

**U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION 5
UNDERGROUND INJECTION CONTROL
CLASS VI PERMIT**

PERMIT ID: IL-155-6A-0001



ISSUED TO:
MARQUIS CARBON INJECTION LLC
10000 MARQUIS DRIVE, HENNEPIN, ILLINOIS 61327

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PERMIT AUTHORIZATION

Under the authority of the Safe Drinking Water Act and Underground Injection Control regulations of the U.S. Environmental Protection Agency (EPA) codified at Title 40 of the Code of Federal Regulations (40 C.F.R.) Parts 124, 144, 146, and 147, and according to the terms of this permit, hereinafter referred to as "Permit," EPA hereby authorizes the company listed below, hereinafter referred to as the "Permittee," to engage in underground injection activities as described herein. This Permit incorporates all attachments to this Permit as enforceable conditions.

PERMITTEE NAME AND ADDRESS

MARQUIS CARBON INJECTION LLC
10000 MARQUIS DRIVE, HENNEPIN, ILLINOIS 61327

The Permittee is authorized, upon the express condition that the Permittee meets the restrictions of this Permit, to construct and operate the Class VI injection well listed below for injection of the carbon dioxide stream generated by MARQUIS CARBON INJECTION LLC ("Marquis", "Marquis Carbon", or "MCI") for the Marquis Biocarbon Project and as characterized in the permit application and the administrative record as a liquid, supercritical fluid, or gas below the ground surface. The authorized injection zone is the Mount Simon Sandstone formation at depths between 3,094 and 4,854 feet.

WELL NAME AND LOCATION

MCI CC3
ILLINOIS, PUTNAM COUNTY
S2 T32N R2W
Latitude: 41.27026520° N
Longitude: 89.30939322° W

Any underground injection activity not authorized by this Permit or by rule is prohibited. All references to 40 C.F.R. are to the regulations in effect on the date that this Permit is effective and, should renumbering occur, their subsequent equivalent. The following attachments are incorporated into this permit as enforceable conditions: A, B, C, D, E, F, G, H, I, J, and K. Compliance with the terms of this Permit does not constitute a defense to any enforcement action brought under the provisions of Section 1431 of the SDWA or any other law governing protection of public health or the environment, nor does it serve as a shield to the Permittee's independent obligation to comply with all applicable UIC regulations.

This Permit becomes effective on the date listed below and remains in full force and effect during the operating life of the injection well, the post-injection site care period, and until site closure is authorized and completed, unless this Permit is revoked and reissued, terminated, or modified pursuant to 40 C.F.R. §§ 124.5, 144.12, 144.39, 144.40, or 144.41. This Permit shall be reviewed at least once every five years to determine if action is required under 40 C.F.R. § 144.36(a). Upon delegation of primary enforcement responsibility to a new entity, this Permit remains in effect until such time as the

new entity issues its own permit to the Permittee or the new entity chooses to adopt this Permit as its permit. The permit will expire in two years from its effective date if the permittee fails to commence well construction, unless a written request in an electronic format for an extension of this two-year period has been approved by the Director. The Permittee shall submit such requests prior to the permit expiration or extension deadline, whichever is applicable. Requests for extension must state delay causality, an estimated well completion date, and list additional wells that penetrate the designated confining zone within the area of review (AOR) which were not included in the initial permit application, including well construction diagrams, cement records, and cement bond logs for any new AOR wells. A maximum of two, two-year extensions are allowed. If the construction of the well has not commenced during the maximum period of six years from the effective date, the permit expires and may not be extended. The permittee may request an expiration date sooner than the two-year period, provided no construction on the well has commenced.

Authorization Signed By:

Tera L. Fong
Director, Water Division
Date Signed:

EFFECTIVE DATE OF PERMIT:

PERMIT CONDITIONS

A. EFFECT OF PERMIT

The Permittee is allowed to engage in underground injection in accordance with the conditions of this Permit. Notwithstanding any other provisions of this Permit, the Permittee authorized by this Permit must not construct, operate, maintain, convert, plug, abandon, or conduct any other injection activity in a manner that allows the movement of injection, annulus, or formation fluids into underground sources of drinking water (USDWs) or any unauthorized geologic zones. The objective of this Permit is to prevent the movement of fluids into or between USDWs or into any unauthorized geologic zones consistent with the requirements at 40 C.F.R. §§ 146.86(a) and 144.12(a) and (b). Any underground injection activity not specifically authorized in this Permit is prohibited. Issuance of this Permit does not convey property rights of any sort or any exclusive privilege (40 C.F.R. § 144.51(g)); nor does it authorize any injury to persons or property, any invasion of other private rights, or any infringement of State or local laws or regulations. Nothing in this Permit shall be construed to relieve the Permittee of any duties under applicable regulations.

B. PERMIT ACTIONS

1. Modification, Revocation and Reissuance, or Termination – The Director of the Water Division of Region 5 of the EPA, hereinafter, the Director, may, for cause or upon request by the Permittee, modify, revoke and reissue, or terminate this Permit in accordance with 40 C.F.R. §§ 124.5, 144.12, 146.86(a), 144.39, and 144.40, and 144.41. The filing of a request for a permit modification, revocation and reissuance, or termination, or the notification of planned changes, or anticipated noncompliance on the part of the Permittee does not stay the applicability or enforceability of any condition of this Permit. (40 C.F.R. § 144.51(f)). The Permittee shall notify the Director at least 30 days in advance of any modification for approval. Upon the consent of the Permittee, the Director may modify a permit to make the corrections or allowances for minor changes in the permitted activity as listed in 40 C.F.R. § 144.41.
2. Transfer of Permit – The Permittee may transfer this Permit in accordance with 40 C.F.R. § 144.38(a) only when the Director has modified or revoked and reissued the Permit into the name of the new owner/operator. The Permittee shall provide written notice (EPA Form 7520-7 or its equivalent) to the Director at least 30 days in advance of the proposed transfer date. Such notice shall include a written agreement between the existing and proposed new Permittees containing a specific date for transfer of permit responsibility, coverage, and liability between them, and shall demonstrate that the financial responsibility requirements of 40 C.F.R. § 144.52(a)(7) have been met by the proposed new Permittee. This permit is only transferable after approval by the Director.
3. Permittee Change of Name or Address – The Permittee shall notify the Director at least 30 days in advance of changes in the Permittee legal name or address or address where

records are kept. The Permit may be subject to a modification in accordance with item (1) of this section.

4. Injection Well Conversion – The Permittee shall notify the Director at least 30 days in advance of planned well conversion to another type of injection or non-injection well. The notice shall include the type of well to which the existing well will be converted and a completed 7520-19 form or its equivalent. Such notice shall also include demonstration that the existing injection well has internal and external mechanical integrity (MI) and documentation that the agency with regulatory authority over the new well type has been notified. The Permittee shall not begin conversion of the well without written approval from the Director that the requirements of this Permit have been met nor without a proper UIC permit/authorization if the well is being converted to a different type of injection well. Upon conversion, the Permittee shall convert the well(s) in a manner which will not allow the movement of fluids into or between USDWs. The Permittee shall also ensure that the conversion meets any and all applicable federal, state, and local requirements. The Permittee must continue to meet all permit requirements until the permit expires unless the Permittee receives written approval from the Director waiving such requirements.
5. Permit Expiration – Once the permit has expired, the Permittee must reapply for a new injection well permit and restart the complete permit process, including opportunity for public comment, before injection can occur. If authorization to inject has not been provided once construction has commenced, the Permittee is subject to the conditions for wells not actively injecting.

C. SEVERABILITY

The provisions of this Permit are severable, and if any provision of this Permit or the application of any provision of this Permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this Permit shall not be affected thereby.

D. CONFIDENTIALITY

In accordance with 40 C.F.R. Part 2 (Public Information) and 40 C.F.R. § 144.5, any information submitted to EPA under this Permit may be claimed as containing trade secret, proprietary, or confidential business information (collectively PBI) by the submitter. Any such claim must be asserted at the time of submission by clearly marking the words "proprietary business information" on every page containing such information. If no claim is made at the time of submission, EPA may make the information available to the public without further notice. If a claim is asserted, the validity of the claim will be treated in accordance with the procedures in 40 C.F.R. Part 2. Claims of confidentiality for the following information will be denied:

1. The name and address of the Permittee; and

2. Information which deals with the existence, absence, or level of contaminants in drinking water.

E. DEFINITIONS

All terms used in this Permit shall have the meaning set forth in the SDWA and Underground Injection Control regulations specified at 40 C.F.R. parts 124, 144, 146, and 147.

F. DUTIES AND REQUIREMENTS

1. Prohibition of Movement of Fluid into a USDW – The Permittee must not construct, operate, maintain, convert, plug, abandon, or conduct any injection activity for the wells covered by this Permit in a manner that allows the movement of a fluid containing any contaminant into USDWs. If any water quality monitoring of a USDW indicates that a well covered by this permit may have caused the movement of any contaminant into the USDW, the Permittee shall initiate actions the Director may prescribe and as are necessary to remediate and prevent such movement.
2. Duty to Comply – The Permittee must comply with all conditions of this Permit. Any permit noncompliance constitutes a violation of the SDWA and is grounds for enforcement action, permit termination, revocation and reissuance, modification, or for denial of a permit renewal application except that the Permittee need not comply with the provisions of this Permit to the extent and for the duration as such noncompliance is authorized in an emergency permit under 40 C.F.R. §§ 144.34 and 144.51(a)).
3. Duty to Reapply – If the Permittee wishes to continue an activity regulated by this Permit after its expiration, the Permittee must apply for and obtain a new permit. (40 C.F.R. § 144.51(b))
4. Penalties for Violations of Permit Conditions – Any person who violates a permit requirement is subject to civil penalties and other enforcement action under the SDWA. Any person who willfully violates permit conditions may be subject to criminal prosecution under the SDWA and other applicable statutes and regulations.
5. Need to Halt or Reduce Activity Not a Defense – It shall not be a defense for the Permittee in an enforcement action to claim that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this Permit. (40 C.F.R. § 144.51(c))
6. Duty to Mitigate – The Permittee shall take all timely and reasonable steps necessary to minimize or correct any adverse impact on the environment resulting from noncompliance with this Permit. (40 C.F.R. § 144.51(d))

7. Proper Operation and Maintenance – The Permittee shall at all times properly operate and maintain all facilities and systems of treatment and control and related appurtenances, which are installed or used by the Permittee to achieve compliance with the conditions of this Permit. Proper operation and maintenance includes, among other things, 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 back-up or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of this Permit. (40 C.F.R. § 144.51(e))
8. Duty to Provide Information – The Permittee shall furnish to the Director in electronic format, within the time specified by the type of submittal or as defined by the Director, any information which the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this Permit, or to determine compliance with this Permit or the UIC regulations. The Permittee shall also furnish to the Director, upon request within a time specified, electronic copies of records required to be kept by this Permit. The Permittee shall also comply with all reporting requirements of this Permit, as specified in Section O, and as required by 40 C.F.R. § 144.32 and 144.51(h)).
9. Inspection and Entry – The Permittee shall allow the Director or an authorized representative, upon the presentation of credentials and other documents as may be required by law, to:
 - (a) Enter upon the Permittee's premises where a regulated facility or activity is located or conducted, or where records which are required to be retained under the conditions of this Permit are kept;
 - (b) Have access to and copy, at reasonable times, any records which are required to be kept under the conditions of this Permit;
 - (c) Inspect, at reasonable times, any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Permit; and
 - (d) Sample or monitor, at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the SDWA, any substances or parameters at any location, including facilities, equipment or operations regulated or required under this Permit. (40 C.F.R. § 144.51(i)).
10. Signatory and Certification Requirements – All reports, notifications, or any other information, required to be submitted by this Permit or requested by the Director shall be signed and certified in accordance with 40 C.F.R. § 144.32. The Permittee shall ensure that all signed documents include the following certification statement: *"I certify under penalty*

of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.” (40 C.F.R. § 144.51(k))

G. AREA OF REVIEW AND CORRECTIVE ACTION

The Permittee shall maintain and comply with the approved Area of Review (AoR) and Corrective Action Plan (CAP) included as Attachment B and shall meet the requirements of 40 C.F.R. § 146.84. In accordance with this Permit and UIC regulations, the Permittee shall do the following:

1. Every 5 years as specified in the AoR and CAP, or more frequently when monitoring and operational conditions warrant, the Permittee must reevaluate the area of review and perform corrective action in the manner specified in 40 C.F.R. § 146.84 and update the AoR and CAP or demonstrate to the Director that no update is needed. Reevaluation of the AoR and CAP must meet the requirements of 40 C.F.R. § 146.84(e) and must include a new survey of wells within the existing or modified AoR; and
2. Following each AoR reevaluation or a demonstration that no evaluation is needed, the Permittee must submit a report of the resultant information the Director for review and approval (per 40 C.F.R. § 146.84) in an electronic format. Once approved by the Director, the revised AoR and CAP become enforceable conditions of this Permit.
3. The Permittee must update the AOR when requesting extensions to permit expiration due to delayed construction.

H. FINANCIAL RESPONSIBILITY

The Permittee must demonstrate and maintain financial responsibility in accordance with 40 C.F.R. § 146.85 to cover estimated costs. The approved financial responsibility documents and estimated costs for this Permit are found in Attachment I of this Permit. The Permittee must submit qualifying financial responsibility instrument(s). No substitution of a demonstration of financial responsibility shall become effective until the Permittee receives notification from the Director that the alternative demonstration of financial responsibility is acceptable. When Financial Statement Coverage is used as the financial mechanism, such coverage shall be updated on an annual basis. The Permittee must maintain financial responsibility requirements regardless of the status of the Director's review of the financial responsibility demonstration. The requirement to maintain adequate financial responsibility and resources is directly enforceable regardless of whether the requirement is a condition of the permit.

1. Cost Estimate Updates and Adjustments – During the life of the geologic sequestration (GS) project, the Permittee shall maintain a current and detailed written cost estimate to reflect adjustments for inflation costs and any amendments made to the Project Plans included as Attachments of this Permit. The Permittee shall submit updates, adjustments, and amendments to the cost estimates as follows:
 - (a) Annually, within 60 days prior to the anniversary date of the establishment of the financial instrument.
 - (b) Within 60 days of any amendment to the area of review and corrective action plan (40 C.F.R. § 146.84), the injection well plugging plan (40 C.F.R. § 146.92), the post-injection site care and site closure plan (40 C.F.R. § 146.93), and the emergency and remedial response plan (40 C.F.R. § 146.94).
 - (c) No later than 60 days after the Director has approved the request to modify the area of review and corrective action plan (40 C.F.R. § 146.84), the injection well plugging plan (40 C.F.R. § 146.92), the post-injection site care and site closure plan (40 C.F.R. § 146.93), and the emergency and response plan (40 C.F.R. § 146.94), if the change in the plan increases the cost.
 - (d) Within 60 days of notification from the Director that the most recent demonstration is no longer adequate to cover the current estimated costs.
 - (e) Cost estimates must be based on costs of hiring a third party that is independent from the corporate structure of the Permittee to perform the required activities.
 - (f) The Permittee must obtain approval from the Director for any new or updated cost estimate or revised financial instrument. The Permittee shall submit qualifying revised financial responsibility instrument(s) that cover the new or updated costs within 60 days of any amendment(s).
 - (g) The Permittee must obtain approval from the Director to decrease the value of the financial assurance instrument or withdraw funds if a change to the plans decreases the cost.
2. Adverse Financial Conditions Notification (40 C.F.R. §§ 146.85(c)(4), 146.85(d)) – The Permittee shall notify the Director by certified mail and by email of adverse financial conditions that may affect the ability to cover current cost estimates.
 - (a) Bankruptcy and/or Insolvency of the Permittee – In the event that the Permittee or the third-party provider of a financial responsibility instrument is going through a bankruptcy, the Permittee shall notify the Director within 10 days after

commencement of a voluntary or involuntary proceeding under Title 11 (Bankruptcy), U.S. Code, naming the Permittee as debtor. A guarantor of a corporate guarantee must make such a notification if he or she is named as debtor, as required under the terms of the guarantee.

- (b) Bankruptcy, Insolvency, Suspension, or Loss of Authority of an Issuing Financial Institution – In the event of insolvency or bankruptcy of the trustee or issuing institution of the financial mechanism; the suspension or revocation of the authority of the trustee institution to act as trustee; or the issuing institution's losing its authority to issue such an instrument: The Permittee must notify the Director within 10 business days of the Permittee receiving notice of such event. See 40 C.F.R. §§ 144.28(d)(5) and 144.64(a). A Permittee who obtains a letter of credit, surety bond, or insurance policy will be deemed to be without the required FR or liability coverage in the event of bankruptcy, insolvency, or a suspension or revocation of the license or charter of the issuing institution. The owner or operator must establish other financial responsibility or liability coverage acceptable to the Director, within 60 calendar days after such an event. See 40 C.F.R. §§ 144.28(d)(6) and 144.64(b).
3. Changes in Coverage – Whenever a cost estimate increases to an amount greater than the face amount of a controlling financial instrument, the Permittee, within 60 days after the increase, must 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 Director, or obtain other qualifying financial responsibility instruments to cover the increase. Whenever a current cost estimate decreases to an amount less than the face amount of a controlling financial instrument, the face amount of the financial assurance instrument may be reduced to the amount of the current cost estimate only after the Permittee has received written approval from the Director. (40 C.F.R. § 146.85(c)(4)).

I. WELL CONSTRUCTION

The requirements listed in this section outline the approved construction standards. A more detailed EPA-approved design and specifications for the injection well, injection zone monitoring wells, confining zone monitoring wells, and the groundwater monitoring wells that are the subject of this Permit are included in Attachment H of this Permit. Changes to the approved construction plan must be approved through permit modification by the Director, prior to operation.

1. Injection Well Construction – The well must be constructed in accordance with 40 C.F.R § 146.86. The design and construction must allow continuous monitoring of the annulus between the long string casing and the injection tubing and accommodate testing devices and workover tools. During construction, the Permittee may make changes to the design of the injection well consistent with the conditions of this Permit. If changes are made to the design of the well before construction, notification must be made to EPA and

the construction changes must be provided for review and approval by the Director before installation. Once the construction of the well is completed, and prior to authorization to inject, the Permittee must submit the final, as-built construction specifications and diagrams within 30 days for review and approval by the Director. Any deviations from the proposed design and as-built construction of the well must be noted. If the changes in well design are significant, the Director may require this Permit to be modified.

2. Siting – The well must be sited in an area with a suitable geologic setting in accordance with the requirements at 40 C.F.R. § 146.83.
3. Casing and Cementing – The well must be cased and cemented per 40 C.F.R. §§ 146.22 and 146.86. Casing, cement, or other materials used in the construction of the well must have sufficient structural strength for the life of the GS project. All well materials must be compatible with all fluids with which the materials may be expected to come into contact and must meet or exceed standards developed for such materials by the American Petroleum Institute, ASTM International, or comparable standards acceptable to the Director. The well must be cased and cemented to prevent the movement of fluids into or between USDWs for the expected duration of the GS project in accordance with 40 C.F.R. § 146.86.
4. Injection Tubing and Packer – The tubing and packer design must meet the requirements of 40 C.F.R. § 146.86(c). Tubing and packer materials used in the construction of the well must be compatible with fluids with which the materials may be expected to come into contact and must meet or exceed standards developed for such materials by the American Petroleum Institute, ASTM International, or comparable standards acceptable to the Director. Injection must only take place through the tubing, with a packer set in the long string casing within or below the nearest cemented and impermeable confining system no more than 100 feet above the injection zone.
5. Sampling and Monitoring Devices – The Permittee must install and maintain in good condition all devices required to measure, monitor, and record the data and parameters required by Attachment A and C of this Permit. The Permittee must ensure that the devices installed and methods used are sufficient to represent the activity being measured, monitored, or recorded. For required continuous monitoring, the Permittee must use devices capable of monitoring the required activity. Calculated flow data or periodic monitoring are not acceptable for required continuous monitoring except as a back-up system if the primary continuous monitoring devices malfunction or become inoperable. The Permittee must notify EPA of such occurrences, and continuous monitoring devices must be repaired or replaced as soon as practicable. If this length of time is extensive in the opinion of the Director, injection activities must cease until such time that normal monitoring is restored. The Permittee must ensure the well's construction and near-wellhead design is appropriate for the collecting of samples and fulfilling of all monitoring requirements of this Permit. The Permittee must ensure adequate well diameter to

accommodate appropriate tools for well development, aquifer testing equipment, and water quality sampling devices. The Permittee must ensure all gauges used for monitoring and testing are properly calibrated.

6. Monitoring Well Construction— 40 C.F.R. §§ 146.84 and 146.90(g) require monitoring of the carbon dioxide plume and pressure front of the confining and injection zones and 40 C.F.R. § 146.90(d) requires monitoring of groundwater located above the injection zone. These sections are incorporated by reference into this permit. Groundwater, confining zone, and injection zone monitoring wells must be constructed in the manner depicted in Attachment C of this Permit using materials that are compatible with the injected fluids. All monitoring wells must be constructed in a manner to provide representative samples that can be analyzed for the monitoring parameters required by this Permit. Once the construction of the monitoring wells has been completed, the as-built construction diagrams must be included in the Pre- injection Testing Report to be submitted to the Director per Section J of this Permit.

J. PRE-INJECTION TESTING

Testing is required during the construction of the well per 40 C.F.R. § 146.87. This testing is required to verify the geology of the well site to ensure compliance with the well construction requirements per 40 C.F.R. § 146.86 and to test viability of the well to meet the stipulated operational requirements. All testing must be conducted in accordance with 40 C.F.R. § 146.87. The pre-injection testing plan is included as Attachment G of this Permit.

1. Prior to receiving authorization to commence injection, the Permittee must perform all pre-injection logging, sampling, and testing specified at 40 C.F.R. § 146.87. This testing must include:
 - (a) Logs, surveys and tests to determine or verify the depth, thickness, porosity, permeability, lithology, and formation fluid salinity in all relevant geologic formations. These tests must include:
 - (i) Deviation checks that meet the requirements of 40 C.F.R. § 146.87(a)(1);
 - (ii) Logs and tests before and upon installation of the surface casing that meet the requirements of 40 C.F.R. § 146.87(a)(2);
 - (iii) Logs and tests before and upon installation of the long-string casing that meet the requirements of 40 C.F.R. § 146.87(a)(3);
 - (iv) Tests to demonstrate internal and external mechanical integrity that meet the requirements of 40 C.F.R. § 146.87(a)(4); and

- (v) Any alternative methods that are required by and/or approved by the Director pursuant to 40 C.F.R. § 146.87(a)(5).
 - (b) Whole cores or sidewall cores of the injection zone and confining system and formation fluid samples from the injection zone that meet the requirements of 40 C.F.R. § 146.87(b).
 - (c) Documentation of the measured fluid temperature, pH, conductivity, reservoir pressure, and static fluid level of the injection zone that meet the requirements of 40 C.F.R. § 146.87(c).
 - (d) Tests to determine well-specific data regarding the injection and confining zones. These tests must determine fracture pressure and the physical and chemical characteristics of the injection and confining zones and the formation fluids in the injection zone that meet the requirements of 40 C.F.R. § 146.87(d).
 - (e) Tests to verify hydrogeologic characteristics of the injection zone that meet the requirements of 40 C.F.R. § 146.87(e), including:
 - (i) A pressure fall-off test; and
 - (ii) A pumping test or injectivity tests.
2. The Permittee must submit to the Director for approval in an electronic format a schedule for pre-operational testing activities 30 days prior to conducting the first test and submit any changes to the schedule 30 days prior to the next scheduled test. The Permittee must provide the Director with the opportunity to witness all logging, sampling, and testing required under this Section.

K. INJECTION WELL OPERATION

1. Outermost Casing Injection Prohibition – Injection between the outermost casing protecting USDWs and the well bore is prohibited.
2. Injection Pressure Limitation – Except at specific times as approved by the Director, the Permittee must ensure that injection pressure does not exceed 90 percent of the fracture pressure of the injection zone(s) and does not initiate new fractures or propagate existing fractures in the injection zone(s). Under no circumstance shall injection pressure initiate fractures or propagate existing fractures in the confining zone or cause the movement of injection or formation fluids into a USDW. The maximum injection pressure limit is listed in Attachment A of this Permit.
3. Stimulation Program – The Permittee must obtain prior approval from the Director to

conduct stimulation activities. The Permittee must carry out the Stimulation Program in accordance with Attachment J of this Permit.

4. Additional Injection Limitations – No injection fluid other than that identified on Page 1 of this Permit may be injected except fluids used for stimulation, rework, and well tests as approved by the Director. Injection must occur within the injection tubing.
5. Annulus Fluid – The Permittee must fill the annulus between the tubing and the long string casing with a non-corrosive fluid approved by the Director.
6. Annulus/Tubing Pressure Differential – Except during workovers or times of annulus maintenance, the Permittee must maintain pressure on the annulus that exceeds the operating injection pressure as specified in Attachment A of this Permit, unless the Director determines that such requirement might harm the integrity of the well or endanger USDWs.
7. Automatic Alarms and Automatic Shut-off System

(a) The Permittee must:

- (i) Install, continuously operate, and maintain an automatic alarm and automatic shut-off system or, at the discretion of the Director, down-hole shut-off systems, or other mechanical devices that provide equivalent protection; and
- (ii) Successfully demonstrate the functionality of the alarm system and shut-off system prior to the Director authorizing injection, and at a minimum of once every twelfth month after the last approved demonstration.

Testing under this Section must involve subjecting the system to simulated failure conditions and must be witnessed by the Director or his or her representative unless the Director authorizes an unwitnessed test in advance. The Permittee must provide notice in an electronic format 30 days prior to running the test and must provide the Director or their representative the opportunity to attend. The test must be documented using either a mechanical or digital device which records the value of the parameter of interest, or by a service company job record. A final report including any additional interpretation necessary for evaluation of the testing must be submitted in an electronic format within the time period specified in Section O of this Permit.

8. Precautions to Prevent Well Blowouts – Except at specific times as approved by the Director, the Permittee must maintain on the well a pressure which will prevent the return of the injection fluid to the surface. The well bore must be filled with a fluid of sufficient specific gravity during workovers to maintain a positive (downward) pressure gradient and/or a plug shall be installed which can resist the pressure differential. A blowout preventer must be installed and kept in proper operational condition whenever the

wellhead is removed to work on the well. The Permittee must follow procedures such as those below to assure that a backflow or blowout does not occur:

- (a) Limit the temperature and/or corrosivity of the injectate; and
 - (b) Develop procedures necessary to assure that pressure imbalances do not occur.
9. Circumstances Under Which Injection Must Cease – Injection must cease when any of the following circumstances arises:
- (a) Failure of the well to pass a mechanical integrity test;
 - (b) A loss of mechanical integrity during operation;
 - (c) The automatic alarm or automatic shut-off system is triggered;
 - (d) A significant unexpected change in the annulus or injection pressure;
 - (e) The Director determines that the well lacks mechanical integrity;
 - (f) Circumstances dictated in the Emergency Remedial and Response Plan (Attachment F of this Permit)
 - (g) Conditions described in Section M, Seismic Event Response of this Permit occur; or
 - (h) The Director determines that the Permittee is unable to maintain compliance with any condition of this Permit or regulatory requirement and the Director determines that injection should cease.

L. MECHANICAL INTEGRITY

The Permittee must ensure that the injection well and all other wells covered by this permit have both internal (no significant leaks in the casing, tubing and packer) and external (no significant fluid movement outside of the injection zone) mechanical integrity for the operational life of the well. The approved tests and test procedures for mechanical integrity (MI) are found in Attachment C of this Permit.

1. Standards – Other than during periods of well workover (repair or maintenance) approved by the Director in which the sealed tubing-casing annulus is disassembled for maintenance or corrective procedures, the injection well must have and maintain mechanical integrity consistent with 40 C.F.R. § 146.89, and the Permittee must continuously monitor injection pressure, injection rate, injection volumes, pressure on the annulus between tubing and long string casing, and annulus fluid volume as specified in 40 C.F.R. §§ 146.88(e) and

146.89(b). The Permittee must demonstrate MI using the approved tests and test procedures found in Attachment C of this Permit. The Permittee must also conduct any additional testing as the Director may require to make this determination. The determination of whether the injection well has mechanical integrity is at the discretion of the Director.

2. MI Demonstration Requirements and Schedule

(a) The Permittee must demonstrate mechanical integrity as follows:

- (i) Any time upon written request from the Director.
- (ii) Annually for external mechanical integrity.
- (iii) After any loss or suspected loss of MI.
- (iv) After any well alteration, repair, or workover that may compromise the internal mechanical integrity of the well including well stimulation.
- (v) Prior to plugging the well.
- (vi) After a seismic event as outlined in Section M of this Permit.
- (vii) After well construction is completed.

(b) The Permittee must obtain written authorization from the Director prior to commencing/resuming injection in any of the circumstances listed in Section L(2) above.

- 3. Monitoring Wells – Mechanical integrity tests and procedures for the confining zone and injection zone monitoring wells are outlined in Attachment C, Testing and Monitoring Plan and K, Quality Assurance and Surveillance Plan of this Permit. Internal and external testing and demonstration of monitoring wells must be conducted annually. Other tests and/or procedures including but not limited to corrosion monitoring, pressure tests, and televising casing integrity will be considered by the Director for approval and are outlined in Attachment C.
- 4. Alternative MI Tests and Procedures – The Permittee must submit any proposed alternative tests and/or procedures not listed in this plan to EPA for approval prior to using them to demonstrate MI.
- 5. EPA Witnessing of MI Tests – MI tests must be witnessed by the Director or an authorized representative of the Director unless prior approval has been granted by the Director to run

an unwitnessed test. To conduct testing without an EPA witness, the Permittee must adhere to the following procedures:

- (a) Submit prior notice in an electronic format within the time period specified within this section and Section O of this Permit, including the information that no EPA representative is available, and receive permission from EPA to proceed;
 - (b) Perform the test in accordance with the Testing and Monitoring Plan found in Attachment C of this Permit and document the test using either a mechanical or digital device that records the value of the parameter of interest; and
 - (c) Submit a final report including any additional interpretation necessary for evaluation of the testing, including a test record and gauge certification in electronic format to the Director for approval within the time period specified in Section O of this Permit.
6. Gauge and Meter Calibration – Prior to testing, the Permittee must ensure proper calibration of all gauges used in mechanical integrity demonstrations and other monitoring required by this Permit. All equipment must be calibrated in the manner and frequency recommended by the manufacturer and at least within one year prior to each required test. The date of the most recent calibration must be noted on or near the gauge or meter. A copy of the calibration certificate must be submitted to the Director in an electronic format with the report of the test. All recordings must read to an accuracy of no more than 0.5 percent of full scale for mechanical gauges. Pressure gauge resolution must be no greater than five psi. Certain mechanical integrity and other testing may require greater accuracy and must be identified in the procedure submitted to the Director prior to the test.
7. Notification Prior to Testing and Reporting
- (a) The Permittee must notify the Director in an electronic format of intent to demonstrate mechanical integrity at least 30 days prior to such demonstration. At the discretion of the Director, a shorter time period may be allowed.
 - (b) The Permittee must notify the Director of any loss or suspected loss of MI as outlined within this Permit in accordance with Section O of this Permit.
 - (c) The Permittee must report in an electronic format the results of a mechanical integrity demonstration as soon as possible but no later than 30 days after the demonstration is complete. Reports of mechanical integrity demonstrations which include logs must include an interpretation of results by a knowledgeable log analyst.

8. Loss of Mechanical Integrity – If the Permittee or the Director finds that the injection well and/or monitoring well(s) fail to demonstrate mechanical integrity during a test, or fails to maintain mechanical integrity during operation or monitoring, or that a loss of mechanical integrity as defined by 40 C.F.R. § 146.89(a)(1) or (2) is suspected during operation (such as a significant unexpected change in the annulus or injection pressure), the Permittee must:
- (a) Cease injection immediately;
 - (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) Implement the steps in the Emergency and Remedial Response Plan (Attachment F of this Permit);
 - (d) Within 24 hours of the event, notify the Director of the circumstances surrounding the event in accordance with Section I.11(e);
 - (e) Notify the Director in an electronic format when injection can be expected to resume and submit a projected plan for reestablishing MI or plugging the well.
 - (f) Follow any other applicable reporting requirements as directed in Section O of this Permit;
 - (g) Restore and demonstrate mechanical integrity to the satisfaction of the Director and receive written approval from the Director prior to resuming injection; and
 - (h) If an automatic shutdown (i.e., down-hole or at the surface) is triggered, the Permittee must immediately investigate and identify as expeditiously as possible the cause of the shutdown. If, upon investigation, the well appears to be lacking mechanical integrity, or if the required monitoring indicates that the well may be lacking mechanical integrity, the Permittee must take the actions listed above in Section L(5)(a)(i) through (v).
 - (i) If the well loses mechanical integrity prior to the next scheduled test date, then the well must either be plugged or repaired and retested within 30 days of losing mechanical integrity.
 - (j) The well(s) must remain shut-in until the Permittee receives written approval from the Director to commence/resume injection.

M. SEISMIC EVENT RESPONSE

The Permittee must implement the response actions for seismic events as described in the Emergency and Remedial Response Plan (Attachment F) of this Permit.

N. TESTING AND MONITORING REQUIREMENTS

The specific measurement and reporting frequencies are listed in Attachment C.

1. Testing and Monitoring Plan

- (a) The Permittee must maintain and comply with the approved Testing and Monitoring Plan included as Attachment C of this Permit and with the requirements at 40 C.F.R. §§ 144.51(j), 146.88(e), and 146.90, and any modifications required by the Director after the effective date of this Permit. Samples and measurements taken for the purpose of monitoring must be representative of the monitored activity. Procedures for all testing and monitoring under this Permit must be submitted to the Director in an electronic format for approval at least 30 days prior to the test if they plan to deviate from the procedures outlined in the Testing and Monitoring Plan in Attachment C of this Permit. When the test report is submitted, a full explanation must be provided as to why any approved procedures were not followed. If the approved procedures were not followed, EPA may take an appropriate action, including but not limited to, requiring the Permittee to re-run the test.
 - (b) The Permittee must update the Testing and Monitoring Plan as required by 40 C.F.R. § 146.90(j) to incorporate monitoring and operational data and in response to AoR reevaluations required under Section G of this Permit or demonstrate to the Director that no update is needed. The amended Testing and Monitoring Plan or demonstration must be submitted to the Director in an electronic format within one year of an AoR reevaluation; following any significant changes to the facility such as addition of monitoring wells or newly permitted injection wells within the AoR; or when required by the Director.
 - (c) Following each update of the Testing and Monitoring Plan or a demonstration that no update is needed, the Permittee must submit the resultant information in an electronic format to the Director for review and approval of the results. Once approved by the Director, the revised Testing and Monitoring Plan will become an enforceable condition of this Permit.
2. Carbon Dioxide Stream Analysis – The Permittee must analyze the carbon dioxide stream with sufficient frequency to yield data representative of its chemical and physical characteristics at least annually, as described in the Testing and Monitoring Plan and to meet the requirements of 40 C.F.R. § 146.90(a).

3. Continuous Monitoring – The Permittee must install and use continuous recording devices to monitor: the injection pressure (at surface and at injection interval), injection flow rate, injection mass, pressure on the annulus between the tubing and the long string of casing, annulus fluid level, and temperature (at surface and at injection interval). This monitoring must be performed as described in the Testing and Monitoring Plan to meet the requirements of 40 C.F.R. § 146.90(b). The Permittee must maintain for EPA's inspection at the facility an appropriately scaled, continuous record of these monitoring results as well as original files of any digitally recorded information pertaining to these operations.
4. Groundwater Monitoring Above the Confining Zone – The Permittee shall monitor groundwater quality and geochemical changes above the confining zone that may be a result of carbon dioxide movement through the confining zone and additional identified geologic units. All monitoring conducted must be performed for the parameters identified in the approved Testing and Monitoring Plan in accordance with the plan in Attachment C at the locations and depths, and at frequencies described in the Testing and Monitoring Plan to meet the requirements of 40 C.F.R. § 146.90(d).
5. Carbon Dioxide Plume and Pressure Front Tracking – The Permittee must track the extent of the carbon dioxide plume and pressure front using direct and indirect monitoring methods as described in the approved Testing and Monitoring Plan with criteria outlined in Attachment C and in accordance with 40 C.F.R. § 146.90(g). The Permittee is required to conduct this monitoring in order to detect and locate the carbon dioxide pressure front and the dissolved carbon dioxide plume and the data will be used to calibrate the AoR model to determine whether modifications to the AoR need to be made. The data collected will be used to monitor the location of the plume and pressure front, evaluate its movement through time, and to compare to the plume and pressure front predictions of the AoR model.
 - (a) Direct Methods – The Permittee must use the deep monitoring point to continuously record the pressure and temperature of the injection zone formation to track the position of the carbon dioxide pressure front and to collect fluid samples from the injection zone formation to track the position of the carbon dioxide plume described in the approved Testing and Monitoring Plan with criteria outlined in Attachments B, C and K to meet the requirements of 40 C.F.R. § 146.90(g)(1).
 - (b) Indirect Methods – The Permittee must use the indirect monitoring methods to track the position of the carbon dioxide plume and pressure front as described in the Testing and Monitoring Plan with criteria outlined in Attachments B, C and K and to meet the requirements of 40 C.F.R. § 146.90(g)(2).
6. Corrosion Monitoring – The Permittee must perform corrosion monitoring of the injection well and monitoring well(s) construction materials for loss of mass, thickness, cracking, pitting, and other signs of corrosion on a quarterly basis using the procedures described in

the Testing and Monitoring Plan with criteria outlined in Attachments B, C, and H and in accordance with 40 C.F.R. § 146.90(c). This ensures that the well components meet the minimum standards for material strength and performance set forth in 40 C.F.R. 146.86(b).

7. External Mechanical Integrity Testing – The Permittee must demonstrate external mechanical integrity annually as described in the approved Testing and Monitoring Plan with criteria outlined in Attachment C and must comply with Section L of this Permit in order to meet the requirements of 40 C.F.R. §§ 146.89 and 146.90.
8. Pressure Fall-Off Test – The Permittee shall conduct a pressure fall-off test at least once every five years unless more frequent testing is required by the Director based on site-specific information. The test shall be performed as described in the Testing and Monitoring Plan to meet the requirements of 40 C.F.R. § 146.90(f).
9. Surface Air and/or Soil Gas Monitoring – In addition to the testing and monitoring outlined in this Permit and in the applicable regulations, the Director may require surface air monitoring and/or soil gas monitoring to detect potential movement of carbon dioxide that could endanger a USDW. Should the Director deem this monitoring necessary, the Testing and Monitoring Plan must be amended to be reflective of the frequency and locations the Director requires and must meet the requirements of 40 C.F.R. § 146.90(h).
10. Casing Inspection Logs – Casing inspection logs shall be run for both Injection and Monitoring Wells as follows:
 - (a) Injection Well whenever the owner or operator conducts a workover in which the injection string is pulled, unless the Director waives this requirement due to well construction or other factors which limit the test's reliability or based upon the satisfactory results of a casing inspection log run within the previous five years.
 - (b) Monitoring Wells whenever the owner or operator conducts a workover of the well of any kind, unless the Director waives this requirement due to well construction or other factors which limit the test's reliability or based upon the satisfactory results of a casing inspection log run within the previous five years.
 - (c) The Director may require that a casing inspection log be run at a minimum of every five years, if the Director has reason to believe that the integrity of any well(s) may be adversely affected by naturally occurring or human-induced events.
11. Additional Monitoring – If required by the Director as provided in 40 C.F.R. § 146.90(i), the Permittee must perform any additional monitoring determined to be necessary to support, upgrade, and improve computational modeling of the AoR evaluation required under 40 C.F.R. § 146.84(c) and to determine compliance with standards under 40 C.F.R. §§ 144.12 or 146.86(a). This monitoring must be performed as described in a modification to the

following Plan Attachments B, C and K of this Permit.

O. REPORTING AND RECORDKEEPING

The Permittee must submit reports at frequencies described in the approved Testing and Monitoring Plan, and as required by this Permit. Reports must contain all the data and information required to be monitored, gathered and reported by this Permit and meet the requirements of 40 C.F.R. §§ 144.17, 144.51(l), 144.54(c), and 146.91.

1. Electronic Reporting – All reports, submittals, notifications, correspondence to the EPA, and records made and maintained by the Permittee under this Permit must be in an electronic format. The Permittee must electronically submit all required reports to an address or location as determined by the Director.
2. Semi-Annual Reports – The Permittee must submit reports on a semi-annual basis in accordance with 40 C.F.R. § 146.91(a). The reporting period for semi-annual reports will be from January 1 through June 30 and from July 1 through December 31. Reports must be submitted within 30 days of the end of each reporting period. Semi-annual reports must include all data collected on a continuous, daily, monthly, quarterly and semi-annual basis as described in the approved Testing and Monitoring Plan. The second semi-annual report for each year must include all data collected on an annual basis as described in the approved Testing and Monitoring Plan. Reports must contain the following information and data, as well as all other information and data collected not listed below, but as described in the approved Testing and Monitoring Plan:
 - (a) Any changes to the physical, chemical, and other relevant characteristics of the carbon dioxide stream from the proposed operating data;
 - (b) Monthly average, maximum, and minimum values for injection pressure, flow rate and daily volume, temperature, and annular pressure;
 - (c) A description of any event that exceeds operating parameters for annulus pressure or injection pressure specified in this Permit;
 - (d) A description of any event which triggers the shut-off systems required in Section K of this Permit pursuant to 40 C.F.R. § 146.88(e), and the response taken;
 - (e) The monthly mass of the carbon dioxide stream injected over the reporting period and the mass injected cumulatively over the life of the project;
 - (f) Monthly annulus fluid volume added or produced; and
 - (g) Results of the continuous monitoring required in Section N including:

- (i) A tabulation of: (1) daily maximum injection pressure, (2) daily minimum annulus pressure, (3) daily minimum value of the difference between simultaneous measurements of annulus and injection pressure, (4) daily mass of injectate, (5) daily maximum flow rate, and (6) average annulus tank fluid level; and
 - (ii) Graph(s) of the continuous monitoring as required in Section N of this Permit, or of daily average values of these parameters. The injection pressure, injection mass and flow rate, annulus fluid level, annulus pressure, and temperature must be submitted on one or more graphs, using contrasting symbols or colors, or in another manner approved by the Director.
- (h) Results of any additional monitoring identified in the Testing and Monitoring Plan and described in Section N of this Permit.

3. 24 Hour Reporting

- (a) The Permittee must report to the Director any permit noncompliance that may endanger human health or the environment and any events that require implementation of actions in the Emergency and Remedial Response Plan (Attachment F of this Permit). Any information must be provided orally within 24 hours from the time the Permittee becomes aware of the circumstances. Such verbal reports must include, but need not be limited to the following information:
 - (i) Any evidence that the injected carbon dioxide stream or associated pressure front may cause an endangerment to a USDW, or any monitoring or other information which indicates that any contaminant may cause endangerment to a USDW;
 - (ii) Any noncompliance with a permit condition, or malfunction of the injection system, which may cause fluid migration into or between USDWs;
 - (iii) Any triggering of the shut-off system required in Section K of this Permit (i.e., down-hole or at the surface);
 - (iv) Any failure to maintain mechanical integrity;
 - (v) Pursuant to compliance with the requirement at 40 C.F.R. § 146.90(h) for surface air/soil gas monitoring or other monitoring technologies, if required by the Director, any release of carbon dioxide to the atmosphere or biosphere; and

(vi) Actions taken to implement appropriate protocols outlined in the Emergency and Remedial Response Plan (Attachment F of this Permit).

(b) A written submission must be provided to the Director in an electronic format within five days of the time the permittee becomes aware of the circumstances described in Section O of this Permit. The submission must contain a description of the noncompliance or emergency, or remedial response and its cause; the period of noncompliance, emergency, or remedial response, including exact dates and times, and, if the noncompliance has not been corrected, the anticipated time it is expected to continue as well as actions taken to implement appropriate protocols outlined in the Emergency and Remedial Response Plan (Attachment F of this Permit); and steps taken or planned to reduce, eliminate and prevent recurrence of the noncompliance or emergency or condition requiring remedial response.

4. Reports on Well Tests and Workovers – Report, within 30 days, the results of:

- (a) Periodic tests of mechanical integrity;
- (b) Any well workover, including stimulation;
- (c) Any other test of the injection well conducted by the Permittee if required by the Director; and
- (d) Any test of any monitoring well required by this Permit.

5. Advanced Notice Reporting

- (a) Well Tests – The Permittee must give at least 30 days advance written notice to the Director in an electronic format of any planned workover, stimulation, or other well test.
- (b) Planned Changes – The Permittee must give written notice to the Director in an electronic format, as soon as possible, of any planned physical alterations or additions to the permitted facility. An analysis of any new injection fluid must be submitted to the Director for review and written approval at least 30 days prior to injection; this approval may result in a permit modification.
- (c) Anticipated Noncompliance – The Permittee must give at least 14 days advance written notice to the Director in an electronic format of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

6. Additional Reports

- (a) Compliance Schedules – Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this Permit must be submitted in an electronic format by the Permittee no later than 30 days following each schedule date.
- (b) Transfer of Permits – This Permit is not transferable to any person except after notice is sent to the Director in an electronic format at least 30 days prior to transfer and the requirements of 40 C.F.R. § 144.38(a) have been met. Pursuant to requirements at 40 C.F.R. § 144.38(a), the Director will require modification or revocation and reissuance of the permit to change the name of the Permittee and incorporate such other requirements as may be necessary under the SDWA. All FR cost estimates, documentation, and instruments as required by 40 C.F.R. § 146.85 and by Section H of this Permit must be updated and provided to the Director by any new owner of the well.
- (c) Other Noncompliance – The Permittee must report in an electronic format all other instances of noncompliance not otherwise reported with the next monitoring report. The reports must contain the information listed in Section O of this Permit.
- (d) Other Information – When the Permittee becomes aware of failure to submit any relevant facts in the permit application or that incorrect information was submitted in a permit application or in any report to the Director, the Permittee must submit such facts or corrected information in an electronic format within 10 days of discovery in accordance with 40 C.F.R. § 144.51(l)(8).
- (e) Report on Permit Review – Within 30 days of receipt of this Permit, the Permittee must certify to the Director in an electronic format that he or she has read and is personally familiar with all terms and conditions of this Permit.

7. Records and Record Retention

- (a) The Permittee must retain records and all monitoring information, including all calibration and maintenance records and all original chart recordings for continuous monitoring instrumentation and copies of all reports required by this Permit (including records from pre-injection, active injection, and post-injection phases) for a period of at least 10 years from collection.
- (b) The Permittee must maintain records of all data required to complete the permit application for this Permit and any supplemental information (e.g., modeling inputs for AoR delineations and reevaluations, plan modifications) submitted under 40 C.F.R. §§ 144.27, 144.31, 144.39, and 144.41 until least 10 years after site closure.

- (c) The Permittee must retain records concerning the nature and composition of all injected fluids until 10 years after site closure.
- (d) The retention periods specified in Section O of this Permit may be extended by request of the Director at any time. The Permittee must continue to retain records after the retention period specified this Section of the Permit or any requested extension thereof expires unless the Permittee delivers the records to the Director or obtains written approval from the Director to discard the records.
- (e) Records of monitoring information must include:
 - (i) The date, exact place, and time of sampling or measurements;
 - (ii) The name(s) of the individual(s) who performed the sampling or measurements;
 - (iii) A precise description of both sampling methodology and the handling of samples;
 - (iv) The date(s) analyses were performed;
 - (v) The name(s) of the individual(s) who performed the analyses;
 - (vi) The analytical techniques or methods used; and
 - (vii) The results of such analyses.

P. WELL PLUGGING, POST-INJECTION SITE CARE, AND SITE CLOSURE

The Permittee must maintain and comply with the approved Well Plugging Plan (Attachment D) and the approved Post Injection Site Care and Site Closure Plan (Attachment E) and must comply with the requirements of 40 C.F.R. §§ 146.92 and 146.93. The Well Plugging Plan and the Post-Injection Site Care and Site Closure Plan are enforceable conditions of this Permit.

1. Well Plugging Plan Revisions – If data indicates and the Permittee deems it necessary, or if the Director requires the approved plans in Attachments C and D of this Permit to be modified, revised plan(s) must be submitted in an electronic format to the Director for review and written approval. Any amendments to the Well Plugging Plan and/or the Post-Injection Site Care and Site Closure plan must be approved by the Director and must be incorporated into the permit and are subject to the permit modification requirements at 40 C.F.R. §§ 144.39 and/or 144.41.

2. Required Activities Prior to Plugging – The Permittee must flush the well with an inert buffer fluid, determine the post-injection bottom hole pressure, and perform final internal and external mechanical integrity tests prior to injection well plugging. The internal and external mechanical integrity tests must be performed as required by Section L of this Permit.
3. Notice of Plugging and Abandonment – The Permittee must notify the Director in writing in an electronic format pursuant to 40 C.F.R. § 146.92(c), at least 60 days before plugging, conversion or abandonment of the well. A shorter notice period may be allowed at the discretion of the Director.
4. Plugging and Abandonment Approval and Report
 - (a) The Permittee must receive written approval from the Director before plugging the well and must plug and abandon the well as required by 40 C.F.R. § 146.92, as described in the approved Well Plugging Plan (Attachment D of this Permit).
 - (b) Within 60 days after plugging, the Permittee must submit in an electronic format a plugging report to the Director. The report must be signed and certified by the Permittee per 40 C.F.R. § 144.32 and by the person who performed the plugging operation (if other than the Permittee.) The Permittee must retain the well plugging report in an electronic format for 10 years following site closure. The report must include:
 - (i) A statement that the well was plugged in accordance with the approved Well Plugging Plan (Attachment D of this Permit); or
 - (ii) If the actual plugging differed from the approved plan, a statement describing the actual plugging and an updated plan specifying the differences from the plan previously submitted and explaining why the Director should approve such deviation. If the Director determines that a deviation from the plan incorporated in this Permit may endanger underground sources of drinking water, the Permittee must replug the well as required by the Director.
5. Temporary Abandonment – After any 24 consecutive month period of no injection, the well is considered to be in a temporarily abandoned status, and the Permittee must plug and abandon the well in accordance with the approved Well Plugging Plan, 40 C.F.R. §§ 144.52 (a)(6) and 146.92 or make a demonstration of non-endangerment of this well that is satisfactory to the Director while it is in temporary abandonment status. Temporary abandonment status includes instances where well construction/conversion has begun but no authorization to commence injection has been approved by the Director. During any periods of temporary abandonment or disuse, the Permittee must continue to comply with the conditions of this Permit, including all monitoring and reporting requirements in

compliance with all of the requirements of this Permit and all applicable regulations. The Permittee of a well that has been temporarily abandoned must notify the Director prior to resuming operation of the well.

6. Post-Injection Site Care and Site Closure Plan – The Permittee must maintain and comply with the Post-Injection Site Care and Site Closure Plan in Attachment E of this Permit and comply with the requirements of 40 C.F.R. § 146.93. The Post-Injection Site Care period is the length of time anticipated to demonstrate that the carbon dioxide injection poses no threat to USDWs and is an enforceable condition of this Permit.
- (a) Upon cessation of injection, the Permittee must either submit in electronic format for the Director's approval an amended Post-Injection Site Care and Site Closure Plan or demonstrate through monitoring data and modeling results that no amendment to the plan is needed.
 - (b) At any time during the life of the project, the Permittee may modify and resubmit in an electronic format the Post-Injection Site Care and Site Closure Plan for the Director's approval per 40 C.F.R. § 146.93(a)(3). The Permittee may, as part of such modifications to the Plan, request a modification to the post-injection site care timeframe that includes documentation of the information at 40 C.F.R. § 146.93(c)(1).
 - (c) The monitoring as outlined in the approved Post-Injection Site Care and Site Closure Plan must define the position of the carbon dioxide plume and pressure front, provide a comparison of data collected to the predictions made by the AoR model, and demonstrate that USDWs are not being endangered per 40 C.F.R. §§ 146.90 and 146.93.
 - (d) Prior to authorization for site closure, the Permittee must submit to the Director for review and approval, in an electronic format, a demonstration, based on information collected pursuant to Section P of this Permit, that the carbon dioxide plume and the associated pressure front do not pose an endangerment to USDWs and that no additional monitoring is needed to ensure that the project does not pose an endangerment to USDWs, as required under 40 C.F.R. § 146.93(b)(3). The Director reserves the right to amend the post-injection site monitoring requirements (including an extension of the monitoring period) if there is a concern that USDWs are at risk of endangerment.
 - (e) The Permittee must notify the Director in an electronic format at least 120 days before site closure. At this time, if any changes to the approved Post-Injection Site Care and Site Closure Plan in Attachment E of this Permit are proposed, the Permittee must submit a revised plan.

- (f) After the Director has authorized site closure, the Permittee must plug all monitoring wells as specified in Attachments D and E of this Permit in a manner which will not allow movement of injection or formation fluids that endangers a USDW. The Permittee must also restore the site to its pre-injection condition.
- (g) The Permittee must submit a site closure report in an electronic format to the Director within 90 days of site closure. The report must include the information specified at 40 C.F.R. § 146.93(f).
- (h) The Permittee must record a notation on the deed to the facility property or any other document that is normally examined during a title search that will in perpetuity provide any potential purchaser of the property the information listed at 40 C.F.R. § 146.93(g). The Permittee must retain for 10 years following site closure an electronic copy of the site closure report, records collected during the post-injection site care period, and any other records required under 40 C.F.R. § 146.91(f)(4). The Permittee must deliver the records in an electronic format to the Director at the conclusion of the retention period.

Q. EMERGENCY AND REMEDIAL RESPONSE

The Emergency and Remedial Response Plan describes actions the Permittee must take to address movement of the injection or formation fluids that may cause an endangerment to a USDW during construction, operation, and post-injection site care periods. The Permittee must maintain and comply with the approved Emergency and Remedial Response Plan (Attachment F of this Permit), which is an enforceable condition of this Permit, and with 40 C.F.R. § 146.94.

1. If the data collected indicates evidence that the carbon dioxide plume and or pressure front may cause endangerment to a USDW, the Permittee must:
 - (a) Cease injection in accordance with Section K and Attachments C and/or F of this Permit;
 - (b) Take all reasonable steps necessary to identify and characterize any release from the underground injection system;
 - (c) Notify the Director within 24 hours; and
 - (d) Implement the approved Emergency and Remedial Response Plan in (Attachment F of this Permit) approved by the Director.
2. At the frequency specified in the Emergency and Remedial Response Plan (Attachment F of this Permit) and 40 C.F.R. § 146.94(d), the Permittee must review the Emergency and Remedial Response Plan and submit an amended Emergency and Remedial Response Plan

or demonstrate to the Director that no amended is needed, as required at 40 C.F.R. § 146.94(d). The amended Emergency and Remedial Response Plan or demonstration must be submitted to the Director in an electronic format at least once every five years, within one year of an AoR reevaluation, following any significant changes to the facility such as the addition of injection or monitoring wells, within six months following the occurrence of an emergency event under the Emergency and Remedial Response Plan, or when required by the Director. If the amendments to the Emergency and Remedial Response Plan cause the cost estimates to change, then new Financial Responsibility must be submitted for review and approval by the Director in accordance with Section H of this Permit.

3. Following each update of the Emergency and Remedial Response Plan or a demonstration that no update is needed, the Permittee must submit the resultant information in an electronic format to the Director for review and confirmation of the results. Once approved by the Director, the revised Emergency and Remedial Response Plan will become an enforceable condition of this Permit.

R. COMMENCING INJECTION

The Permittee may not commence injection until:

1. Results of the formation testing and logging program as specified in Section J of this Permit and in 40 C.F.R. § 146.87 are submitted to the Director in an electronic format and subsequently reviewed and approved by the Director;
2. Mechanical integrity of the well has been demonstrated in accordance with 40 C.F.R. § 146.89(a)(1) and (2), and in accordance with Section L of this Permit;
3. The completion of corrective action required by the Area of Review and Corrective Action Plan found in Attachment B of this Permit in accordance with 40 C.F.R. § 146.84;
4. All requirements at 40 C.F.R. § 146.82(c) have been met, including but not limited to reviewing and updating of the Area of Review and Corrective Action, Testing and Monitoring, Well Plugging, Post-Injection Site Care and Site Closure, and Emergency and Remedial Response plans to incorporate final site characterization information, final delineation of the AoR, and the results of pre-injection testing, and information has been submitted in an electronic format, reviewed and approved by the Director;
5. Construction is complete and the Permittee has submitted to the Director in an electronic format a notice that completed construction is in compliance with 40 C.F.R. § 146.86 and Section I of this Permit;
6. The Director has inspected or otherwise reviewed the injection well and all submitted information and finds it is in compliance with the conditions of the Permit;

7. The Director has approved demonstration of the alarm system and shut-off system under Section K of this Permit; and
8. The Director has given written authorization to commence injection.

ATTACHMENTS

This Part includes, but is not limited to, permit conditions and plans concerning operating procedures, monitoring, and reporting, as required by 40 C.F.R. Parts 144 and 146. The Permittee must comply with these conditions and adhere to these plans as they are approved by the Director by their incorporation into this Permit.

- A. SUMMARY OF OPERATING REQUIREMENTS**
- B. AREA OF REVIEW AND CORRECTIVE ACTION PLAN**
- C. TESTING AND MONITORING PLAN**
- D. WELL PLUGGING PLANS**
- E. POST-INJECTION SITE CARE AND SITE CLOSURE PLAN**
- F. EMERGENCY AND REMEDIAL RESPONSE PLAN**
- G. PRE-INJECTION TESTING PLAN**
- H. WELL CONSTRUCTION DETAILS**
- I. FINANCIAL ASSURANCE DEMONSTRATION**
- J. STIMULATION PROGRAM**
- K. QUALITY ASSURANCE AND SURVEILLANCE PLAN**