

## CHAPTER 43-02-14 GEOLOGICAL STORAGE OF OIL OR GAS

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### **43-02-14-01. Definitions.**

The terms used throughout this chapter have the same meaning as in chapters 43-02-02.1, 43-02-03, and 43-02-05, and North Dakota Century Code chapters 38-08, 38-12, 38-25, and 47-31 except:

1. "Facility area" means the areal extent of the storage reservoir or salt cavern.
2. "Storage reservoir" means the total pore space occupied by the injected produced oil or gas during all phases of the project plus any reasonable or necessary horizontal buffer zones.

**History:** Effective April 1, 2022.

**General Authority:** NDCC 38-08-04

**Law Implemented:** NDCC 38-25

### **43-02-14-02. Scope of chapter.**

This chapter pertains to the geological storage of hydrogen and produced oil or gas with little to no processing involved. If the rules differ from federal requirements on federally regulated storage facilities, the federal rules take precedence. The storage facility operator shall provide sufficient documentation to the director confirming the storage facility is federally operated. Applications filed with the commission proposing to inject gas for the purposes of enhanced oil or gas recovery will be processed under chapter 43-02-05. This chapter does not apply to class III injection wells used to create a salt cavern. Applications for class III wells are under the jurisdiction of the state geologist

pursuant to chapter 43-02-02.1. The commission may grant exceptions to this chapter, after due notice and hearing, when such exceptions will result in the prevention of waste and operate in a manner to protect correlative rights.

**History:** Effective April 1, 2022.

**General Authority:** NDCC 38-08-04

**Law Implemented:** NDCC 38-25

#### **43-02-14-02.1. Application of rules for geological storage.**

All geological storage facilities, injection wells, and monitoring wells are also subject to the provisions of chapters 43-02-03, 43-02-05, and 43-05-01 where applicable.

**History:** Effective April 1, 2022.

**General Authority:** NDCC 38-08-04

**Law Implemented:** NDCC 38-25

#### **43-02-14-02.2. Injection into underground source of drinking water prohibited.**

Underground injection of oil or gas that causes or allows movement of fluid into an underground source of drinking water is prohibited.

**History:** Effective April 1, 2022.

**General Authority:** NDCC 38-08-04

**Law Implemented:** NDCC 38-25

#### **43-02-14-02.3. Transitioning from enhanced oil or gas recovery to geological storage.**

A storage facility operator injecting oil or gas for the primary purpose of geological storage into an oil and gas reservoir shall apply for a geological storage facility and injection well permit. 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. Oil or gas 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 facility operator's plan for recovery of oil or gas at the cessation of injection.
8. The source and properties of the injected oil or gas.
9. Any additional site specific factors as determined by the commission.

**History:** Effective April 1, 2022.

**General Authority:** NDCC 38-08-04

**Law Implemented:** NDCC 38-25

#### **43-02-14-02.4. Prohibition of unauthorized injection.**

Any underground injection of oil or gas for the purpose of geological storage, except into a well authorized by permit issued under this chapter, is prohibited. The construction of any well or site or

access road is prohibited until the permit authorizing construction of the well or site or access road has been issued.

**History:** Effective April 1, 2022.

**General Authority:** NDCC 38-08-04

**Law Implemented:** NDCC 38-25

#### **43-02-14-02.5. Existing well conversion.**

Storage facility operators seeking to convert an existing well to an injection well for the purpose of geological storage of oil or gas 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, 2022.

**General Authority:** NDCC 38-08-04

**Law Implemented:** NDCC 38-25

#### **43-02-14-03. 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 dissolution of the storage facility, 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, 2022.

**General Authority:** NDCC 38-08-04

**Law Implemented:** NDCC 38-25

#### **43-02-14-04. Access to records.**

The 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 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 is public information. If requested, copies of storage facility records must be filed with the commission.

**History:** Effective April 1, 2022.

**General Authority:** NDCC 38-08-04

**Law Implemented:** NDCC 38-25

#### **43-02-14-05. Geological storage facility permit hearing.**

1. At least thirty days before the scheduled hearing, the applicant shall give notice of the hearing to persons outlined in North Dakota Century Code 38-25-04.
2. Notice given by the applicant must contain the following:
  - a. A legal description of the land within the oil or gas facility area.
  - b. The date, time, and place the commission will hold a hearing on the permit application.
  - c. A statement of purpose of the application.
  - d. A statement that a digital copy (.pdf format) of the permit may be obtained from the commission.

- e. A statement that all comments regarding the geological storage facility permit application must be in writing and submitted to the commission by five p.m. on the last business day before the hearing date or presented at the hearing.
- f. Storage in an oil and gas reservoir must contain:
  - (1) A statement that amalgamation of the pore space within the geological storage reservoir is required to operate the geological storage facility, which requires consent of persons who own at least fifty-five percent, unless otherwise provided for as outlined in North Dakota Century Code section 38-25-05, of the pore space, and a statement that the commission may require the pore space owned by nonconsenting owners to be included in the geological storage facility.
  - (2) A statement that unitization of oil and gas minerals and oil and gas leases within the geological storage reservoir is required to operate the geological storage facility, which requires consent of persons who own at least fifty-five percent, unless otherwise provided for as outlined in North Dakota Century Code section 38-25-05, of the oil and gas minerals and oil and gas leases, and a statement that the commission may require the oil and gas minerals and oil and gas leases owned by nonconsenting owners to be included in the geological storage facility.
- g. Storage in a saline reservoir must contain a statement that amalgamation of the pore space within the geological storage reservoir is required to operate the geological storage facility, which requires consent of persons who own at least sixty percent of the pore space, and a statement that the commission may require the pore space owned by nonconsenting owners to be included in the geological storage facility.
- h. Storage in a salt cavern must contain:
  - (1) A statement that amalgamation of the pore space within the salt cavern is required to operate the geological storage facility, which requires consent of persons who own at least sixty percent of the pore space, and a statement that the commission may require the pore space owned by nonconsenting owners to be included in the geological storage facility.
  - (2) A statement that unitization of salt minerals and salt leases within the salt cavern is required to operate the geological storage facility, which requires consent of persons who own at least fifty-five percent of the salt minerals and salt leases, and a statement that the commission may require the salt minerals and salt leases owned by nonconsenting owners to be included in the geological storage facility.

**History:** Effective April 1, 2022.

**General Authority:** NDCC 38-08-04

**Law Implemented:** NDCC 38-25

**43-02-14-05.1. Area of review and corrective action.**

- 1. The storage facility operator shall prepare, maintain, and comply with a plan to delineate the area of review for a proposed storage facility, periodically re-evaluate 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 facility operator shall submit an area of review and corrective action plan that includes the following:

- a. The method for delineating the area of review, results of the reservoir or geomechanical modeling and simulation, inputs that will be made, and the site characterization data on which the model will be based.
  - b. A description of:
    - (1) The re-evaluation date, not to exceed five years, at which time the storage facility operator shall re-evaluate the area of review.
    - (2) The monitoring and operational conditions that would warrant a re-evaluation of the area of review before the next scheduled re-evaluation date.
    - (3) How monitoring and operational data will be used to inform an area of review re-evaluation.
    - (4) How corrective action will be conducted to meet requirements of this section, and how corrective action will be adjusted if there are changes in the area of review.
2. The storage facility operator shall perform the following actions to delineate the area of review and identify all wells that require corrective action:
- a. Applicable to oil and gas and saline reservoirs. Predict, using existing site characterization, monitoring and operational data, and reservoir modeling and simulation, the projected lateral and vertical migration of the injectate in the subsurface from the commencement of injection activities until the oil or gas movement ceases, or until the end of a fixed time as determined by the director:
    - (1) Be based on detailed geologic data collected to characterize the injection zone, confining zones, and any additional zones; and anticipated operating data, including injection pressures, rates, and total volumes over the proposed life of the storage project.
    - (2) Consider any geologic heterogeneities, other discontinuities, data quality, and their possible impact on model predictions.
    - (3) Consider potential migration through faults, fractures, and artificial penetrations.
  - b. Applicable to salt caverns. Using site-specific geology, cavern construction data acquired during dissolution mining, and geomechanical modeling, determine necessary buffers as setbacks for the following:
    - (1) Future drilling in the proximity of the cavern.
    - (2) Additional caverns.
3. The storage facility 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 injectate or fluid into or between underground sources of drinking water or other unauthorized zones.
4. At the re-evaluation 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 facility operator shall:
- a. Re-evaluate the area of review in the same manner specified in subdivision a or b of subsection 2, whichever is applicable.

- b. Identify all wells or caverns in the re-evaluated area of review in the same manner specified in subsection 2.
  - c. Perform corrective action on wells requiring action in the re-evaluated area of review in the same manner specified in subsection 3.
  - 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 director's approval and must be incorporated into the permit.
5. All modeling inputs and data used to support area of review delineations and re-evaluations must be retained until project completion. Upon project completion, the storage facility operator shall deliver the records to the commission.

**History:** Effective April 1, 2022.

**General Authority:** NDCC 38-08-04

**Law Implemented:** NDCC 38-25

**43-02-14-06. Permit requirements - Storage in oil and gas reservoir.**

An application for a geological storage facility permit must include at least the following:

1. The name and address of the operator of the storage facility.
2. Address surface, pore space, and mineral ownership by filing the following:
  - a. An affidavit of mailing, including the name and address of each owner, certifying that all surface owners of record within the storage reservoir and one-half mile [.80 kilometer] adjacent have been notified of the proposed geological storage project.
  - b. An affidavit of mailing, including the name and address of each owner, certifying that all mineral lessees, mineral owners of record, pore space owners and pore space lessees of record within the storage reservoir and one-half mile [.80 kilometer] adjacent have been notified of the proposed geological storage project.
  - c. Legal descriptions of surface ownership of record within the storage reservoir and one-half mile [.80 kilometer] adjacent.
  - d. Legal descriptions of mineral lessees and mineral owners of record within the storage reservoir and one-half mile [.80 kilometer] adjacent.
  - e. Legal descriptions of pore space owners and pore space lessees of record within the storage reservoir and one-half mile [.80 kilometer] adjacent.
3. Applicant shall request a permit for all oil or gas injection wells, monitoring wells, and surface facilities by filing the following:
  - a. Application for permit to drill filed on a form provided by the director pursuant to chapter 43-02-03; and
  - b. Application for permit to inject filed on a form provided by the director including at least the following:
    - (1) The name and address of the operator of the injection well.
    - (2) The estimated bottom hole fracture pressure of the upper confining zone.

- (3) Average maximum daily rate of oil or gas to be injected.
  - (4) Average and maximum requested surface injection pressure.
  - (5) Geologic name and depth to base of the lowermost underground source of drinking water which may be affected by the injection.
  - (6) Existing or proposed casing, tubing, and packer data.
  - (7) Existing or proposed cement specifications, including amounts and actual or proposed top of cement.
  - (8) A plat and maps depicting the area of review, based on the associated geological storage facility permit, and detailing the location, well name, and operator of all wells in the area of review. The plat and maps must include all injection wells, producing wells, plugged wells, abandoned wells, drilling wells, dry holes, permitted wells, water wells, surface bodies of water, and other pertinent surface features, such as occupied dwellings and roads.
  - (9) A review of the surficial aquifers within one mile [1.61 kilometers] of the proposed injection well site or surface facilities.
  - (10) Proposed injection program, including method of transportation of the oil or gas to the injection facility and the injection well.
  - (11) List identifying all source wells or sources of injectate.
  - (12) All logging and testing data on the well which has not been previously submitted.
  - (13) Schematic or other appropriate drawings and tabulations of the wellhead and surface facilities, including the size, location, construction, and purpose of all tanks, the height and location of all dikes and containment, including a calculated containment volume, all areas underlain by a synthetic liner, the location of all flow lines, and a tabulation of any pressurized flow line specifications. It must also include the proposed road access to the nearest existing public road and the authority to build such access.
  - (14) A schematic drawing of the well detailing the proposed well bore construction, including the size of the borehole; the total depth and plug back depth; the casings and tubing sizes, weights, grades, and top and bottom depths; the perforated interval top and bottom depths; the packer depth; the injection zone; and upper and lower confining zones top and bottom depths.
  - (15) A detailed description of the proposed completion or conversion procedure, including any proposed well stimulation.
  - (16) Any other information required by the director to evaluate the proposed well.
4. A map showing the extent of the pore space that will be occupied by the injection and geological storage of oil or gas over the life of the project.
  5. A map showing the outside boundary of the oil or gas facility area, its delineated area of review, and the surface and bottom hole location of all proposed injection wells, monitoring wells, cathodic protection boreholes, and surface facilities.
  6. Structural and stratigraphic cross sections that describe the geological conditions of the geological storage reservoir.

7. A structure map of the top and base of the geological storage reservoir.
8. An isopach map of the geological storage reservoir.
9. Identification of all structural spill points or stratigraphic discontinuities controlling the isolation of stored oil or gas and associated fluids within the geological storage reservoir.
10. Geomechanical information sufficient to demonstrate that the confining zone is free of transmissive faults or fractures and of sufficient areal extent and integrity to contain the injected oil or gas stream.
11. Any known regional or local faulting. If faults are known or suspected, a cross section that includes a depiction of the fault at depth.
12. A method for delineating the area of review, including the computational model to be used, assumptions that will be made, and the site characterization data on which the model will be based.
13. A map of all wells, including all injection wells, producing wells, plugged wells, abandoned wells, drilling wells, dry holes, water wells, and other subsurface structures within the oil or gas facility area and its delineated area of review.
14. A determination that all abandoned wells have been properly plugged and all operating wells have been constructed in a manner that prevents the oil or gas or associated fluids from escaping the geological storage reservoir.
15. A tabular description and well bore diagram of each well's type, construction, date drilled, location, depth, record of plugging, and completion.
16. Quantitative analysis from a state-certified laboratory of freshwater from all available freshwater wells within the oil or gas facility area and its delineated area of review. The location of all wells by quarter-quarter, section, township, and range must also be submitted. This requirement may be waived by the director in certain instances.
17. Quantitative analysis from a third-party laboratory of a representative sample of the oil or gas to be injected. A compatibility analysis with the receiving formation may also be required.
18. A map showing all occupied dwellings within the oil or gas facility area and its delineated area of review.
19. Corrective action plan pursuant to section 43-02-14-05.1.
20. Identify whether the area of review extends across state jurisdiction boundary lines.
21. Address the potential for unrecoverable injected oil or gas.
22. Address enrichment of the injected gas by hydrocarbons native to the oil and gas reservoir.
23. The stimulation plan for all geological storage facility wells, if any, including a description of the stimulation fluids to be used, and a determination that the stimulation will not interfere with containment.
24. An emergency and remedial response plan pursuant to section 43-02-14-15.
25. A corrosion monitoring and prevention plan for all wells and surface facilities.
26. A leak detection and monitoring plan for all surface facilities.

27. A leak detection and monitoring plan to monitor any movement of the oil or gas outside of the geological storage reservoir. This may include monitoring wells and the collection of baseline information of oil or gas background concentrations in ground water, surface soils, and chemical composition of in situ waters within the oil or gas facility area, and its delineated area of review.
28. A time frame for extraction of injected oil or gas and expected recovery percentages.
29. Address associated water recovery and a plan for disposal.
30. Any additional information the director may require.

**History:** Effective April 1, 2022.

**General Authority:** NDCC 38-08-04

**Law Implemented:** NDCC 38-25

#### **43-02-14-07. Permit requirements - Storage in saline reservoir.**

An application for a geological storage facility permit must include at least the following:

1. The name and address of the operator of the storage facility.
2. Address surface and pore space ownership by filing the following:
  - a. An affidavit of mailing, including the name and address of each owner, certifying that all surface owners of record within the storage reservoir and one-half mile [.80 kilometer] adjacent have been notified of the proposed geological storage project.
  - b. An affidavit of mailing, including the name and address of each owner, certifying that all pore space owners and pore space lessees of record within the storage reservoir and one-half mile [.80 kilometer] adjacent have been notified of the proposed geological storage project.
  - c. Legal descriptions of surface ownership of record within the storage reservoir and one-half mile [.80 kilometer] adjacent.
  - d. Legal descriptions of pore space owners and pore space lessees of record within the storage reservoir and one-half mile [.80 kilometer] adjacent.
3. Applicant shall request a permit for all oil or gas injection wells, monitoring wells, and surface facilities by filing the following:
  - a. Application for permit to drill filed on a form provided by the director pursuant to chapter 43-02-03; and
  - b. Application for permit to inject filed on a form provided by the director, including at least the following:
    - (1) The name and address of the operator of the injection well.
    - (2) The estimated bottom hole fracture pressure of the upper confining zone.
    - (3) Average maximum daily rate of oil or gas to be injected.
    - (4) Average and maximum requested surface injection pressure.
    - (5) Geological name and depth to base of the lowermost underground source of drinking water which may be affected by the injection.

- (6) Existing or proposed casing, tubing, and packer data.
  - (7) Existing or proposed cement specifications, including amounts and actual or proposed top of cement.
  - (8) A plat and maps depicting the area of review, based on the associated geological storage facility permit, and detailing the location, well name, and operator of all wells in the area of review. The plat and maps must include all injection wells, producing wells, plugged wells, abandoned wells, drilling wells, dry holes, permitted wells, water wells, surface bodies of water, and other pertinent surface features, such as occupied dwellings and roads.
  - (9) A review of the surficial aquifers within one mile [1.61 kilometer] of the proposed injection well site or surface facilities.
  - (10) Proposed injection program, including method of transportation of the oil or gas to the injection facility and the injection well.
  - (11) List identifying all source wells or sources of injectate.
  - (12) All logging and testing data on the well which has not been previously submitted.
  - (13) Schematic or other appropriate drawings and tabulations of the wellhead and surface facilities, including the size, location, construction, and purpose of all tanks, the height and location of all dikes and containment, including a calculated containment volume, all areas underlain by a synthetic liner, the location of all flow lines, and a tabulation of any pressurized flow line specifications. It must also include the proposed road access to the nearest existing public road and the authority to build such access.
  - (14) A schematic drawing of the well detailing the proposed well bore construction, including the size of the borehole; the total depth and plug back depth; the casings and tubing sizes, weights, grades, and top and bottom depths; the perforated interval top and bottom depths; the packer depth; the injection zone; and upper and lower confining zones top and bottom depths.
  - (15) A detailed description of the proposed completion or conversion procedure, including any proposed well stimulation.
  - (16) Any other information required by the director to evaluate the proposed well.
4. A map showing the extent of the pore space that will be occupied by the injection and geological storage of oil or gas over the life of the project.
  5. A map showing the outside boundary of the oil or gas facility area, its delineated area of review, and the surface and bottom hole location of all proposed injection wells, monitoring wells, cathodic protection boreholes, and surface facilities.
  6. Structural and stratigraphic cross sections that describe the geological conditions of the geological storage reservoir.
  7. A structure map of the top and base of the geological storage reservoir.
  8. An isopach map of the geological storage reservoir.
  9. Identification of all structural spill points or stratigraphic discontinuities controlling the isolation of stored oil or gas and associated fluids within the geological storage reservoir.

10. Geomechanical information sufficient to demonstrate that the confining zone is free of transmissive faults or fractures and of sufficient areal extent and integrity to contain the injected oil or gas stream.
11. Any known regional or local faulting. If faults are known or suspected, a cross section that includes a depiction of the fault at depth.
12. A method for delineating the area of review, including the computational model to be used, assumptions that will be made, and the site characterization data on which the model will be based.
13. A map of all wells, including all injection wells, producing wells, plugged wells, abandoned wells, drilling wells, dry holes, water wells, and other subsurface structures within the oil or gas facility area and its delineated area of review.
14. A determination that all abandoned wells have been properly plugged and all operating wells have been constructed in a manner that prevents the oil or gas or associated fluids from escaping the geological storage reservoir.
15. A tabular description and well bore diagram of each well's type, construction, date drilled, location, depth, record of plugging, and completion.
16. Quantitative analysis from a state-certified laboratory of freshwater from all available freshwater wells within the oil or gas facility area and its delineated area of review. The location of all wells by quarter-quarter, section, township, and range must also be submitted. This requirement may be waived by the director in certain instances.
17. Quantitative analysis from a third-party laboratory of a representative sample of the oil or gas to be injected. A compatibility analysis with the receiving formation may also be required.
18. A map showing all occupied dwellings within the oil or gas facility area, including the delineated area of review.
19. Corrective action plan pursuant to section 43-02-14-05.1.
20. Identify whether the area of review extends across state jurisdiction boundary lines.
21. Address the potential for migration of unrecoverable injected oil or gas.
22. The stimulation plan for all geological storage facility wells, if any, including a description of the stimulation fluids to be used, and a determination that the stimulation will not interfere with containment.
23. An emergency and remedial response plan pursuant to section 43-02-14-15.
24. A corrosion monitoring and prevention plan for all wells and surface facilities.
25. A leak detection and monitoring plan for all surface facilities.
26. A leak detection and monitoring plan to monitor any movement of the oil or gas outside of the geological storage reservoir. This may include monitoring wells and the collection of baseline information of oil or gas background concentrations in ground water, surface soils, and chemical composition of in situ waters within the oil or gas facility area, its delineated area of review.
27. A time frame for extraction of injected oil or gas and expected recovery percentages.
28. Address associated water recovery and a plan for disposal.

29. Any additional information the director may require.

**History:** Effective April 1, 2022.

**General Authority:** NDCC 38-08-04

**Law Implemented:** NDCC 38-25

**43-02-14-08. Permit requirements - Storage in salt cavern.**

An application for a geological storage facility permit must include at least the following:

1. The name and address of the operator of the storage facility.
2. Address surface, pore space, and salt mineral ownership by filing the following:
  - a. An affidavit of mailing, including the name and address of each owner, certifying that all surface owners of record within the salt cavern and one-half mile [.80 kilometer] adjacent have been notified of the proposed geological storage project.
  - b. An affidavit of mailing, including the name and address of each owner, certifying that all salt mineral lessees, salt mineral owners of record, pore space owners and pore space lessees of record within the salt cavern and one-half mile [.80 kilometer] adjacent have been notified of the proposed geological storage project.
  - c. Legal descriptions of surface ownership of record within the salt cavern and one-half mile [.80 kilometer] adjacent.
  - d. Legal descriptions of salt mineral lessees and salt mineral owners of record within the salt cavern and one-half mile [.80 kilometer] adjacent.
  - e. Legal descriptions of pore space owners and pore space lessees of record within the salt cavern and one-half mile [.80 kilometer] adjacent.
3. Applicant shall request a permit for all oil or gas injection wells, monitoring wells, and surface facilities by filing an application for permit to inject filed on a form provided by the director, including at least the following:
  - a. The name and address of the operator of the injection well.
  - b. The estimated bottom hole fracture pressure of the upper confining zone.
  - c. Average maximum daily rate of oil or gas to be injected.
  - d. Average and maximum requested surface injection pressure.
  - e. Current capacity and geometry of the cavern.
  - f. Tools used to confirm capacity and geometry of cavern.
  - g. Current thickness of remaining salt at top and bottom of cavern.
  - h. Geological name and depth to base of the lowermost underground source of drinking water which may be affected by the injection.
  - i. Existing or proposed casing, tubing, and packer data.
  - j. Existing or proposed cement specifications, including amounts and actual or proposed top of cement.

- k. A plat and maps depicting the area of review, based on the associated geological storage facility permit, and detailing the location, well name, and operator of all wells in the area of review. The plat and maps must include all injection wells, producing wells, plugged wells, abandoned wells, drilling wells, dry holes, permitted wells, water wells, surface bodies of water, and other pertinent surface features, such as occupied dwellings and roads.
  - l. A review of the surficial aquifers within one mile [1.61 kilometer] of the proposed injection well site or surface facilities.
  - m. Proposed injection program, including method of transportation of the oil or gas to the injection facility and the injection well.
  - n. List identifying all source wells or sources of injectate.
  - o. All logging and testing data on the well which has not been previously submitted.
  - p. Schematic or other appropriate drawings and tabulations of the wellhead and surface facilities, including the size, location, construction, and purpose of all tanks, the height and location of all dikes and containment, including a calculated containment volume, all areas underlain by a synthetic liner, the location of all flow lines, and a tabulation of any pressurized flow line specifications. It must also include the proposed road access to the nearest existing public road and the authority to build such access.
  - q. A schematic drawing of the well detailing the proposed well bore construction, including the size of the borehole; the total depth and plug back depth; the casings and tubing sizes, weights, grades, and top and bottom depths; the perforated interval top and bottom depths; the packer depth; the injection zone; and upper and lower confining zones top and bottom depths.
  - r. A detailed description of the proposed completion or conversion procedure.
  - s. Any other information required by the director to evaluate the proposed well.
4. Anticipated capacity and geometry of the cavern.
  5. Minimum and maximum capacity of the cavern to be utilized.
  6. Tools used to confirm capacity and geometry of the cavern.
  7. Current thickness of remaining salt at the top and bottom of the cavern.
  8. Description and schematics for brine management at the surface.
  9. Description of measures in place to prevent unintended flowback.
  10. A map showing the extent of the pore space that will be occupied by the injection and geological storage of oil or gas over the life of the project.
  11. A map showing the outside boundary of the oil or gas facility area, its delineated area of review, and the surface and bottom hole location of all proposed injection wells, monitoring wells, cathodic protection boreholes, and surface facilities.
  12. Structural and stratigraphic cross sections that describe the geological conditions of the salt cavern.
  13. A structure map of the top and base of the salt formation being utilized.

14. An isopach map of the salt formation being utilized.
15. Geomechanical analysis of the cavern used to determine cavern stability, using the following:
  - a. Geological characteristics.
  - b. Petrophysical properties.
  - c. Rock mechanical properties.
  - d. In situ stresses.
  - e. Any other input data acquired and utilized.
16. Address the following cavern stability issues at minimum:
  - a. Salt creep and mitigation measures.
  - b. Minimum salt roof thickness.
  - c. Roof collapse.
  - d. Maximum cavern diameter.
  - e. Spacing between offsetting caverns.
  - f. Minimum setback for drilling in the vicinity.
  - g. Salt thinning due to any stratigraphic change.
  - h. Any dissolution zones in the salt.
    - i. Minimum operating pressures and capacity volumes, roof geometry, and height/diameter ratios used to prevent any of the above or other pertinent stability issues.
17. Any known regional or local faulting. If faults are known or suspected, a cross section that includes a depiction of the fault at depth.
18. A method for delineating the area of review, including the geomechanical model to be used, assumptions that will be made, and the site characterization data on which the model will be based.
19. A map of all wells, including all injection wells, producing wells, plugged wells, abandoned wells, drilling wells, dry holes, water wells, and other subsurface structures within the oil or gas facility area and its delineated area of review.
20. A determination that all abandoned wells have been properly plugged and all operating wells have been constructed in a manner that prevents the oil or gas or associated fluids from escaping the salt cavern.
21. A tabular description and well bore diagram of each well's type, construction, date drilled, location, depth, record of plugging, and completion.
22. Quantitative analysis from a state-certified laboratory of freshwater from all available freshwater wells within the geological storage facility. The location of all wells by quarter-quarter, section, township, and range must also be submitted. This requirement may be waived by the director in certain instances.

23. Quantitative analysis from a third-party laboratory of a representative sample of the oil or gas to be injected. A compatibility analysis with the receiving formation may also be required.
24. A map showing all occupied dwellings within the oil or gas facility area, including the delineated area of review.
25. Corrective action plan pursuant to section 43-02-14-05.1.
26. Identify whether the area of review extends across state jurisdiction boundary lines.
27. An emergency and remedial response plan pursuant to section 43-02-14-15.
28. A corrosion monitoring and prevention plan for all wells and surface facilities.
29. A leak detection and monitoring plan for all surface facilities.
30. A leak detection and monitoring plan to monitor any movement of the oil or gas outside of the salt cavern. This may include monitoring wells and the collection of baseline information of oil or gas background concentrations in ground water, surface soils, and chemical composition of in situ waters within the oil or gas facility area and its delineated area of review.
31. Any additional information the director may require.

**History:** Effective April 1, 2022.

**General Authority:** NDCC 38-08-04

**Law Implemented:** NDCC 38-25

#### **43-02-14-09. Siting.**

All injection wells must be sited in such a fashion that they inject into a formation which has confining zones that are free of known open faults or fractures within the facility area and its delineated area of review.

**History:** Effective April 1, 2022.

**General Authority:** NDCC 38-08-04

**Law Implemented:** NDCC 38-25

#### **43-02-14-10. Construction requirements.**

1. All injection wells must be cased and cemented to prevent movement of fluids into or between underground sources of drinking water or into an unauthorized zone. The casing and cement used in construction of each new injection well must be designed for the life expectancy of the well. All wells used for injection into a storage reservoir or salt cavern must have surface casing set and cemented at a point not less than fifty feet [15.24 meters] below the base of the Fox Hills formation. In determining and specifying casing and cementing requirements, all the following factors must be considered:
  - a. Depth to the injection zone and lower confining zone, or salt cavern specifics. Long string casing must be set at least to the top of the injection zone and cemented as approved by the director.
  - b. Depth to the bottom of all underground sources of drinking water.
  - c. Estimated minimum, maximum, and average injection pressures.
  - d. Fluid pressure.
  - e. Estimated fracture pressures.

- f. Physical and chemical characteristics of the injection zone.
2. Appropriate logs and other tests must be conducted during the drilling and construction of injection wells. Any well drilled or converted to an injection well must have a cement bond log from which a presence of channels and microannulus can be determined radially. Cement bond logs must contain elements approved by the director.
3. After an injection well has been completed, approval must be obtained on a sundry notice filed on a form provided by the director before any subsequent perforating.

**History:** Effective April 1, 2022.

**General Authority:** NDCC 38-08-04

**Law Implemented:** NDCC 38-25

#### **43-02-14-11. Mechanical integrity.**

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. One of the following methods must be used to evaluate the absence of significant leaks:
  - a. Pressure test with liquid or gas.
  - b. Monitoring of positive annulus pressure following a valid pressure test.
  - c. Radioactive tracer survey.
3. On a schedule determined by the commission, the storage facility operator shall use one or more of the following methods to determine the absence of significant fluid or gas movement:
  - a. A cement bond log from which a presence of channels and micro annulus can be determined radially.
  - b. A temperature log.
  - c. Any alternative testing method that provides equivalent or better information and that the director requires or approves.
4. The operator of an injection well immediately shall shut in the well if mechanical failure indicates fluids are, or may be, migrating into an underground source of drinking water or an unauthorized zone, or if so directed by the director.

**History:** Effective April 1, 2022.

**General Authority:** NDCC 38-08-04

**Law Implemented:** NDCC 38-25

#### **43-02-14-12. Plugging of injection wells.**

The proper plugging of an injection well requires the well be plugged with cement or other types of plugs, or both, in a manner which will not allow movement of fluids into an underground source of drinking water. The operator shall file a notice of intention to plug on a form provided by the director and shall obtain the director's approval of the plugging method before the commencement of plugging operations.

**History:** Effective April 1, 2022.

**General Authority:** NDCC 38-08-04

**Law Implemented:** NDCC 38-25

**43-02-14-13. Pressure restrictions.**

1. The following applies to geological storage in an oil and gas reservoir or saline reservoir:
  - a. Injection pressure at the wellhead may not exceed a maximum authorized injection pressure which must be calculated to assure that the pressure in the storage reservoir during injection does not initiate new fracture or propagate existing fractures in the confining zones.
  - b. In no case may injection pressure initiate fractures in the confining zones or cause the movement of injection or formation fluids into an unauthorized zone or underground source of drinking water.
2. The following applies to geological storage in a salt cavern:
  - a. A minimum operating pressure protective of the cavern's integrity must be maintained.
  - b. A maximum allowable operating pressure must be established based on the casing seat or the highest elevation of the cavern's roof, whichever is higher in elevation.

**History:** Effective April 1, 2022.

**General Authority:** NDCC 38-08-04

**Law Implemented:** NDCC 38-25

**43-02-14-13.1. Salt cavern integrity.**

The operator shall execute the emergency and remedial response plan pursuant to section 43-02-14-15 in the event of loss of integrity in the storage cavern for any reason.

**History:** Effective April 1, 2022.

**General Authority:** NDCC 38-08-04

**Law Implemented:** NDCC 38-25

**43-02-14-14. Bonding requirements.**

All storage facilities, injection wells, and monitoring wells must be bonded as provided in section 43-02-03-15.

**History:** Effective April 1, 2022.

**General Authority:** NDCC 38-08-04

**Law Implemented:** NDCC 38-25

**43-02-14-15. Emergency and remedial response plan.**

The storage facility operator shall maintain a commission approved emergency and remedial response plan. 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 facility operator's nearest operational office.

1. The emergency and remedial response plan requires a description of the actions the storage facility operator shall take to address movement of the injection or formation fluids that may endanger an underground source of drinking water during any phase of the project. 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 the facility area and its delineated area of review.
  - b. Contingency plans for addressing oil or gas leaks from any well, flow lines, or other facility, and loss of containment from the storage reservoir or salt cavern 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 facility operator obtains evidence that the injected oil or gas stream, or displaced fluids may endanger an underground source of drinking water, the storage facility operator shall:
    - a. Immediately cease injection.
    - b. Take all steps reasonably necessary to identify and characterize any release.
    - c. Notify the director immediately and submit a subsequent sundry notice filed on a form provided by the director within twenty-four hours.
    - d. Implement the emergency and remedial response plan approved by the director.
  3. The commission may allow the operator to resume injection before remediation if the storage facility operator demonstrates that the injection operation will not endanger underground sources of drinking water.
  4. The storage facility operator shall review annually the emergency and remedial response plan developed under subsection 1. 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 must be submitted to the commission as follows:
    - a. With the area of review re-evaluation.
    - b. Following any significant changes to the facility, such as addition of injection or monitoring wells, or on a schedule determined by the commission.
    - c. When required by the commission.

**History:** Effective April 1, 2022.

**General Authority:** NDCC 38-08-04

**Law Implemented:** NDCC 38-25

**43-02-14-16. Reporting, monitoring, and operating requirements.**

1. The operator of a storage facility shall meter or use an approved method to keep records and shall report monthly to the director, the volume and nature of the injected hydrocarbons, the average, minimum, and maximum injection pressures, the maximum injection rates, and such other information as the director may require. The operator of each storage facility shall, on or before the fifth day of the second month succeeding the month in which the well is capable of injection, file with the director the aforementioned information for the storage facility in a format provided by the director.
2. Immediately upon the commencement or recommencement of injection, the operator shall notify the director of the injection date verbally and in writing.
3. The operator shall place accurate gauges on the tubing and the tubing casing annulus of all injection wells utilized in the storage facility. Accurate gauges must also be placed on any other annuluses deemed necessary by the director.

4. The operator of a storage facility shall keep the wells, surface facilities, and injection system under continuing surveillance and conduct such monitoring, testing, and sampling as the director may require verifying the integrity of the surface facility, gathering system, and injection wells to protect surface and subsurface waters. Before commencing operations, the injection pipeline must be pressure tested. All existing injection pipelines where the pump and the wellhead are not located on the same site are required to be pressure tested annually.
5. The operator of a storage facility shall report any noncompliance with regulations or permit conditions to the director verbally within twenty-four hours followed by a written explanation within five days. The operator shall cease injection operations if so directed by the director.
6. Within ten days after the discontinuance of injection operations, the operator shall notify the director of the date of such discontinuance and the reason therefor.
7. Upon the completion or recompletion of an injection well or the completion of any remedial work or attempted remedial work, such as plugging back, deepening, acidizing, shooting, formation fracturing, squeezing operations, setting liner, perforating, reperforating, tubing repairs, packer repairs, casing repairs, or other similar operations not specifically covered herein, a report on the operation must be filed with the director within thirty days. The report must present a detailed account of all work done, including the reason for the work, the date of such work, the shots per foot and size and depth of perforations, the quantity of sand, crude, chemical, or other materials employed in the operation, the size and type of tubing, the type and location of packer, the result of the packer pressure test, and any other pertinent information or operations which affect the status of the well and are not specifically covered herein.
8. Annular injection of fluids is prohibited.

**History:** Effective April 1, 2022.

**General Authority:** NDCC 38-08-04

**Law Implemented:** NDCC 38-25

#### **43-02-14-17. Leak detection and reporting.**

1. Leak detection must be integrated, where applicable and must be inspected and tested on a semiannual basis and, if defective, must be repaired or replaced within ten days. Any repaired or replaced detection equipment must be retested if required by the commission. An extension of time for repair or replacement of leak detection equipment may be granted upon a showing of good cause by the storage facility operator. A record of each inspection must include the inspection results and be maintained by the operator at least until project completion, and must be made available to the commission upon request.
2. Pursuant to section 43-02-03-30 the storage facility operator shall immediately report to the commission any leak detected at any well or surface facility.
3. The storage facility operator immediately shall report to the commission any pressure changes or other monitoring data from subsurface observation wells or injection wells that indicate the presence of leaks in the storage reservoir or salt cavern.
4. The storage facility operator immediately shall report to the commission any other indication that the storage facility is not containing oil, gas, or brine, whether the lack of containment concerns the storage reservoir or salt cavern, surface equipment, or any other aspect of the storage facility.

**History:** Effective April 1, 2022.

**General Authority:** NDCC 38-08-04

**Law Implemented:** NDCC 38-25

#### **43-02-14-18. Storage facility permit transfer.**

1. 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. Meet the bonding requirements of section 43-02-14-14.
2. A transfer may only take place after notice and hearing. The transferee shall demonstrate that all requirements of chapter 43-02-14 are complied with. The transferee shall outline necessary permit modifications based on operational changes, if any.
3. Commission review. The commission shall review the proposed transfer to ensure that the purposes of North Dakota Century Code chapter 38-25 are not compromised but are promoted. For good cause, the commission may deny a transfer request, delay on acting on it, and place conditions on its approval.
4. Commission approval required. A permit transfer may occur only upon the commission's written order. The transferor of a permit shall receive notice from the commission that the approved new storage facility operator has met the bonding requirements of section 43-02-14-14.

**History:** Effective April 1, 2022.

**General Authority:** NDCC 38-08-04

**Law Implemented:** NDCC 38-25

#### **43-02-14-19. 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 schedule a hearing to review the permit and thereafter issue an order modifying or revoking the permit. Permits, after notice and hearing, 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. Area of review or corrective action re-evaluations pursuant to section 43-02-14-05.1.
  - c. Operating outside of parameters of the permit of section 43-02-14-06, 43-02-14-07, or 43-02-14-08, whichever is applicable.
  - d. Amendment to the emergency and remedial response plan of section 43-02-14-15.
  - e. Amendment to the leak detection plan of section 43-02-14-17.
  - f. Review of monitoring and testing results conducted in accordance with injection well permit requirements.

- g. 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 application of different permit conditions at the time of the issuance.
  - h. 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.
  - i. 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.
  - j. There are material and substantial 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 incorporate the proposed changes to the original permit. 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 may be reopened when a revised permit is prepared. All other aspects of the existing permit 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 may not be considered at the time of a 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 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.
    - c. A determination that the permitted activity endangers human health or the environment.
  6. If the commission tentatively decides to terminate a permit, the commission shall issue notice of intent to terminate.

**History:** Effective April 1, 2022.

**General Authority:** NDCC 38-08-04

**Law Implemented:** NDCC 38-25

#### **43-02-14-19.1. Minor modifications of permit.**

Upon agreement between the storage facility 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 43-02-14-18. Minor modifications may include:

1. Correct typographical errors.
2. Require more frequent monitoring or reporting by the storage operator.
3. Change quantities or types of fluids or gases injected which are within the capacity of the facility as permitted and, in the judgement 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.
4. Change construction requirements approved by the commission, provided that any such alteration must comply with the requirements of this chapter and no such changes are physically incorporated into construction of the well before approval of the modification by the commission.
5. Amending any of the plans of this chapter where the modifications merely clarify or correct the plan, as determined by the commission.

**History:** Effective April 1, 2022.

**General Authority:** NDCC 38-08-04

**Law Implemented:** NDCC 38-25