copies of records required to be kept by the storage facility permit.

9. The storage operator shall allow the commission, or an authorized representative, upon the presentation of credentials and other documents as may be required by law, to:

    a. Enter upon the storage facility premises where records must be kept under the conditions of the permit;

    b. At reasonable times, have access to and copy any records that must be kept under the conditions of the permit;

    c. At reasonable times, inspect any facilities, equipment, including monitoring and control equipment, practices, or operations regulated or required under the permit; and

    d. At reasonable times, sample or monitor for the purposes of assuring permit compliance, any substances or parameters at any location.

10. The storage operator shall prepare, maintain, and comply with a testing and monitoring plan pursuant to section 43-05-01-11.4.

11. The storage operator shall comply with the reporting requirements provided in section 43-05-01-18.

12. The storage operator must obtain an injection well permit under section 43-05-01-10 and injection wells must meet the construction and completion requirements in section 43-05-01-11.

13. The storage operator shall prepare, maintain, and comply with a plugging plan pursuant to section 43-05-01-11.5.

14. The storage operator shall establish mechanical integrity prior to commencing injection and maintain mechanical integrity pursuant to section 43-05-01-11.1.

15. The storage operator shall implement the worker safety plan pursuant to section 43-05-01-13.

16. The storage operator shall comply with leak detection and reporting requirements pursuant to section 43-05-01-14.

17. The storage operator shall conduct a corrosion monitoring and prevention program pursuant to section 43-05-01-15.

18. The storage operator shall prepare, maintain, and comply with the area of review and corrective action plan pursuant to section 43-05-01-05.1.

19. The storage operator shall maintain financial responsibility pursuant to section 43-05-01-09.1.

20. The storage operator shall maintain and comply with the postinjection site care and facility closure plan pursuant to section 43-05-01-19.

History: Effective April 1, 2013.
General Authority: NDCC 28-32-02
Law Implemented: NDCC 38-22

43-05-01-07.4. Establishing permit conditions.

1. In addition to conditions required in section 43-05-01-07.3, the commission shall establish conditions, as required on a case-by-case basis. Storage facility permits shall include conditions meeting the requirements of this chapter and such additional conditions as are necessary to prevent the endangerment of underground sources of drinking water.

2. The commission shall establish conditions in any permit as required on a case-by-case basis, to provide for and assure compliance with all statutory or regulatory requirements which take effect prior to final administrative disposition of the permit.

3. New or reissued permits, and to the extent allowed under section 43-05-01-12 modified or revoked and reissued permits, shall incorporate each of the applicable requirements referenced in this section.

4. All permit conditions shall be incorporated either expressly or by reference. If incorporated by reference, a specific citation to the applicable regulations or requirements must be given in the permit.

History: Effective April 1, 2013.
General Authority: NDCC 28-32-02
Law Implemented: NDCC 38-22

43-05-01-08. Storage facility permit hearing.

1. The commission shall hold a public hearing before issuing a storage facility permit. At least forty-five days prior to the hearing, the applicant shall give notice of the hearing to the following:

    a. Each operator of mineral extraction activities within the facility area and within one-half mile [.80 kilometer] of its outside boundary;

    b. Each mineral lessee of record within the facility area and within one-half mile [.80 kilometer] of its outside boundary;

    c. Each owner of record of the surface within the facility area and one-half mile [.80 kilometer] of its outside boundary;

    d. Each owner of record of minerals within the facility area and within one-half mile [.80 kilometer] of its outside boundary;

    e. Each owner and each lessee of record of the pore space within the storage reservoir and within one-half mile [.80 kilometer] of the reservoir's boundary; and

    f. Any other persons as required by the commission.

2. The notice given by the applicant must contain:

   a. A legal description of the land within the facility area.

   b. The date, time, and place that the commission will hold a hearing on the permit application.

   c. A statement that a copy of the permit application and draft permit may be obtained from the commission.

   d. A statement that all comments regarding the storage facility permit application must be in writing and submitted to the commission prior to the hearing or presented at the hearing.

   e. A statement that amalgamation of the storage reservoirs pore space is required to operate the storage facility, that the commission may require that the pore space owned by nonconsenting owners be included in the storage facility and subject to geologic storage, and the amalgamation of pore space will be considered at the hearing.

3. The commission shall give at least a thirty-day public notice and comment period for a draft storage facility permit, except in an emergency, including notice of the time and place of hearing thereon by one publication of such notice in a newspaper of general circulation in Bismarck, North Dakota, and in a newspaper of general circulation in the county where the land affected or some part thereof is situated, unless in some particular proceeding a longer period of time or a different method of publication is required by law, in which event such period of time and method of publication shall prevail. The notice shall issue in the name of the commission and shall conform to the other requirements provided by law. The public notice must state that an application has been filed with the commission for permission to store carbon dioxide and describe the location of the proposed facility area and the date, time, and place of the hearing before the commission at which time the merits of the application and draft permit will be considered.

4. The public notice given by the commission must contain the following:

   a. Name and address of the commission;

   b. Name and address of the applicant;

   c. A brief description of the nature and purpose of the hearing, including the applicable rules and procedures;

   d. A brief description of the activity described in the storage facility permit application or the draft storage facility permit;

   e. Name, address, and telephone number of a person from whom interested persons may obtain further information, including copies of the draft storage facility permit, fact sheet, and the storage facility permit application;

   f. A brief description of the comment procedures and other procedures by which the public may participate in the final permit decision;

   g. The date of any previous public notices relating to the storage facility; and

   h. Any additional information that the commission requires.

5. Public notice shall be given by the following methods:

   a. By mailing or e-mailing a copy of the notice, the fact sheet, the storage facility permit application, and draft permit to the following:

(1) The applicant;

(2) The state department of health;

(3) The state geological survey;

(4) The state water commission;

(5) The United States environmental protection agency; and

(6) Federal and state agencies with jurisdiction over fish and wildlife resources, the advisory council on historic preservation, and state historical preservation officers, including any affected Indian tribes and the bureau of Indian affairs.

b. By mailing or e-mailing of copy of the public notice to the following:

(1) To any unit of local government having jurisdiction over the area where the storage facility is proposed to be located and to each state agency having any authority under state law with respect to the construction or operation of such facility.

(2) Any other person or group either upon request or on a departmental mailing list to receive geologic storage of carbon dioxide public notices:

(a) Including those who request in writing to be on the list;

(b) Persons on "area lists" from past permit proceedings in that area; and

(c) Notifying the public of the opportunity to be put on the mailing list through periodic publication in the public press and in such publications as state-funded newsletters, environmental bulletins, or state law journals. The commission may update the mailing list from time to time by requesting written indication of continued interest from those listed. The commission may delete from the list the name of any person who fails to respond to such a request.

6. During the public comment period any interested person may submit written comments on the draft storage facility permit or the storage facility permit application. All comments shall be considered in making the final decision and shall be answered when a final storage facility permit is issued. The response to comments must include:

a. Provisions, if any, of the draft permit that have been changed in the final permit decision, and the reasons for the change; and

b. A brief description and response to all significant comments on the draft permit or the permit application.

7. The response to all applicable comments shall be available to the public.

History: Effective April 1, 2010; amended effective April 1, 2013.
General Authority: NDCC 28-32-02
Law Implemented: NDCC 38-22

43-05-01-09. Well permit application requirements.

1. Following receipt of a storage facility permit, the storage operator shall obtain a permit to drill, deepen, convert, operate, or, upon demonstration of mechanical integrity, reenter a previously plugged and abandoned well for storage purposes.

2. Application for permits to drill, deepen, convert, operate, or reenter a well must be submitted on form 25 provided by the commission and must include at a minimum:

   a. An accurate plat certified by a registered surveyor showing the location of the proposed injection or subsurface observation well. The plat must be drawn to the scale of one inch [25.4 millimeters] equals one thousand feet [304.8 meters], unless otherwise directed by the commission, and must show distances from the proposed well to the nearest facility area boundary. The plat must show the latitude and longitude of the proposed well location to the nearest tenth of a second. The plat must also show the location and status of all other wells that have been drilled within one-fourth mile [402.34 meters], or any other distance deemed necessary by the commission, of the proposed injection or subsurface observation well;

   b. The drilling, completion, or conversion procedures for the proposed injection or subsurface observation well;

   c. A well bore schematic showing the name, description, and depth of the storage reservoirs and the depth of the deepest underground source of drinking water; a description of the casing in the injection or subsurface observation well, or the proposed casing program, including a full description of cement already in place or as proposed; and the proposed method of testing casing before use of the injection well;

   d. A geophysical log, if available, through the storage reservoir to be penetrated by the proposed injection well or if an injection or subsurface observation well is to be drilled, a complete log through the reservoir from a nearby well is permissible. Such log must be annotated to identify the estimated location of the base of the deepest underground source of drinking water, showing the stratigraphic position and thickness of all confining strata above the reservoirs and the stratigraphic position and thickness of the reservoir; and

   e. The proposed pad layout, including cut and fill diagrams.

3. Within thirty days after the conclusion of well drilling and completion activities, a permit application shall be submitted to operate an injection well and must include at a minimum:

   a. A schematic diagram of the surface injection system and its appurtenances;

   b. A final well bore diagram showing the name, description, and depths of the storage reservoir and the base of the deepest underground source of drinking water and a diagram of the well depicting the casing, cementing, perforation, tubing, and plug and packer records associated with the construction of the well;

   c. The well's complete dual induction or equivalent log through the storage reservoir. Such a log shall be run prior to setting casing through the storage reservoir. Logs must be annotated to identify the estimated location of the base of the deepest underground source of drinking water, showing the stratigraphic position and thickness of all confining strata above the storage reservoir and the reservoir's stratigraphic position and thickness unless that information has been previously submitted. When approved in advance by the commission, this information can be demonstrated with a dual induction or equivalent log run in a nearby well or by such other method acceptable to the commission;

   d. An affidavit specifying the chemical constituents, their relative proportions and the physical properties of the carbon dioxide stream, and the source of the carbon dioxide stream;

   e. Proof that the long string of casing of the well is cemented adequately so that the carbon dioxide is confined to the storage reservoirs. Such proof must be provided in the form of

a cement bond log or the results of a fluid movement study or such other method specified by the commission;

f. The results of a mechanical-integrity test, if applicable to well type, of the casing in accordance with the pressure test requirements of this section if a test was run within one calendar year preceding the request for a conversion permit for a previously drilled well;

g. The final area of review based on modeling, using data obtained during logging and testing of the well and the formation, including any relevant updates on the geologic structure and hydrogeologic properties of the proposed storage reservoir and overlying formations;

h. Information on the compatibility of the carbon dioxide stream with fluids in the injection zone and minerals in both the injection and the confining zone, based on the results of the formation testing program, and with the materials used to construct the well;

i. The results of the formation testing program;

j. The status of corrective action on wells in the area of review;

k. All available logging and testing program data on the well;

l. Any updates to the proposed area of review and corrective action plan, testing and monitoring plan, injection well plugging plan, postinjection site care and facility closure plan, and the emergency and remedial response plan, which are necessary to address new information collected during logging and testing of the well; and

m. Any other information that the commission requires.

History: Effective April 1, 2010; amended effective April 1, 2013.
General Authority: NDCC 28-32-02
Law Implemented: NDCC 38-22

43-05-01-09.1. Financial responsibility.

1. The storage operator shall demonstrate and maintain financial responsibility as determined by the commission that meets the following conditions:

   a. The qualifying financial responsibility instrument used must be from the following list of qualifying instruments:

      (1) Trust funds;

      (2) Surety or cash bonds;

      (3) Letter of credit;

      (4) Insurance;

      (5) Self-insurance (i.e., financial test and corporate guarantee);

      (6) Escrow account; or

      (7) Any other instrument the commission finds satisfactory.

   b. The qualifying financial responsibility instrument must be sufficient to cover the cost of:

      (1) Corrective action that meets the requirements of section 43-05-01-05.1;

(2) Injection well plugging that meets the requirements of section 43-05-01-11.5;

(3) Postinjection site care and facility closure that meets the requirements of section 43-05-01-19; and

(4) Emergency and remedial response that meets the requirements of section 43-05-01-13.

c. The qualifying financial responsibility instrument must be sufficient to address endangerment of underground sources of drinking water.

d. The qualifying financial responsibility instrument must comprise protective conditions of coverage.

(1) Protective conditions of coverage must include at a minimum cancellation, renewal, and continuation provisions; specifications on when the provider becomes liable following a notice of cancellation if there is a failure to renew with a new qualifying financial responsibility instrument; and requirements for the provider to meet a minimum rating, minimum capitalization, and ability to pass the bond rating when applicable.

(2) Cancellation. The storage operator shall provide that its financial mechanism may not cancel, terminate, or fail to renew except for failure to pay such financial instrument. If there is a failure to pay the financial instrument, the financial institution may elect to cancel, terminate, or fail to renew the instrument by sending notice by certified mail to the storage operator and the commission. The cancellation must not be final for one hundred twenty days after receipt of cancellation notice. The storage operator shall provide an alternate qualifying financial responsibility demonstration within sixty days of notice of cancellation, and if it is not acceptable or possible, any funds from the instrument being canceled must be released to the commission within sixty days of notification by the commission.

(3) Renewal. The storage operator shall renew all qualifying financial responsibility instruments, if an instrument expires, for the entire term of the geologic sequestration project. The instrument must be automatically renewed as long as the storage operator has the option of renewal at the face amount of the expiring instrument. The automatic renewal must, at a minimum, provide the storage operator with the option of renewal at the face amount of the expiring financial instrument.

(4) Cancellation, termination, or failure to renew may not occur and the financial instrument will remain in full force and effect in the event that on or before the date of expiration:

(a) The commission deems the facility abandoned;

(b) The permit is terminated or revoked or a new permit is denied;

(c) Closure is ordered by the commission or a United States district court or other court of competent jurisdiction;

(d) The storage operator is named as debtor in a voluntary or involuntary proceeding under title 11 (bankruptcy), United States Code; or

(e) The amount due is paid.

e. The qualifying financial responsibility instrument is subject to the commission's approval.

(1) The commission shall consider and approve the qualifying financial responsibility demonstration for all the phases of the geologic sequestration project prior to issuing a storage facility permit.

(2) The storage operator shall provide any updated information related to its qualifying financial responsibility instrument on an annual basis and, if there are any changes, the commission must evaluate, within a reasonable time, the qualifying financial responsibility demonstration to confirm that the instrument used remains adequate. The storage operator shall maintain financial responsibility requirements regardless of the status of the commission's review of the financial responsibility demonstration.

(3) The commission may disapprove the use of a financial instrument if it determines that it is not sufficient to meet the requirements of this section.

f. Upon the commission's approval, the storage operator may demonstrate financial responsibility by using one or multiple qualifying financial responsibility instruments for specific phases of the geologic sequestration project.

If the storage operator combines more than one instrument for a specific geologic sequestration phase (e.g., well plugging), such combination must be limited to instruments that are not based on financial strength or performance (i.e., self-insurance or performance bond), for example trust funds, surety bonds guaranteeing payment into a trust fund, letters of credit, escrow account, and insurance. In this case, it is the combination of mechanisms, rather than the single mechanism, which must provide financial responsibility for an amount at least equal to the current cost estimate.

g. When using a third-party instrument to demonstrate financial responsibility, the storage operator shall provide proof that the third-party providers either have passed financial strength requirements based on credit ratings; or have met a minimum rating, minimum capitalization, and ability to pass the bond rating when applicable.

h. The storage operator using certain types of third-party instruments shall establish a standby trust to enable the commission to be party to the financial responsibility agreement without the commission being the beneficiary of any funds. The standby trust fund must be used along with other qualifying financial responsibility instruments (e.g., surety bonds, letters of credit, or escrow accounts) to provide a location to place funds if needed.

i. If the storage operator uses a surety bond or cash bond to satisfy its financial responsibility requirements, the storage operator shall be the principal on the bond and each surety bond must be executed by a responsible surety company authorized to transact business in North Dakota.

j. If the storage operator uses an escrow account to satisfy its financial responsibility requirements, the account must segregate funds sufficient to cover estimated costs for geologic sequestration financial responsibility from other accounts and uses.

k. If the storage operator or its guarantor uses self-insurance to satisfy its financial responsibility requirements, the storage operator shall:

(1) Meet a tangible net worth of an amount approved by the commission;

(2) Have a net working capital and tangible net worth each at least six times the sum of the current well plugging, postinjection site care, and facility closure cost;

(3) Have assets located in the United States amounting to at least ninety percent of total assets or at least six times the sum of the current well plugging, postinjection site care, and facility closure cost; and

(4) Must submit a report of its bond rating and financial information annually.

l. In addition to the requirements in subdivision k, the storage operator shall either:

(1) Have a bond rating test of AAA, AA, A, or BBB as issued by Standard & Poor's, or Aaa, Aa, A, or Baa as issued by Moody's; or

(2) Meet all of the following five financial ratio thresholds:

(a) A ratio of total liabilities to net worth less than 2.0;

(b) A ratio of current assets to current liabilities greater than 1.5;

(c) A ratio of the sum of net income plus depreciation, depletion, and amortization to total liabilities greater than 0.1;

(d) A ratio of current assets minus current liabilities to total assets greater than -0.1; and

(e) A net profit (revenues minus expenses) greater than zero.

m. The storage operator who is not able to meet corporate financial test criteria in the preceding provision, may arrange a corporate guarantee by demonstrating that its corporate parent meets the financial test requirements on its behalf. The parent's demonstration that it meets the financial test requirement is insufficient if it has not also guaranteed to fulfill the obligations for the storage operator.

n. If the storage operator uses an insurance policy to satisfy its financial responsibility requirements, the insurance policy must be obtained from a third-party provider.

2. The requirement to maintain commission-approved qualifying financial responsibility and resources is directly enforceable regardless of whether the requirement is a condition of the permit.

a. The storage operator shall maintain qualifying financial responsibility and resources until the commission approves project completion.

b. The storage operator may be released from a financial instrument in the following circumstances:

(1) The storage operator has completed the phase of the geologic sequestration project for which the financial instrument was required and has fulfilled all its financial obligations as determined by the commission, including obtaining financial responsibility for the next phase of the geologic sequestration project, if required;

(2) The storage operator has submitted a replacement financial instrument and received written approval from the commission accepting the new financial instrument and releasing the storage operator from the previous financial instrument; or

(3) The commission approves project completion.

3. The storage operator shall have a detailed written estimate, in current dollars, of the cost of performing corrective action on wells in the area of review, plugging the injection well, postinjection site care and facility closure, and emergency and remedial response.

   a. The cost estimate must be performed for each phase separately and must be based on the costs to the commission of hiring a third party to perform the required activities. A third party is a party who is not within the corporate structure of the storage operator;

   b. During the active life of the geologic sequestration project, the storage operator shall adjust the cost estimate for inflation within sixty days prior to the anniversary date of the establishment of the financial instrument used to comply with this section and provide this adjustment to the commission. The storage operator shall also provide to the commission written updates of adjustments to the cost estimate within sixty days of any amendments to the area of review and corrective action plan, the injection well plugging plan, the postinjection site care and facility closure plan, and the emergency and remedial response plan;

   c. Any decrease or increase to the initial cost estimate is subject to the commission's approval. During the active life of the geologic sequestration project, the storage operator shall revise the cost estimate no later than sixty days after the commission has approved the request to modify the area of review and corrective action plan, the injection well plugging plan, the postinjection site care and facility closure plan, and the emergency and remedial response plan, if the change in the plan increases the cost. If the change to the plans decreases the cost, any withdrawal of funds is subject to the commission's approval. Any decrease to the value of the financial responsibility instrument must first be approved by the commission. The revised cost estimate must be adjusted for inflation; and

   d. Whenever the current cost estimate increases to an amount greater than the face amount of a financial instrument currently in use, the storage operator, within sixty days after the increase, shall either cause the face amount to be increased to an amount at least equal to the current cost estimate and submit evidence of such increase to the commission, or obtain other qualifying financial responsibility instruments to cover the increase. Whenever the current cost estimate decreases, the face amount of the financial assurance instrument may be reduced to the amount of the current cost estimate only after the storage operator has received written approval from the commission.

4. The storage operator shall notify the commission by certified mail of adverse financial conditions that may affect the operator's ability to carry out its obligations under state and federal laws.

   a. If the storage operator or the third-party provider of a qualifying financial responsibility instrument is named as the debtor in a bankruptcy proceeding, the notice to the commission must be made within ten days after commencement of the proceeding;

   b. A guarantor of a corporate guarantee shall make the notification required in subdivision a if the guarantor is named as debtor, as required under the terms of the corporate guarantee; and

   c. The storage operator who fulfills its financial responsibility requirements by obtaining a trust fund, surety bond, letter of credit, escrow account, or insurance policy will be deemed to be without the required financial assurance in the event of bankruptcy of the trustee or issuing institution, or a suspension or revocation of the authority of the trustee institution to act as trustee of the institution issuing the trust fund, surety bond, letter of credit, escrow account, or insurance policy. The storage operator shall establish other financial assurance within sixty days after such an event.

5. The storage operator shall provide an adjustment of the cost estimate to the commission within sixty days of notification by the commission, if the commission determines during the annual evaluation of the qualifying financial responsibility instrument that the most recent demonstration is no longer adequate to cover the operator's obligations under state and federal laws.

6. The use and length of pay-in periods for trust funds or escrow accounts are subject to the commission's approval. The storage operator may make periodic deposits into a trust fund or escrow account throughout the operational period in order to ensure sufficient funds are available to carry out the required activities on the date on which they may occur. The commission shall take into account project-specific risk assessments, projected timing of activities (e.g., postinjection site care), and interest accumulation in determining whether sufficient funds are available to carry out the required activities.

History: Effective April 1, 2013.
General Authority: NDCC 28-32-02
Law Implemented: NDCC 38-22

43-05-01-10. Injection well permit.

1. Upon review and approval of the application to drill, deepen, convert, reenter, or operate an injection well, submitted in accordance with section 43-05-01-09, the commission shall issue permits to drill and operate.

2. A permit shall expire twelve months from the date of issue if the permitted well has not been drilled, deepened, reentered, operated, or converted.

3. Injection well permits must be issued for the operating life of the storage facility and the closure period.

4. The commission shall review each issued injection well permit at least once every five years to determine whether it should be modified, revoked, or a minor modification made.

5. On a case-by-case basis when required by the commission, the storage operator shall submit a schedule of compliance leading to full compliance with all provisions of this chapter and North Dakota Century Code chapter 38-22.

   a. Any schedules of compliance shall require compliance as soon as possible, and in no case later than three years after the effective date of the permit.

   b. If the schedule of compliance is for a duration of more than one year from the date of permit issuance, then interim requirements and completion dates (not to exceed one year) must be incorporated into the compliance schedule and permit.

   c. No later than thirty days following each interim and final date, the storage operator shall submit progress reports to the commission.

6. For the purposes of enforcement, compliance with an injection well permit during its term means compliance with this chapter and North Dakota Century Code chapter 38-22. However, a permit may be modified, revoked, or terminated during its term pursuant to section 43-05-01-12.

7. The issuance of an injection well permit does not convey any property rights of any sort or any exclusive privilege.

8. The issuance of an injection well permit does not authorize any injury to persons or property or invasion of other private rights or any infringement of state or local law or regulations.

9. Injection is prohibited until construction is complete, and

   a. The storage operator has submitted notice of completion of construction to the commission;

   b. The commission has issued an approved permit to operate an injection well; and

   c. The commission has inspected or otherwise reviewed the injection well and finds it is in compliance with the conditions of the permit; or

   d. The storage operator has not received notice from the commission of its intent to inspect the injection well within fourteen days of the date of the notice in subdivision a, in which case prior inspection or review is waived and the storage operator may commence permitted injection. The commission shall include in the notice a reasonable time period in which it shall inspect the well.

10. The permit shall establish any maximum injection volumes and pressures necessary to assure that fractures are not initiated in the confining zone, that injected fluids do not migrate into any underground source of drinking water, that formation fluids are not displaced into any underground source of drinking water, and to assure compliance with section 43-05-01-11.3.

History: Effective April 1, 2010; amended effective April 1, 2013.
General Authority: NDCC 28-32-02
Law Implemented: NDCC 38-22

43-05-01-11. Injection well construction and completion standards.

1. The storage operator shall ensure that all injection wells are constructed and completed to prevent movement of the carbon dioxide stream or fluids into underground sources of drinking water or outside the authorized storage reservoir. The injection wells must be constructed and completed in a way that allows the use of appropriate testing devices and workover tools. The casing and cement or other materials used in the construction of each new injection well must be designed for the well's life expectancy. In determining and specifying casing and cementing requirements, all of the following factors must be considered:

   a. Depth to the injection zone;

   b. Injection pressure, external pressure, internal pressure, and axial loading;

   c. Hole size;

   d. Size and grade of all casing strings (wall thickness, external diameter, nominal weight, length, joint specification, and construction material);

   e. Corrosiveness of the carbon dioxide stream and formation fluids;

   f. Down-hole temperatures;

   g. Lithology of injection and confining zone;

   h. Type or grade of cement and cement additives; and

   i. Quantity, chemical composition, and temperature of the carbon dioxide stream.

2. Surface casing in all newly drilled carbon dioxide injection and subsurface observation wells drilled below the underground source of drinking water must be set fifty feet [15.24 meters] below the base of the lowermost underground source of drinking water and cemented pursuant to section 43-02-03-21.

3. The long string casing in all injection and subsurface observation wells must be cemented pursuant to section 43-02-03-21. Sufficient cement must be used on the long string casing to fill the annular space behind the casing to the surface of the ground and a sufficient number of centralizers shall be used to assure a good cement job. The long string casing must extend to the injection zone.

4. Any liner set in the well bore must be cemented with a sufficient volume of cement to fill the annular space.

5. All cements used in the cementing of casings in injection and subsurface observation wells must be of sufficient quality to maintain well integrity in the carbon dioxide injection environment. Circulation of cement may be accomplished by staging. The commission may approve an alternative method of cementing in cases where the cement cannot be recirculated to the surface, provided the storage operator can demonstrate by using logs that the cement does not allow fluid movement behind the well bore.

6. All casings must meet the standards specified in any of the following documents, which are hereby adopted by reference:

    a. The most recent American petroleum institute bulletin on performance properties of casing, tubing, and drill pipe;

    b. Specification for casing and tubing (United States customary units), American petroleum institute specification 5CT, as published by the American petroleum institute;

    c. North Dakota Administrative Code section 43-02-03-21; or

    d. Other equivalent casing as approved by the commission.

7. All casings used in new wells must be new casing or reconditioned casing of a quality equivalent to new casing and that has been pressure-tested in accordance with the requirements of subsection 6. For new casings, the pressure test conducted at the manufacturing mill or fabrication plant may be used to fulfill the requirements of subsection 6.

8. The location and amount of cement behind casings must be verified by an evaluation method approved by the commission. The evaluation method must be capable of evaluating cement quality radially and identifying the location of channels to ensure that underground sources of drinking water are not endangered.

9. All injection wells must be completed with and injection must be through tubing and packer. In order for the commission to determine and specify requirements for tubing and packer, the storage operator shall submit the following information:

    a. Depth of setting;

    b. Characteristics of the carbon dioxide stream (chemical content, corrosiveness, temperature, and density) and formation fluids;

    c. Maximum proposed injection pressure;

    d. Maximum proposed annular pressure;

    e. Proposed injection rate (intermittent or continuous) and volume and mass of the carbon dioxide stream;

    f. Size of tubing and casing; and

    g. Tubing tensile, burst, and collapse strengths.

10. All tubing strings must meet the standards contained in subsection 6. All tubing must be new tubing or reconditioned tubing of a quality equivalent to new tubing and that has been pressure-tested. For new tubing, the pressure test conducted at the manufacturing mill or fabrication plant may be used to fulfill this requirement.

11. All wellhead components, including the casinghead and tubing head, valves, and fittings, must be made of steel having operating pressure ratings sufficient to exceed the maximum injection pressures computed at the wellhead and to withstand the corrosive nature of carbon dioxide. Each flow line connected to the wellhead must be equipped with a manually operated positive shutoff valve located on or near the wellhead.

12. All packers, packer elements, or similar equipment critical to the containment of carbon dioxide must be of a quality to withstand exposure to carbon dioxide.

13. All injection wells must have at all times an accurate, operating pressure gauge or pressure recording device. Gauges must be calibrated as required by the commission and evidence of such calibration must be available to the commission upon request.

14. All newly drilled wells must establish internal and external mechanical integrity as specified by the commission and demonstrate continued mechanical integrity through periodic testing as determined by the commission. All other wells to be used as injection wells must demonstrate mechanical integrity as specified by the commission prior to use for injection and be tested on an ongoing basis as determined by the commission using these methods:

    a. Pressure tests. Injection wells, equipped with tubing and packer as required, must be pressure-tested as required by the commission. A testing plan must be submitted to the commission for prior approval. At a minimum, the pressure must be applied to the tubing casing annulus at the surface for a period of thirty minutes and must have no decrease in pressure greater than ten percent of the required minimum test pressure. The packer must be set at a depth at which the packer will be opposite a cemented interval of the long string casing and must be set no more than fifty feet [15.24 meters] above the uppermost perforation or open hole for the storage reservoirs; and

    b. The commission may require additional testing, such as a bottom hole temperature and pressure measurements, tracer survey, temperature survey, gamma ray log, neutron log, noise log, casing inspection log, or a combination of two or more of these surveys and logs, to demonstrate mechanical integrity.

15. The commission has the authority to witness all mechanical integrity tests conducted by the storage operator.

16. If an injection well fails to demonstrate mechanical integrity by an approved method, the storage operator shall immediately shut in the well, report the failure to the commission, and commence isolation and repair of the leak. The operator shall, within ninety days or as otherwise directed by the commission, perform one of the following:

    a. Repair and retest the well to demonstrate mechanical integrity; or

    b. Properly plug the well.

17. All injection wells must be equipped with shutoff systems designed to alert the operator and shut in wells when necessary.

18. Additional requirements may be required by the commission to address specific circumstances and types of projects.

History: Effective April 1, 2010; amended effective April 1, 2013.

General Authority: NDCC 28-32-02
Law Implemented: NDCC 38-22

43-05-01-11.1. Mechanical integrity - Injection wells.

1. An injection well has mechanical integrity if:

   a. There is no significant leak in the casing, tubing, or packer; and

   b. There is no significant fluid movement into an underground source of drinking water through channels adjacent to the well bore.

2. To evaluate the absence of significant leaks, the storage operator shall, following initial annulus pressure test, continuously monitor injection pressure, rate, injected volumes, pressure on the annulus between tubing and long string casing, and annulus fluid volume.

3. On a schedule determined by the commission, but at least annually, the storage operator shall use one of the following methods to determine the absence of significant fluid movement:

   a. An approved tracer survey; or

   b. A temperature or noise log.

4. If required by the commission, at a frequency specified in the testing and monitoring plan, the storage operator shall run a casing inspection log to determine the presence or absence of corrosion in the long string casing.

5. The commission may require alternative and additional methods to evaluate mechanical integrity. Also, the commission may allow the use of an alternative method to demonstrate mechanical integrity other than those listed above with the written approval of the United States environmental protection agency administrator. To obtain approval for a new mechanical integrity test, the commission shall submit a written request to the United States environmental protection agency administrator.

6. To conduct and evaluate mechanical integrity, the storage operator shall apply methods and standards generally accepted in the industry. When the storage operator reports the results of mechanical integrity tests to the commission, the storage operator shall include a description of the test and the method used.

7. The commission may require additional or alternative tests if the results presented by the storage operator are not satisfactory to the commission to demonstrate mechanical integrity.

8. If the commission determines that an injection well lacks mechanical integrity pursuant to this section, the commission shall give written notice of its determination to the storage operator. Unless the commission requires immediate cessation of injection, the storage operator shall cease injection into the well within forty-eight hours of receipt of the commission's determination. The commission may allow plugging of the well pursuant to the requirements of section 43-05-01-11.5 or require the storage operator to perform such additional construction, operation, monitoring, reporting, and corrective action as is necessary to prevent the movement of fluid into or between underground sources of drinking water caused by the lack of mechanical integrity. The storage operator may resume injection upon written notification from the commission that the storage operator has demonstrated mechanical integrity pursuant to this section.

9. The commission may allow the storage operator of an injection well that lacks mechanical integrity pursuant to this section to continue or resume injection, if the storage operator has

made a satisfactory demonstration that there is no movement of fluid into or between underground sources of drinking water.

History: Effective April 1, 2013.
General Authority: NDCC 28-32-02
Law Implemented: NDCC 38-22

43-05-01-11.2. Logging, sampling, and testing prior to injection well operation.

1. During the drilling and construction of an injection well, the storage operator shall run appropriate logs, surveys, and tests to determine or verify the depth, thickness, porosity, permeability, lithology, and salinity of any formation fluids in all relevant geologic formations to ensure conformance with the injection well construction requirements under section 43-05-01-11, and to establish accurate baseline data against which future measurements may be compared. The storage operator shall submit to the commission a descriptive report prepared by a log analyst that includes an interpretation of the results of such logs and tests. At a minimum, such logs and tests must include:

    a. Deviation checks during drilling on all holes constructed by drilling a pilot hole which is enlarged by reaming or another method. Such checks must be at sufficiently frequent intervals to determine the location of the borehole and to ensure that vertical avenues for fluid movement in the form of diverging holes are not created during drilling.

    b. Before and upon installing the surface casing:

        (1) Resistivity, spontaneous potential, and caliper logs before the casing is installed; and

        (2) A cement bond and variable density log to evaluate cement quality radially and a temperature log after the casing is set and cemented.

    c. Before and upon installation of the long string casing:

        (1) Resistivity, spontaneous potential, porosity, caliper, gamma ray, fracture finder logs, and any other logs the commission requires for the given geology before the casing is installed; and

        (2) A cement bond and variable density log, and a temperature log after the casing is set and cemented.

    d. A series of tests designed to demonstrate the internal and external mechanical integrity of injection wells, which may include:

        (1) A pressure test with liquid or gas;

        (2) A tracer survey;

        (3) A temperature or noise log;

        (4) A casing inspection log; and

    e. Any alternative methods that provide equivalent or better information and that the commission requires or approves.

2. The storage operator shall take whole cores or sidewall cores of the injection zone and confining zone and formation fluid samples from the injection zone, and shall submit to the commission a detailed report prepared by a log analyst that includes well log analyses (including well logs), core analyses, and formation fluid sample information. The commission

may accept information on cores from nearby wells if the storage operator can demonstrate that core retrieval is not possible and that such cores are representative of conditions at the well. The commission may require the storage operator to core other formations in the borehole.

3. The storage operator shall record the fluid temperature, pH, conductivity, reservoir pressure, and static fluid level of the injection zone.

4. At a minimum, the storage operator shall determine or calculate the following information concerning the injection and confining zone:

   a. Fracture pressure;

   b. Other physical and chemical characteristics of the injection and confining zone; and

   c. Physical and chemical characteristics of the formation fluids in the injection zone.

5. Upon completion, but prior to operation, the storage operator shall conduct the following tests to verify hydrogeologic characteristics of the injection zone:

   a. Pressure fall-off test; and

   b. Pump test; or

   c. Injectivity test.

6. The storage operator shall provide the commission with the opportunity to witness all logging and testing carried out under this section. The storage operator shall submit a schedule of such activities to the commission thirty days prior to conducting the first test and submit any changes to the schedule thirty days prior to the next scheduled test.

History: Effective April 1, 2013.
General Authority: NDCC 28-32-02
Law Implemented: NDCC 38-22

43-05-01-11.3. Injection well operating requirements.

1. Except during stimulation, the storage operator shall ensure that injection pressure does not exceed ninety percent of the fracture pressure of the injection zone so as to ensure that the injection does not initiate new fractures or propagate existing fractures in the injection zone. Injection pressure must never initiate fractures in the confining zone or cause the movement of injection or formation fluids that endanger an underground source of drinking water. All stimulation programs are subject to the commission's approval as part of the storage facility permit application and incorporated into the permit.

2. Injection between the outermost casing protecting underground sources of drinking water and the well bore is prohibited.

3. The storage operator shall fill the annulus between the tubing and the long string casing with a noncorrosive fluid approved by the commission. The storage operator shall maintain on the annulus a pressure that exceeds the operating injection pressure, unless the commission determines that such requirement might harm the integrity of the well or endanger underground sources of drinking water.

4. Other than during periods approved by the commission in which the sealed tubing-casing annulus is disassembled for maintenance or corrective procedures, the storage operator shall maintain mechanical integrity of the injection well at all times.

5. The storage operator shall install and use:

   a. Continuous recording devices to monitor the injection pressure; the rate, volume or mass, and temperature of the carbon dioxide stream; and the pressure on the annulus between the tubing and the long string casing and annulus fluid volume; and

   b. Alarms and automatic surface shutoff systems or, at the discretion of the commission, down-hole shutoff systems (e.g., automatic shutoff, check valves) or, other mechanical devices that provide equivalent protection that are designed to alert the operator and shut-in the well when operating parameters diverge beyond permitted ranges or gradients specified in the permit.

6. If a shutdown (down-hole or at the surface) is triggered or a loss of mechanical integrity is discovered, the storage operator shall immediately investigate and identify the cause as expeditiously as possible. If, upon such investigation, the well appears to be lacking mechanical integrity, or if monitoring required under subsection 5 indicates that the well may lack mechanical integrity, the storage operator shall:

   a. Immediately cease injection;

   b. Take all steps reasonably necessary to determine whether there may have been a release of the injected carbon dioxide stream or formation fluids into any unauthorized zone;

   c. Notify the commission within twenty-four hours;

   d. Restore and demonstrate mechanical integrity to the satisfaction of the commission prior to resuming injection; and

   e. Notify the commission when injection can be expected to resume.

7. If any monitoring indicates the movement of injection or formation fluids into underground sources of drinking water, the commission shall prescribe such additional requirements for construction, corrective action, operation, monitoring, or reporting as are necessary to prevent such movement. These additional requirements must be imposed by modifying or terminating the permit in accordance with section 43-05-01-12 if the commission determines that cause exists, or appropriate enforcement action may be taken if the permit has been violated.

History: Effective April 1, 2013.
General Authority: NDCC 28-32-02
Law Implemented: NDCC 38-22

43-05-01-11.4. Testing and monitoring requirements.

The storage operator shall prepare, maintain, and comply with a testing and monitoring plan to verify that the geologic sequestration project is operating as permitted and is not endangering underground sources of drinking water. The requirement to maintain and implement a commission-approved plan is directly enforceable regardless of whether the requirement is a condition of the permit. The plan must be submitted with the storage facility permit application for commission approval and must include a description of how the storage operator will meet the requirements of this section, including accessing sites for all necessary monitoring and testing during the life of the project.

1. The testing and monitoring plan must include:

   a. Analysis of the carbon dioxide stream in compliance with applicable analytical methods and standards generally accepted by industry and with sufficient frequency to yield data representative of its chemical and physical characteristics;

b. Installation and use, except during well workovers, of continuous recording devices to monitor injection pressure, rate, and volume; the pressure on annulus between the tubing and the long string casing; and the annulus fluid volume added;

c. Corrosion monitoring of the well materials for loss of mass, thickness, cracking, pitting, and other signs of corrosion, which must be performed on a quarterly basis to ensure that the well components meet the minimum standards for material strength and performance by:

   (1) Analyzing coupons of the well construction materials placed in contact with the carbon dioxide stream;

   (2) Routing the carbon dioxide stream through a loop constructed with the material used in the well and inspecting the materials in the loop; or

   (3) Using an alternative method approved by the commission;

d. Periodic monitoring of the ground water quality and geochemical changes above the confining zone that may be a result of carbon dioxide movement through the confining zone or additional identified zones, including:

   (1) The location and number of monitoring wells based on specific information about the geologic sequestration project, including injection rate and volume, geology, the presence of artificial penetrations, and other factors; and

   (2) The monitoring frequency and spatial distribution of monitoring wells based on baseline geochemical data and on any modeling results in the area of review evaluation;

e. A demonstration of external mechanical integrity at least once per year until the injection well is plugged; and, if required by the commission, a casing inspection log at a frequency established in the testing and monitoring plan;

f. A pressure fall-off test at least once every five years unless more frequent testing is required by the commission based on site-specific information;

g. Testing and monitoring to track the extent of the carbon dioxide plume and the presence or absence of elevated pressure (e.g., the pressure front) by using:

   (1) Direct methods in the injection zone; and

   (2) Indirect methods (e.g., seismic, electrical, gravity, interferometric synthetic aperture radar or electromagnetic surveys and down-hole carbon dioxide detection tools), unless the commission determines, based on site-specific geology, that such methods are not appropriate;

h. The commission may require surface air monitoring and soil gas monitoring to detect movement of carbon dioxide that could endanger an underground source of drinking water. Regarding these requirements:

   (1) Design of surface air and soil gas monitoring must be based on potential risks to underground sources of drinking water within the area of review;

   (2) The monitoring frequency and spatial distribution of surface air monitoring and soil gas monitoring must be based on using baseline data, and the monitoring plan must describe how the proposed monitoring will yield useful information on the area of review; and

(3) Surface air monitoring and soil gas monitoring methods are subject to the commission's approval;

i. Any additional monitoring, as required by the commission, necessary to support, upgrade, and improve computational modeling of the area of review evaluation;

j. Periodic reviews of the testing and monitoring plan by the storage operator to incorporate monitoring data collected, operational data collected, and the most recent area of review reevaluation performed. The storage operator shall review the testing and monitoring plan at least once every five years. Based on this review, the storage operator shall submit an amended testing and monitoring plan or demonstrate to the commission that no amendment to the testing and monitoring plan is needed. Any amendments to the testing and monitoring plan are subject to the commission's approval, must be incorporated into the permit, and are subject to the permit modification requirements. Amended plans or demonstrations must be submitted to the commission as follows:

(1) Within one year of an area of review reevaluation;

(2) Following any significant changes to the facility, such as addition of monitoring wells or newly permitted injection wells within the area of review, on a schedule determined by the commission; or

(3) When required by the commission; and

k. A quality assurance and surveillance plan for all testing and monitoring requirements.

2. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.

3. Records of monitoring information shall include:

a. The date, exact place, and time of sampling or measurements;

b. The individual who performed the sampling or measurements;

c. The date analyses were performed;

d. The individual who performed the analyses;

e. The analytical techniques or methods used; and

f. The results of such analyses.

4. All permits shall specify:

a. Requirements concerning the proper use, maintenance, and installation, when appropriate, of monitoring equipment or methods, including biological monitoring methods when appropriate;

b. Required monitoring, including type, intervals, and frequency sufficient to yield data, which are representative of the monitored activity, including when appropriate, continuous monitoring; and

c. Applicable reporting requirements based upon the impact of the regulated activity and as specified throughout this chapter. Reporting shall be no less frequent than specified in section 43-05-01-18.

History: Effective April 1, 2013.

General Authority: NDCC 28-32-02
Law Implemented: NDCC 38-22

43-05-01-11.5. Injection well plugging.

1. Prior to the well plugging, the storage operator shall flush each injection well with a buffer fluid, determine bottom hole reservoir pressure, and perform a final external mechanical integrity test.

2. The storage operator shall prepare, maintain, and comply with a plugging plan that is acceptable to the commission. The requirement to maintain and implement a commission-approved plan is directly enforceable regardless of whether the requirement is a condition of the permit. The plan must be submitted as part of the storage facility permit application and must include the following:

   a. Appropriate tests or measures for determining bottom hole reservoir pressure;

   b. Appropriate testing methods to ensure external mechanical integrity;

   c. The type and number of plugs to be used;

   d. The placement of each plug, including the elevation of the top and bottom of each plug;

   e. The type, grade, and quantity of material to be used in plugging. The material must be compatible with the carbon dioxide stream; and

   f. The method of placement of the plugs.

3. The storage operator shall notify the commission in writing, at least sixty days before plugging a well, although the commission may allow a shorter period. At this time, if any changes have been made to the original well plugging plan, the storage operator shall also provide the revised well plugging plan. Any amendments to the plan are subject to the commission's approval and must be incorporated into the storage facility permit and are subject to the permit modification requirements.

4. Within sixty days after plugging, the storage operator shall submit a plugging report to the commission. The report must be certified as accurate by the storage operator and by the person who performed the plugging operation if other than the storage operator. The storage operator shall retain the well plugging report until project completion. Upon project completion the storage operator shall deliver the records to the commission.

History: Effective April 1, 2013.
General Authority: NDCC 28-32-02
Law Implemented: NDCC 38-22

43-05-01-11.6. Injection depth waiver requirements.

1. In seeking a waiver of the requirement to inject below the lowermost underground sources of drinking water, the storage operator shall submit a supplemental report concurrent with the storage facility permit application. The supplemental report must:

   a. Demonstrate that the injection zone is laterally continuous, is not an underground source of drinking water, and is not hydraulically connected to underground sources of drinking water; does not outcrop; has adequate injectivity, volume, and sufficient porosity to safely contain the injected carbon dioxide and formation fluids; and has appropriate geochemistry;

b. Demonstrate that the injection zone is bounded by laterally continuous, impermeable confining units above and below the injection zone adequate to prevent fluid movement and pressure buildup outside of the injection zone; and that the confining unit is free of transmissive faults and fractures. The report shall further characterize the regional fracture properties and demonstrate that such fractures will not interfere with injection, serve as conduits, or endanger underground sources of drinking water;

c. Demonstrate, using computational modeling, that underground sources of drinking water above and below the injection zone will not be endangered as a result of fluid movement. This modeling must be conducted in conjunction with the area of review determination, and is subject to requirements and periodic reevaluation;

d. Demonstrate that well design and construction, in conjunction with the waiver, will ensure isolation of the injectate in lieu of requirements and will meet well construction requirements;

e. Describe how the monitoring and testing and any additional plans will be tailored to the geologic sequestration project to ensure protection of underground sources of drinking water above and below the injection zone, if a waiver is granted;

f. Provide information on the location of all the public water supplies affected, reasonably likely to be affected, or served by underground sources of drinking water in the area of review; and

g. Provide any other information requested by the commission that the United States environmental protection agency regional administrator might find useful in making the decision whether to issue a waiver.

2. To assist the United States environmental protection agency regional administrator in making the decision whether to grant a waiver of the injection depth requirements, the commission shall submit to the regional administrator documentation of the following:

a. An evaluation of the following information as it relates to siting, construction, and operation of a geologic sequestration project with a waiver:

(1) The integrity of the upper and lower confining units;

(2) The suitability of the injection zone (e.g., lateral continuity; lack of transmissive faults and fractures; knowledge of current or planned artificial penetrations into the injection zone or formations below the injection zone);

(3) The potential capacity of the geologic formation to sequester carbon dioxide, accounting for the availability of alternative injection sites;

(4) All other site characterization data, the proposed emergency and remedial response plan, and a demonstration of financial responsibility;

(5) Community needs, demands, and supply from drinking water resources;

(6) Planned needs, potential and future use of underground sources of drinking water and nonunderground sources of drinking water in the area;

(7) Planned or permitted water, hydrocarbon, or mineral resource exploitation potential of the proposed injection formation and other formations both above and below the injection zone to determine if there are any plans to drill through the formation to access resources in or beneath the proposed injection zone;

(8) The proposed plan for securing alternative resources or treating underground sources of drinking water in the event of contamination related to the carbon dioxide injection well activity; and

(9) Any other applicable considerations or information requested by the commission.

b. A review of the commission's consultation with the state department of health and federally recognized Indian tribes having jurisdiction over lands within the area of review for the injection well for which a waiver is sought.

c. Any written waiver-related information submitted by the state department of health to the commission.

3. The commission shall give public notice that a waiver application has been submitted. The notice must include a map of the area of review and state:

a. The depth of the proposed injection zone;

b. The location of the injection well;

c. The name and depth of all underground sources of drinking water within the area of review;

d. The names of any public water supplies affected, reasonably likely to be affected, or served by underground sources of drinking water in the area of review; and

e. The results of the consultation with the state department of health.

4. Following public notice, the commission shall provide all information received through the waiver application process to the United States environmental protection agency regional administrator.

a. If the regional administrator determines that additional information is required to support a decision, the commission shall request that the applicant for the waiver provide the information.

b. The commission may not issue a waiver without written concurrence from the regional administrator.

5. Upon receipt of a waiver, the storage operator shall comply with:

a. All requirements in sections 43-05-01-5.1, 43-05-01-9.1, 43-05-01-11.1, 43-05-01-11.2, 43-05-01-11.3, 43-05-01-11.5, 43-05-01-13, and 43-05-01-18.

b. All requirements in section 43-05-01-11 with the following modifications:

(1) Injection wells must be constructed and completed to prevent movement of fluids into any unauthorized zones, including underground sources of drinking water.

(2) The casing and cementing program must be designed to prevent the movement of fluids into any unauthorized zones, including underground sources of drinking water in lieu of requirements in section 43-05-01-11.

(3) The surface casing must extend through the base of the nearest underground source of drinking water directly above the injection zone and be cemented to the surface; or, at the commission's discretion, another formation above the injection zone and below the nearest underground source of drinking water above the injection zone.

c. All requirements in section 43-05-01-11.4 with the following modifications:

(1) Ground water quality, geochemical changes, and pressure in the first underground source of drinking water immediately above and below the injection zone, and in any other formations at the discretion of the commission, must be monitored.

(2) Test and monitor to track the extent of the carbon dioxide plume and the presence or absence of elevated pressure (e.g., the pressure front) by using direct methods to monitor for pressure changes in the injection zone, and indirect methods (e.g., seismic, electrical, gravity, or electromagnetic surveys or down-hole carbon dioxide detection tools), unless the commission determines based on site-specific geology that such methods are not appropriate.

d. All requirements in section 43-05-01-19 with the following modifications for postinjection site care monitoring requirements:

(1) Ground water quality, geochemical changes and pressure in the first underground source of drinking water immediately above and below the injection zone, and in any other formations at the discretion of the commission, must be monitored.

(2) Test and monitor to track the extent of the carbon dioxide plume and the presence or absence of elevated pressure (e.g., the pressure front) by using direct methods in the injection zone, and indirect methods (e.g., seismic, electrical, gravity, or electromagnetic surveys or down-hole carbon dioxide detection tools), unless the commission determines based on site-specific geology that such methods are not appropriate.

e. Any additional requirements requested by the commission to ensure protection of underground sources of drinking water above and below the injection zone.

History: Effective April 1, 2013.
General Authority: NDCC 28-32-02
Law Implemented: NDCC 38-22

43-05-01-12. Modification, revocation, and reissuance or termination of permits.

1. Permits are subject to review by the commission. Any interested person (i.e., the storage operator, local governments having jurisdiction over land within the area of review, and any person who has suffered or will suffer actual injury or economic damage) may request that the commission review permits issued under this chapter for one of the reasons set forth below. All requests must be in writing and must contain facts or reasons supporting the request. If the commission determines that the request may have merit or at the commission's initiative for one or more of the reasons set forth below, the commission may review the permit. After review, the commission may modify or revoke a permit. Permits may be modified or revoked and reissued when the commission determines one of the following events has occurred:

a. Changes to the facility area;

b. Injecting into a reservoir not specified in the permit;

c. Any increase greater than the permitted carbon dioxide storage volume;

d. Changes in the chemical composition of the carbon dioxide stream;

e. Area of review reevaluations under subdivision a of subsection 4 of section 43-05-01-05.1;

f. Amendment to the testing and monitoring plan under subdivision j of subsection 1 of section 43-05-01-11.4;

g. Amendment to the injection well plugging plan under subsection 3 of section 43-05-01-11.5;

h. Amendment to the postinjection site care and facility closure plan under subsection 3 of section 43-05-01-19;

i. Amendment to the emergency and remedial response plan under subsection 4 of section 43-05-01-13;

j. Review of monitoring and testing results conducted in accordance with injection well permit requirements;

k. The commission receives information that was not available at the time of permit issuance. Permits may be modified during their terms for this cause only if the information was not available at the time of permit issuance (other than revised regulations, guidance, or test methods) and would have justified the application of different permit conditions at the time of issuance;

l. The standards or regulations on which the storage facility permit was based have been changed by promulgation of new or amended standards or regulations or by judicial decision after the permit was issued;

m. The commission determines good cause exists for modification of a compliance schedule, such as an act of God, strike, flood, or materials shortage or other events over which the storage operator has little or no control and for which there is no reasonably available remedy; or

n. There are material and substantial alterations or additions to the permitted facility or activity which occurred after permit issuance which justify the application of permit conditions that are different or absent in the existing permit.

2. If the commission tentatively decides to modify or revoke and reissue a permit, the commission shall prepare a draft permit incorporating the proposed changes. The commission may request additional information and, in the case of a modified permit, may require the submission of an updated application. In the case of a revoked and reissued permit, the commission shall require the submission of a new permit application.

3. In a permit modification under this section, only those conditions to be modified shall be reopened when a new draft permit is prepared. All other aspects of the existing permit shall remain in effect for the duration of the unmodified permit. When a permit is revoked and reissued, the entire permit is reopened just as if the permit had expired and was being reissued. During any revocation and reissuance proceeding, the storage operator shall comply with all conditions of the existing permit until a new final permit is reissued.

4. Suitability of the storage facility location will not be considered at the time of permit modification or revocation unless new information or standards indicate that a threat to human health or the environment exists which was unknown at the time of permit issuance.

5. The commission has received notification of a proposed transfer of the storage facility permit.

6. The following are causes for terminating an injection well permit during its term:

a. Noncompliance by the storage operator with any permit condition;

b. Failure by the storage operator to fully disclose all relevant facts or misrepresentation of relevant facts to the commission; or

c. A determination that the permitted activity endangers human health or the environment.

7. If the commission tentatively decides to terminate a permit, the commission shall issue notice of intent to terminate. A notice of intent to terminate is a type of draft permit which follows the same procedures as any draft permit prepared under section 43-05-01-07.2.

History: Effective April 1, 2010; amended effective April 1, 2013.
General Authority: NDCC 28-32-02
Law Implemented: NDCC 38-22

43-05-01-12.1. Minor modifications of permits.

Upon agreement between the storage operator and the commission, the commission may modify a permit to make the corrections or allowances without the storage operator filing an application to amend a permit. Any permit modification not processed as a minor modification under this section must be filed as an application to amend an existing permit under section 43-05-01-12. Minor modifications may include:

1. Correct typographical errors;

2. Require more frequent monitoring or reporting by the storage operator;

3. Change an interim compliance date in a schedule of compliance, provided the new date is not more than one hundred twenty days after the date specified in the existing permit and does not interfere with attaintment of the final compliance date requirement;

4. Allow for a change in ownership or operational control of a facility where the commission determines that no other change in the storage facility permit is necessary, provided that a written agreement containing a specific date for transfer of permit responsibility, coverage, and liability between the current and new storage operator has been submitted to the commission pursuant to section 43-05-01-06;

5. Change quantities or types of fluids injected which are within the capacity of the facility as permitted and, in the judgment of the commission, would not interfere with the operation of the facility or its ability to meet conditions described in the permit and would not change its classification;

6. Change construction requirements approved by the commission, provided that any such alteration shall comply with the requirements of this chapter and no such changes are physically incorporated into construction of the well prior to approval of the modification by the commission; or

7. Amend the testing and monitoring plan, plugging plan, postinjection site care and facility closure plan, emergency and remedial response plan, worker safety plan, or corrosion monitoring and prevention program where the modifications merely clarify or correct the plan, as determined by the commission.

History: Effective April 1, 2013.
General Authority: NDCC 28-32-02
Law Implemented: NDCC 38-22

43-05-01-13. Emergency and remedial response plan.

The storage operator shall implement the commission-approved emergency and remedial response plan and the worker safety plan proposed in section 43-05-01-05. This plan must include emergency response and security procedures. The plan, including revision of the list of contractors and equipment vendors, must be updated as necessary or as the commission requires. Copies of the plans must be available at the storage facility and at the storage operator's nearest operational office.

1. The emergency and remedial response plan requires a description of the actions the storage operator shall take to address movement of the injection or formation fluids that may endanger an underground source of drinking water during construction, operation, and postinjection site care periods. The requirement to maintain and implement a commission-approved plan is directly enforceable regardless of whether the requirement is a condition of the permit. The plan must also detail:

    a. The safety procedures concerning the facility and residential, commercial, and public land use within one mile [1.61 kilometers], or any other distance set by the commission, of the outside boundary of the facility area; and

    b. Contingency plans for addressing carbon dioxide leaks from any well, flow lines, or other facility, and loss of containment from the storage reservoir, and identify specific contractors and equipment vendors capable of providing necessary services and equipment to respond to such leaks or loss of containment.

2. If the storage operator obtains evidence that the injected carbon dioxide stream and associated pressure front may endanger an underground source of drinking water, the storage operator shall:

    a. Immediately cease injection;

    b. Take all steps reasonably necessary to identify and characterize any release;

    c. Notify the commission within twenty-four hours; and

    d. Implement the emergency and remedial response plan approved by the commission.

3. The commission may allow the operator to resume injection prior to remediation if the storage operator demonstrates that the injection operation will not endanger underground sources of drinking water.

4. The storage operator shall review annually the emergency and remedial response plan developed under subsection 1. Based on this review, the storage operator shall submit to the commission an amended plan or demonstrate to the commission that no amendment to the plan is needed. Any amendments to the plan are subject to the commission's approval, must be incorporated into the storage facility permit, and are subject to the permit modification requirements. Amended plans or demonstrations that amendments are not needed shall be submitted to the commission as follows:

    a. Within one year of an area of review reevaluation;

    b. Following any significant changes to the facility, such as addition of injection or monitoring wells, on a schedule determined by the commission; or

    c. When required by the commission.

History: Effective April 1, 2010; amended effective April 1, 2013.
General Authority: NDCC 28-32-02

Law Implemented: NDCC 38-22

43-05-01-14. Leak detection and reporting.

1. Leak detectors or other approved leak detection methodologies must be placed at the wellhead of all injection and subsurface observation wells. Leak detectors must be integrated, where applicable, with automated warning systems and must be inspected and tested on a semiannual basis and, if defective, shall be repaired or replaced within ten days. Each repaired or replaced detector must be retested if required by the commission. An extension of time for repair or replacement of a leak detector may be granted upon a showing of good cause by the storage operator. A record of each inspection must include the inspection results, must be maintained by the operator for at least ten years, and must be made available to the commission upon request.

2. The storage operator shall immediately report to the commission any leak detected at any well or surface facility.

3. The storage operator shall immediately report to the commission any pressure changes or other monitoring data from subsurface observation wells that indicate the presence of leaks in the storage reservoir.

4. The storage operator shall immediately report to the commission any other indication that the storage facility is not containing carbon dioxide, whether the lack of containment concerns the storage reservoir, surface equipment, or any other aspect of the storage facility.

History: Effective April 1, 2010; amended effective April 1, 2013.
General Authority: NDCC 28-32-02
Law Implemented: NDCC 38-22

43-05-01-15. Storage facility corrosion monitoring and prevention requirements.

The storage operator shall conduct a corrosion monitoring and prevention program approved by the commission.

History: Effective April 1, 2010; amended effective April 1, 2013.
General Authority: NDCC 28-32-02
Law Implemented: NDCC 38-22

43-05-01-16. Storage facility identification requirements.

Identification signs must be placed at each storage facility in a centralized location and at each well site. The signs must show the name of the operator, the facility name, and the emergency response number to contact the operator.

History: Effective April 1, 2010.
General Authority: NDCC 28-32-02
Law Implemented: NDCC 38-22

43-05-01-17. Storage facility fees.

1. The storage operator shall pay the commission a fee of one cent on each ton of carbon dioxide injected for storage. The fee must be deposited in the carbon dioxide storage facility administrative fund.

2. The storage operator shall pay the commission a fee of seven cents on each ton of carbon dioxide injected for storage. The fee must be deposited in the carbon dioxide storage facility trust fund.

3. Moneys from the carbon dioxide storage facility trust fund, including accumulated interest, may be relied upon to satisfy the financial assurance requirements pursuant to section 43-05-01-09.1 for the postclosure period. If sufficient moneys are not available in the carbon dioxide storage facility trust fund at the end of the closure period, the storage operator shall make additional payments into the trust fund to ensure that sufficient funds are available to carry out the required activities on the date at which they may occur. The commission shall take into account project-specific risk assessments, projected timing of activities (e.g., postinjection site care), and interest accumulation in determining whether sufficient funds are available to carry out the required activities.

History: Effective April 1, 2010; amended effective April 1, 2013.
General Authority: NDCC 28-32-02
Law Implemented: NDCC 38-22

43-05-01-18. Reporting requirements.

1. The storage operator shall file with the commission all reports, submittals, notifications, and any other information that the commission requires.

2. The storage operator shall give notice to the commission as soon as possible of any planned physical alterations or additions to the permitted storage facility or any other planned changes in the permitted storage facility or activity which may result in noncompliance with permit requirements.

3. Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than thirty days following each schedule date.

4. The storage operator shall file with the commission quarterly, or more frequently if the commission requires, a report on the volume of carbon dioxide injected into or withdrawn since the last report, the average injection rate, average composition of the carbon dioxide stream, wellhead and downhole temperature and pressure data or calculations, or other pertinent operational parameters as required by the commission.

5. The storage operator shall submit all required reports, submittals, and notification under chapter 43-05-01 to the United States environmental protection agency in an electronic format approved by that agency.

6. The quarterly report is due thirty days after the end of the quarter. The report must:

   a. Describe any changes to the physical, chemical, and other relevant characteristics of the carbon dioxide stream from the proposed operating data;

   b. State the monthly average, maximum, and minimum values for injection pressure, flow rate and volume, and annular pressure;

   c. Describe any event that exceeds operating parameters for annulus pressure or injection pressure specified in the permit;

   d. Describe any event which triggers a shutoff device required pursuant to subsection 5 of section 43-05-01-11.3 and the response taken;

   e. State the monthly volume and mass of the carbon dioxide stream injected over the reporting period and the volume injected cumulatively over the life of the project to date;

   f. State the monthly annulus fluid volume added; and

g. State the results of monitoring prescribed under section 43-05-01-11.4.

7. The storage operator shall file with the commission an annual report that summarizes the quarterly reports and that provides updated projections of the response and storage capacity of the storage reservoir. The projections must be based on actual reservoir operational experience, including all new geologic data and information. All anomalies in predicted behavior as indicated in permit conditions or in the assumptions upon which the permit was issued must be explained and, if necessary, the permit conditions amended in accordance with section 43-05-01-12. The annual report is due forty-five days after the end of the year.

8. The storage operator shall report, within thirty days, the results of:

   a. Periodic tests of mechanical integrity;

   b. Any well workover; and

   c. Any other test of the injection well conducted by the storage operator if required by the commission.

9. The storage operator shall report the following, within twenty-four hours:

   a. Any evidence that the injected carbon dioxide stream or associated pressure front may cause an endangerment to an underground source of drinking water;

   b. Any noncompliance which may endanger health and safety of persons or cause pollution of the environment, including:

      (1) Any monitoring or other information which indicates that any contaminant may cause an endangerment to underground sources of drinking water; or

      (2) Any noncompliance with a permit condition or malfunction of the injection system which may cause fluid migration into or between underground sources of drinking water shall be provided verbally within twenty-four hours from the time the storage operator becomes aware of the circumstances. A written submission shall also be provided within five days of the time the storage operator becomes aware of the circumstances. 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 steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

   c. Any triggering of a shutoff system (e.g., down-hole or at the surface);

   d. Any failure to maintain mechanical integrity; or

   e. Any release of carbon dioxide to the atmosphere or biosphere in compliance with the requirement under subdivision h of subsection 1 of section 43-05-01-11.4 for surface air and soil gas monitoring, or other monitoring technologies required by the commission.

10. The storage operator shall notify the commission in writing thirty days in advance of:

    a. Any planned well workover;

    b. Any planned stimulation activities, other than stimulation for formation testing conducted;

    c. Any other planned test of the injection well conducted by the storage operator; and

d. The conversion or abandonment of any well used or proposed to be used in a geologic storage operation.

11. The storage operator shall retain the following records until project completion:

    a. All data collected for the applications of the storage facility permit, injection well permit, and operation of injection well permit;

    b. Data on the nature and composition of all injected fluids collected pursuant to subdivision a of subsection 1 of section 43-05-01-11.4; and

    c. All records from the closure period, including well plugging reports, postinjection site care data, and the final assessment.

    d. Upon project completion, the storage operator shall deliver any records required in this section to the commission.

12. The storage operator shall retain the following records for a period of at least ten years from the date of the sample, measurement, or report:

    a. Monitoring data collected pursuant to subdivisions b through i of subsection 1 of section 43-05-01-11.4; and

    b. Calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, and copies of all reports required by the storage facility permit.

    c. This period may be extended by request of the commission at any time.

13. The storage operator shall report all instances of noncompliance not otherwise reported under this section, at the time monitoring reports are submitted. The reports shall contain the information listed in subsection 9.

14. Where the storage operator becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the commission, such facts or information shall be promptly submitted to the commission. Failure to do so may result in revocation of the permit, depending on the nature of the information withheld.

History: Effective April 1, 2010; amended effective April 1, 2013.
General Authority: NDCC 28-32-02
Law Implemented: NDCC 38-22

43-05-01-18.1. Abandonment of wells.

1. The removal of injection equipment or the failure to operate an injection well for one year constitutes abandonment of the well. An abandoned well must be plugged in accordance with the plugging plan and its site must be reclaimed.

2. The commission may waive for one year the requirement to plug and reclaim an abandoned well by giving the well temporarily abandoned status. This status may only be given to wells that are to be used for purposes related to the geologic storage of carbon dioxide. If a well is given temporarily abandoned status, the well's perforations must be isolated, the integrity of its casing must be proven, and its casing must be sealed at the surface, all in a manner approved by the commission. The commission may extend a well's temporarily abandoned status beyond one year. A fee of one hundred dollars shall be submitted for each application to extend the temporary abandonment status of any well.

3. In addition to the waiver in subsection 2, the commission may also waive the duty to plug and reclaim an abandoned well for any other good cause found by the commission. If the commission exercises this discretion, the commission shall set a date or circumstance upon which the waiver expires.

History: Effective April 1, 2013.
General Authority: NDCC 28-32-02
Law Implemented: NDCC 38-22

43-05-01-19. Postinjection site care and facility closure.

The storage operator shall submit and maintain the postinjection site care and facility closure plan as a part of the storage facility permit application to be approved by the commission. The requirement to maintain and implement a commission-approved plan is directly enforceable regardless of whether the requirement is a condition of the permit.

1. The postinjection site care and facility closure plan must include the following information:

   a. The pressure differential between preinjection and predicted postinjection pressures in the injection zone;

   b. The predicted position of the carbon dioxide plume and associated pressure front at cessation of injection as demonstrated in the area of review evaluation;

   c. A description of postinjection monitoring location, methods, and proposed frequency;

   d. A schedule for submitting postinjection site care monitoring results to the commission; and

   e. The duration of the postinjection site care monitoring timeframe that ensures nonendangerment of underground sources of drinking water.

2. The storage operator shall specify in the postinjection site care and facility closure plan which wells will be plugged and which will remain unplugged to be used as subsurface observation wells. Subsurface observation and ground water monitoring wells as approved in the plan must remain in place for continued monitoring during the closure and postclosure periods.

3. Upon cessation of injection, the storage operator shall either submit an amended postinjection site care and facility closure plan or demonstrate to the commission through monitoring data and modeling results that no amendment to the plan is needed. Any amendments to the postinjection site care and facility closure plan are subject to the commission's approval and must be incorporated into the storage facility permit.

4. At any time during the life of the geologic sequestration project, the storage operator may modify and resubmit the postinjection site care and facility closure plan for the commission's approval within thirty days of such change.

5. Upon cessation of injection, all wells not associated with monitoring must be properly plugged and abandoned in a manner which will not allow movement of injection or formation fluids that endanger underground sources of drinking water in accordance with section 43-05-01-11.5. All storage facility equipment, appurtenances, and structures not associated with monitoring must be removed. Following well plugging and removal of all surface equipment, the surface must be reclaimed to the commission's specifications that will, in general, return the land as closely as practicable to original condition.

6. The well casing must be cut off at a depth of five feet [1.52 meters] below the surface and a steel plate welded on top identifying the well name and that it was used for carbon dioxide.

7. The commission shall develop in conjunction with the storage operator a continuing monitoring plan for the postclosure period, including a review and final approval of wells to be plugged.

8. The storage operator shall continue to conduct monitoring during the closure period as specified in the commission-approved postinjection site care and facility closure plan. The storage operator may apply for project completion with an alternative postinjection site care monitoring timeframe pursuant to North Dakota Century Code section 38-22-17. Once it is demonstrated that underground sources of drinking water are no longer endangered, the final assessment under subsection 9 is complete, and upon full compliance with North Dakota Century Code section 38-22-17, the storage operator may apply to the commission for a certificate of project completion. If the storage operator is unable to meet the requirements of North Dakota Century Code section 38-22-17 and is unable to demonstrate that underground sources of drinking water are no longer being endangered, the storage operator shall continue monitoring the storage facility for fifty years or until full compliance is met and such demonstration can be made.

9. Before project completion, the storage operator shall provide a final assessment of the stored carbon dioxide's location, characteristics, and its future movement and location within the storage reservoir. The storage operator shall submit the final assessment to the commission within ninety days of completing all postinjection site care and facility closure requirements.

   a. The final assessment must include:

      (1) The results of computational modeling performed pursuant to delineation of the area of review under section 43-05-01-05.1;

      (2) The predicted timeframe for pressure decline within the injection zone, and any other zones, such that formation fluids may not be forced into any underground sources of drinking water or the timeframe for pressure decline to preinjection pressures;

      (3) The predicted rate of carbon dioxide plume migration within the injection zone and the predicted timeframe for the cessation of migration;

      (4) A description of the site-specific processes that will result in carbon dioxide trapping, including immobilization by capillary trapping, dissolution, and mineralization at the site;

      (5) The predicted rate of carbon dioxide trapping in the immobile capillary phase, dissolved phase, or mineral phase;

      (6) The results of laboratory analyses, research studies, or field or site-specific studies to verify the information required in paragraphs 4 and 5;

      (7) A characterization of the confining zone, including a demonstration that it is free of transmissive faults, fractures, and microfractures, and an evaluation of thickness, permeability, and integrity to impede fluid (e.g., carbon dioxide, formation fluids) movement;

      (8) Any other projects in proximity to the predictive modeling of the final extent of the carbon dioxide plume and area of elevated pressures. The presence of potential conduits for fluid movement, including planned injection wells and project monitoring wells associated with the proposed geologic sequestration project;

      (9) A description of the well construction and an assessment of the quality of plugs of all abandoned wells within the area of review;

(10) The distance between the injection zone and the nearest underground source of drinking water above and below the injection zone;

(11) An assessment of the operations conducted during the operational period, including the volumes injected, volumes extracted, all chemical analyses conducted, and a summary of all monitoring efforts. The report must also document the stored carbon dioxide's location and characteristics and predict how it might move during the postclosure period;

(12) An assessment of the funds in the carbon dioxide storage facility trust fund to ensure that sufficient funds are available to carry out the required activities on the date on which they may occur, taking into account project-specific risk assessments, projected timing of activities (e.g., postinjection site care), and interest accumulation in the trust fund; and

(13) Any additional site-specific factors required by the commission.

b. Information submitted to support the demonstration in subdivision a must meet the following criteria:

(1) All analyses and tests for the final assessment must be accurate, reproducible, and performed in accordance with the established quality assurance standards. An approved quality assurance and quality control plan must address all aspects of the final assessment;

(2) Estimation techniques must be appropriate and test protocols certified by the United States environmental protection agency must be used where available;

(3) Predictive models must be appropriate and tailored to the site conditions, composition of the carbon dioxide stream, and injection and site conditions over the life of the geologic sequestration project;

(4) Predictive models must be calibrated using existing information when sufficient data are available;

(5) Reasonably conservative values and modeling assumptions must be used and disclosed to the commission whenever values are estimated on the basis of known, historical information instead of site-specific measurements;

(6) An analysis must be performed to identify and assess aspects of the postinjection monitoring timeframe demonstration that contribute significantly to uncertainty. The storage operator shall conduct sensitivity analyses to determine the effect that significant uncertainty may contribute to the modeling demonstration; and

(7) Any additional criteria required by the commission.

10. The storage operator shall provide a copy of an accurate plat certified by a registered surveyor which has been submitted to the county recorder's office designated by the commission. The plat must indicate the location of the injection well relative to permanently surveyed benchmarks. The storage operator must also submit a copy of the plat to the United States environmental protection agency regional administrator office.

11. The storage operator shall record a notation on the deed to the property on which the injection well was located, or any other document that is normally examined during title search, that will in perpetuity provide any potential purchaser of the property the following information:

a. The fact that land has been used to sequester carbon dioxide;

b. The name of the state agency, local authority, or tribe with which the survey plat was filed, as well as the address of the United States environmental protection agency regional office to which it was submitted; and

c. The volume of fluid injected, the injection zone or zones into which it was injected, and the period over which injection occurred.

History: Effective April 1, 2010; amended effective April 1, 2013.
General Authority: NDCC 28-32-02
Law Implemented: NDCC 38-22

43-05-01-20. Determining storage amounts.

1. Upon application by an enhanced oil or gas recovery unit operator or a storage operator, the commission, after notice and hearing, shall issue an order determining the amount of injected carbon dioxide stored in a reservoir that has been or is being used for an enhanced oil or gas recovery project or in a storage reservoir that has been or is being used for storage under a permit issued pursuant to North Dakota Century Code chapter 38-22.

2. The applicant shall pay a processing fee for a storage amount determination.

   The applicant shall pay a processing fee based on the commission's actual processing costs, including computer data processing costs, as determined by the commission. The following procedures and criteria will be utilized in establishing the fee:

   a. A record of all application processing costs incurred must be maintained by the commission.

   b. Promptly after receiving an application, the commission shall prepare and submit to the applicant an estimate of the processing fee.

   c. After the commission's work on the application has concluded, a final statement will be sent to the applicant. The full processing fee must be paid before the commission issues its decision on the application.

   d. The applicant must pay the processing fee even if the application is denied or withdrawn.

History: Effective April 1, 2010; amended effective April 1, 2013.
General Authority: NDCC 28-32-02
Law Implemented: NDCC 38-22