

FACT SHEET

Intent to Issue Class VI Underground Injection Control Permits for ExxonMobil Low Carbon Solutions Onshore Storage, LLC of Spring, Texas

Rose Carbon Capture and Storage Project Jefferson County, Texas

ExxonMobil Low Carbon Solutions Onshore Storage LLC has applied to the Railroad Commission of Texas (RRC) for a Class VI Underground Injection Control (UIC) permit to construct and operate injection wells for their Rose Carbon Capture and Storage (CCS) Project. The proposed injection wells will be located in Section 42, Abstract 874 in Jefferson County approximately 15 miles southwest of Beaumont, Texas. The locations of the wells are included in Table 1 below.

Table 1: Injection Well Locations

Well Name & No.	API No.	Latitude/Longitude (NAD 83)
LaBelle Props. Ltd. #1 (Rose CCS #01)	42-245-32913	29.999678/-94.285108
Bead Farm Co. #2 (Rose CCS #02)	42-245-32911	29.991017/-94.298036
Bead Farm #3 (Rose CCS #03)	42-245-32912	30.011778/-94.297858

BACKGROUND ON THE UNDERGROUND INJECTION CONTROL PROGRAM

Protecting Underground Sources of Drinking Water and Public Health

Storage or disposal of fluids (including gases) may be managed by injecting them underground using injection wells. Injection wells are regulated by the Underground Injection Control (UIC) program. The purpose of the UIC program is to protect underground sources of drinking water.

The U.S. Environmental Protection Agency (EPA) established the UIC program under the federal Safe Drinking Water Act.

Types of Injection Wells

More than 740,000 injection wells were regulated by the UIC program in 2018. Injection wells are found in all fifty states, territories, and tribal lands.

The UIC program classifies injection wells based on the type of fluids the well receives, the purpose of the injection, and where the fluid is injected relative to underground sources of drinking water.

- Class I wells are used to inject hazardous and nonhazardous waste into deep, confined rock formations below all underground sources of drinking water.
- Class II wells are used to inject fluids related to oil and gas production.

- Class III wells are used to inject fluids to aid in the extraction of minerals such as uranium, salt, copper, and sulfur.
- Class IV wells are allowed in limited circumstances for injection of groundwater treated as part of environmental cleanup.
- Class V wells are used to inject fluids that are not classified as Class I, II, III, IV, and VI. Fluids injected into Class V wells include stormwater and a wide variety of other fluids.
- Class VI wells are used to inject CO₂ deep underground for long-term storage.

On December 10, 2010, the Environmental Protection Agency (EPA) finalized federal requirements for the geologic storage of carbon dioxide (CO₂) under the authority of the UIC Program, creating a new class of injection well, Class VI. These requirements are designed to protect underground sources of drinking water based on the UIC Program regulatory framework with modifications to address the unique nature of CO₂ injection for the primary purpose of long-term storage.

The UIC program may be implemented by EPA or by states, territories, or tribes with EPA-approved primary permitting and enforcement authority. EPA is the acting regulatory authority in all States except those granted primary enforcement authority or Primacy. Under the federal UIC program, each State may apply for primacy by demonstrating, through application, to EPA that its Class VI UIC Program is at least as stringent as the federal standards. Texas has applied for but not yet been granted primacy by EPA for Class VI wells in Texas.

Class VI Injection Wells

Class VI wells are used to inject CO₂ into deep rock formations for the purpose of long-term underground storage, also known as geologic sequestration or geologic storage. When used as a part of carbon capture and storage and CO₂ removal projects, geologic storage is a promising tool for reducing the amount of CO₂ in the atmosphere. States and EPA ensure that these activities are permitted to protect underground drinking water and consider potential impacts to nearby communities.

Requirements for Class VI Wells

The UIC Class VI program provides safeguards to protect underground sources of drinking water. Persons who wish to inject CO₂ for the purpose of geologic storage must demonstrate that their injection well will meet stringent regulatory requirements and receive a Class VI permit for each well. The Class VI UIC program requires ExxonMobil to meet requirements to obtain a Class VI permit, including:

- Site characterization to ensure the geological formations in the project area will effectively contain the CO₂ within the zone where it will be injected.
- Modeling to define the area where the CO₂ will be stored over the lifetime of operation.
- Evaluation to ensure all potential pathways for fluid movement have been identified and addressed through corrective action.
- Well construction requirements to ensure the Class VI injection well will not leak CO₂.

- Testing and monitoring throughout the life of the project, including after CO₂ injection has ended. Requirements include testing to ensure physical integrity of the well, monitoring for seismic activity near the injection site, monitoring of injection pressure and flow, chemical analysis of the CO₂ stream that is being injected, and monitoring the extent of the injected CO₂ plume and the surrounding area (e.g., ground water) to ensure the CO₂ is contained.
- Operating requirements to ensure the injection activity will not endanger underground sources of drinking water or human health.
- Financial assurance mechanisms sufficient to cover the cost for all phases of the geologic storage project including the post injection site care period and until the Director approves site closure.
- Emergency and remedial response plans.
- Reporting of all testing and monitoring results to the permitting authority to ensure the well is operating in compliance with all permit and regulatory requirements.

The permitting authority ensures that these protective requirements are included in each Class VI permit.

Compliance

The UIC program works with injection well operators throughout the life of the well to confirm their practices do not contaminate underground sources of drinking water. The program conducts inspections to verify compliance with the UIC permit or other applicable requirements. The program verifies the following during an inspection:

- Proper well construction,
- No leaks from the well into the environment,
- Monitoring, recordkeeping, and reporting are conducted by the operator,
- Any required operating conditions are followed, and
- Proper well closure when operations end.

Inspections are only one way that the UIC program ensures compliance. The UIC program also evaluates periodic monitoring reports submitted by operators and discusses potential issues with operators. If a well is found to be out of compliance with applicable requirements in its permit or UIC regulations, the program will identify specific actions that an operator must take to address the issues. The UIC program may assist the operator in returning the well to compliance. Assistance may include discussing options or providing information to the operator. In some cases, enforcement may be necessary to return a well to compliance. Enforcement may include administrative or judicial processes.

THE SUBJECT DRAFT PERMITS

The RRC has prepared a draft permit and this Fact Sheet for this project.

ExxonMobil plans to inject approximately 4 million metric tons (1.36 MMT into each of the three injector wells) per annum (MMTPA) for 13 years. ExxonMobil plans to inject a cumulative total of 53 million metric tons (MMT) into the proposed wells over the 13-year injection period of the Rose CCS Project.

The source of the CO₂ ExxonMobil plans to inject will come from several large industrial emitters near the surface location of ExxonMobil Rose CCS facility. The CO₂ captured at the nearby industrial emitters will be compressed into a supercritical nearly-pure CO₂ fluid which will then be injected deep underground through the three injection wells.

ExxonMobil selected the locations of the proposed wells based on its research and used site-specific data to ensure that the CO₂ would be safely stored in the proposed injection formation. The proposed injection formations are the Fleming and Upper Frio sands, perforated in seven shale-separated injection intervals, where tops are ranging in depth between approximately 3,400 – 7,525 feet below ground level (BGL). The three deepest (Upper Frio) injection reservoirs are sealed below an approximately 400-foot thick layer of Anahuac Shale, and each of the four shallower Fleming injection reservoirs are overlain by individual intervening shale layers and are collectively top-sealed by an approximately 500-foot thick Upper Composite Confining Zone (UCCZ).

ExxonMobil will monitor the wells of the geologic storage facility during the 13-year injection period, and for 50 years after injection ceases, or until a demonstration of non-endangerment to underground sources of drinking water has been approved by the RRC.

How did the RRC make its tentative decision?

In reviewing the permit application, the RRC evaluated technical information and project-specific data, such as:

- Advanced computational modeling to determine the maximum extent of the CO₂ plume and pressure front defining the proposed project area;
- A detailed study of the local geology and the rock layers through which the proposed injection wells would be drilled to confirm that the CO₂ will stay where it is injected;
- The location of drinking water resources near the project and how they will be protected;
- The proposed construction design for the injection wells;
- The characteristics of the CO₂ to be injected;
- The proposed approach and technologies ExxonMobil would use to operate and monitor the project during and after injection;
- The financial resources ExxonMobil will have available to responsibly operate, monitor, and close the project; and
- ExxonMobil's approach to ensure that the project will protect underground sources of drinking water, public health, and the environment.

[Reasons why any requested variances or alternatives to required standards do or do not appear justified, if applicable.]

Technical Background and Details of ExxonMobil's Carbon Storage Project

The RRC's review of the permit application determined that the proposed injection would comply with the Class VI UIC regulations. Therefore, the RRC proposes to issue permits for the proposed injection wells. RRC regulations require that the RRC Class VI UIC permits for CO₂ storage specify conditions for the construction, operation, monitoring, reporting, plugging, post-injection site care, and site closure of Class VI injection wells. These conditions are designed to prevent the movement of fluids into any underground source of drinking water. Refer to Chapter 5, Subchapters A and B for the general provisions of Class VI UIC permits.

Information on the proposed activity and proposed permit conditions is provided below.

Area of Review and Corrective Action:

The Area of Review, or AoR, is the region surrounding the geologic storage project where underground sources of drinking water may be endangered by the injection activity (e.g., if there are any improperly sealed, completed, or abandoned wells that penetrate the confining zone that could provide a conduit for fluid migration). The Area of Review for the proposed well(s) is approximately 10.2 square miles and was delineated using a model that predicts the movement of the CO₂ plume and pressure front based on available information about planned injection operations and the subsurface rock formations.

Based on ExxonMobil's search of well records and aeromagnetic (well locator) survey, there were two pre-existing legacy wellbores within the Area of Review that required re-entry and proper plugging and abandonment by ExxonMobil because the wellbores penetrate the injection zone or confining layer and will not be used for injection or monitoring for the proposed injection project. RRC will review the plugging and abandonment plans for the well(s) and will require ExxonMobil to properly plug and abandon the wells before authorizing injection.

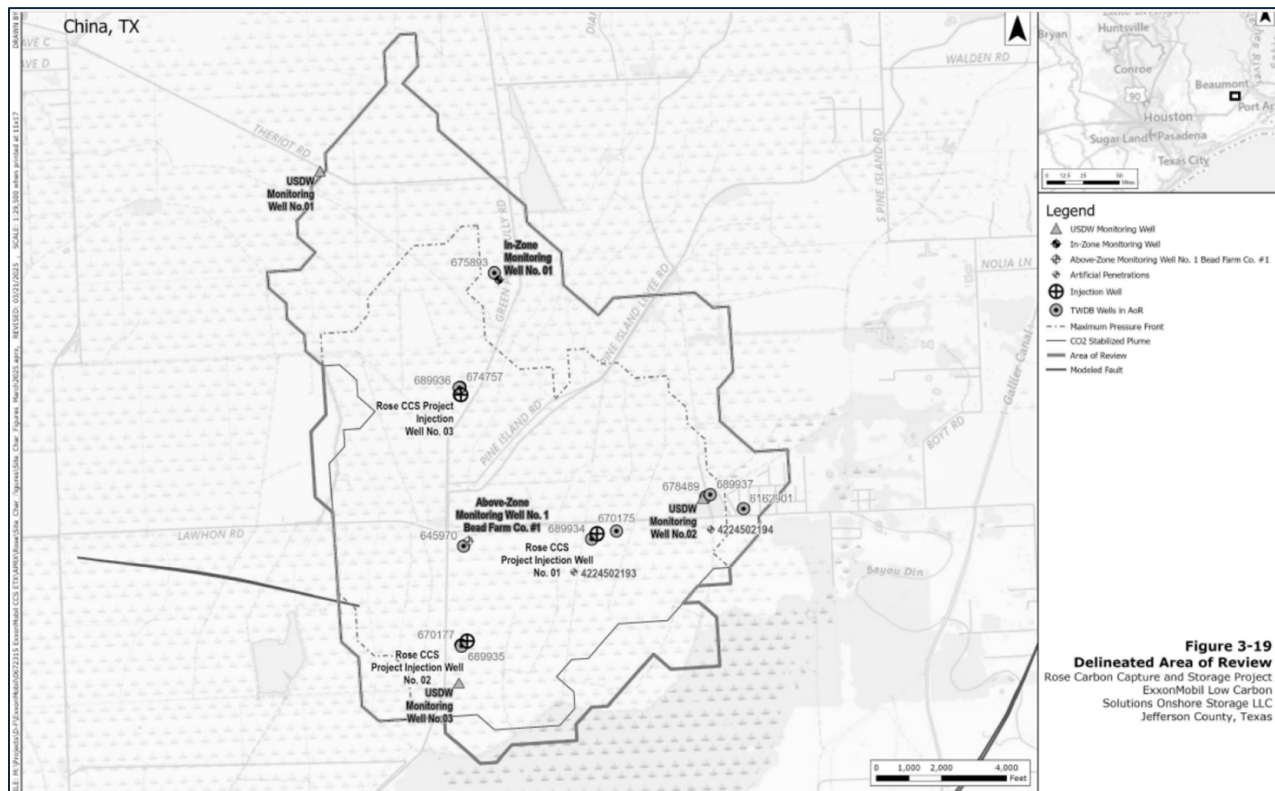
ExxonMobil will re-evaluate the Area of Review by assessing monitoring and operational data every five (5) years over the duration of the project to verify that the CO₂ plume and pressure front are moving as predicted. If any significant changes from the modeled predictions are detected, ExxonMobil will revise the project-specific plans described here, and RRC will modify the permit per 16 TAC §5.202(d)(2).

Underground Sources of Drinking Water:

Underground sources of drinking water are defined as aquifers or portions thereof which contain less than 10,000 milligrams per liter (mg/l) of total dissolved solids and are being used, or could be used, as a source of drinking water.

The lowest geologic unit in the Area of Review that has the potential to be an underground source of drinking water is the Evangeline Aquifer which is found at an average depth of 1,450 feet below the ground surface.

Figure 1. ExxonMobil Rose CCS Class VI UIC - Area of Review (AoR)



Injection and Confining Zone:

Injection for geologic storage is limited by the draft permit to the Upper Frio and Fleming formations between approximately 3,382 – 8,101 feet TVDSS. This zone is separated from the lowest formation that could be an underground source of drinking water by approximately 1,890 feet of rock, including a more than 500-foot-thick impermeable confining layer consisting of laterally continuous impermeable shales and tight silt that will act as a barrier to vertical fluid movement. The RRC has reviewed information provided by ExxonMobil, including maps, well logs, cores, and the results of seismic surveys, and determined that the regional and local geologic characteristics of the site will allow the Upper Frio and Fleming formations to receive the proposed volumes of injected CO₂ without fracturing either the injection reservoirs or the sealing intervals. The confining layers will provide suitable containment so that the CO₂ will remain in place and not endanger underground sources of drinking water.

Class VI Well Construction Requirements:

ExxonMobil proposes to drill 3 new wells Class VI injection wells. The proposed construction of the injection wells meets the regulatory criteria at 16 TAC §5.203(e). All Class VI wells must be constructed with materials and cements that can withstand exposure to CO₂ and CO₂/water mixtures over the life of the project. Class VI wells also must be cased and cemented to prevent the movement of fluids into or between underground sources of drinking water. These wells would be equipped with an automatic surface shut-off system that would shut off the well if any permitted operating parameters such as injection pressure diverge from permit limitations.

ExxonMobil may not commence construction, including drilling, of any new well until a final W-1 permit has been issued and is effective.

Injection Fluid:

The injected fluid would be greater than 97% pure CO₂. The ExxonMobil Rose CCS Project will collect concentrated CO₂ streams from third-party atmospheric emission points in the area surrounding their project site.

ExxonMobil plans to inject approximately 4 Million Metric Tons (MMT), 1.36 MMT into each of the three injector wells annually. ExxonMobil plans to inject a cumulative total of 53 MMT into the proposed wells over the 13-year injection period of the Rose CCS Project. During the course of this injection, ExxonMobil may propose that the RRC review additional sources of CO₂ for injection, as outlined in the draft permit, up to but not to exceed the maximum proposed permit limit of 53 MMT for the project. The RRC will review whether the chemical and physical characteristics of the CO₂ stream from any additional proposed source meet the permit requirements. The RRC will also review whether injecting CO₂ from any additional source(s) in the future would alter the project or permit requirements and result in the need for a major permit modification, including public notice.

Maximum Injection Pressure:

Before commencing injection at the Rose CCS site, ExxonMobil will perform pre-operational testing (per 16 TAC § 5.203(f)) to provide additional data on the injection and confining zones to further verify the information on which the permit application narrative is based. Injection for geologic sequestration at the Rose CCS site will be permitted only in the interval of two Upper Frio Sands and three Fleming Sands, which together range in depth from 3,545 feet to 8,522 feet TVD (KB) in Rose CCS No.01, from 3,583 feet to 8,588 feet TVD (KB) in Rose CCS No. 02, and from 3,469 feet to 8,406 feet TVD (KB) in Rose CCS No. 03. The designated primary confining zones for the project are the Anahuac Shale top-seal above the Frio Sands injection reservoirs, and three upper combined confining zones (UCCZ) that comprise seals within and over-lying the Fleming Sands injection reservoirs. The shallowest primary confining zone at the Rose CCS site is separated vertically in the subsurface from the deepest USDW by approximately 1,890 feet of geologic strata. Each of the three injector wells in this facility has a different depth-dependent maximum allowable bottomhole injection pressure (BHP) listed as follows:

- Maximum BHP 4,620 pounds per square inch (psi) in Rose CCS No. 01
- Maximum BHP 4,670 pounds per square inch (psi) in Rose CCS No. 02
- Maximum BHP 4,553 pounds per square inch (psi) in Rose CCS No. 03

These maximum allowable (not-to-exceed) bottomhole injection pressures ensure that the pressure during injection does not initiate fractures in the injection or confining zones and ensures that the injection pressure will not cause movement of injection or formation fluids into an underground source of drinking water.

Monitoring and Reporting Requirements:

The draft permit will implement an RRC-approved Testing and Monitoring Plan. The permittee is required to analyze the CO₂ stream quarterly to provide information about its chemical and physical characteristics. ExxonMobil is also required to demonstrate well integrity before injection begins and periodically throughout the duration of injection operations. ExxonMobil is required to conduct and pass a two-part mechanical integrity test, in accordance with 16 TAC §5.203(h) and §5.206(f), before the RRC will authorize ExxonMobil to start injecting.

After injection begins, ExxonMobil is required to:

- Continuously observe and record injection pressure, flow rate and volume, and the pressure on the annulus (the space between casing and tubing) to detect leaks in the casing, tubing, or packer.
- Annually demonstrate external mechanical integrity using a temperature or noise log or another approved method to detect any fluid movement behind the casing.
- Test the injection wells for signs of corrosion every quarter to provide early indication of any well material corrosion due to contact with CO₂ in the presence of water that could compromise the well.
- Monitor the environment near the wells to verify that the project and the injected CO₂ plume are behaving as predicted and that CO₂ is not migrating outside the injection formation. ExxonMobil will perform groundwater quality monitoring in shallow and deep wells quarterly to detect geochemical changes that may be a result of injection—such as leaching or mobilization of heavy metals and organic compounds or fluid displacement that could impact Underground sources of drinking water.
- Perform pressure fall-off testing at least every five years to verify that the injection zone is responding to injection as predicted.
- Track the movement of the CO₂ plume and pressure front using direct methods such as fluid monitoring of the injection zone and Underground sources of drinking water and pressure monitoring of the injection zone, and indirect methods such as seismicity monitoring and pulse neutron logging of well bores to verify that the CO₂ plume and pressure front are moving as predicted or to provide early indication if they are not.

The permittee will be required to submit results of this monitoring to the RRC semiannually or within 30 days of the completion of a mechanical integrity test or other required testing.

Emergency and Remedial Response:

As required by 16 TAC §5.203(n), ExxonMobil has prepared and submitted to the RRC for approval, a site-specific Emergency and Remedial Response Plan (ERRP) that identifies key resources / infrastructure in the Area of Review that must be protected.

The Emergency and Remedial Response Plan describes the responses that would be taken to address adverse events, and identifies the staff, equipment, and other resources available to support emergency and remedial response events. The emergency and remedial response provisions of the permit would facilitate expeditious responses and prevent or mitigate harm to public health and the environment, including underground sources of drinking water. The Emergency and Remedial Response Plan will be an enforceable part of the permit.

Financial Responsibility:

ExxonMobil has demonstrated, and will maintain, adequate financial responsibility to perform all needed corrective action on wells in the Area of Review, to plug the injection wells, to perform all required post-injection site care, to close the site, and to conduct any needed emergency and remedial response measures. The total initial cost estimates for these activities to be covered by the approved financial assurance mechanisms is \$23,631,000 in 2025 dollars. ExxonMobil will use a surety bond to cover costs and demonstrate financial responsibility.

The draft permits require the permittee to annually update cost estimates for the covered activities. These provisions ensure that resources are available to perform the required activities without using public funds.

Plugging and Abandonment:

The draft permits include an Injection Well Plugging Plan for environmentally protective well plugging at the cessation of injection operations. The wells will be plugged using approved materials that are compatible with CO₂/water mixtures to ensure that the wells will not serve as conduits for fluid movement into underground sources of drinking water.

Post-Injection Site Care and Site Closure:

The permittee will be required to implement a RRC-approved Post-Injection Site Care and Site Closure Plan. Following the cessation of injection, the permittee will be required to continue to monitor groundwater quality and track the position of the CO₂ plume and pressure front in a similar manner to what is described under “Monitoring and Reporting Requirements” above. This monitoring will help confirm predictions about the behavior of the CO₂ plume and pressure front (e.g., that pressures are subsiding after injection ceases) and provide early indication of any potential endangerment of underground sources of drinking water. The permittee will continue this post-injection site monitoring for a period of 50 years following the cessation of injection. At the end of the Post-Injection Site Care period, if site data support it, the RRC may authorize the permittee to close the site.

Following authorization to proceed with site-closure activities, the permittee will plug all monitoring wells with CO₂-compatible materials to ensure they cannot serve as conduits for fluid movement and will restore the site to its original condition.

COMMENT PERIOD

During the public comment period, any interested person may submit written comments on the draft permit and may request a hearing if one has not already been scheduled. The public comment period shall automatically be extended to the close of any public hearing under this section. The hearing examiner may also extend the comment period by so stating at the hearing.

PUBLIC HEARING

If the Commission receives a protest on the draft permits from a person notified pursuant to subsection (a) of this section or from any other affected person within 30 days of the date of receipt of the application by the RRC, receipt of individual notice, or last publication of notice, whichever is later, then the director will notify ExxonMobil that the director cannot

administratively approve the application. Upon the written request of ExxonMobil, the director will schedule a hearing on the application.

The director will hold a public hearing whenever the director finds, on the basis of requests, a significant degree of public interest in a draft permit. The director may also hold a public hearing at the director's discretion, whenever, for instance, such a hearing might clarify one or more issues involved in the permit decision.

Public notice of a public hearing shall be given at least 30 days before the hearing. Public notice of a hearing may be given at the same time as public notice of the draft permit and the two notices may be combined.

The RRC must give notice of a hearing to all affected persons, local governments, and other persons who express, in writing, an interest in the application. After the hearing, the examiner will recommend a final action by the RRC. Notices shall include information satisfying the requirements of 16 TAC §5.202(e) and the Texas Government Code, §2001.052.

Upon making a final permit decision, the director shall issue a response to comments. The response shall specify which provisions, if any, of the draft permit have been changed in the final permit decision, and the reasons for the change, and shall briefly describe and respond to all significant comments on the draft permit raised during the public comment period or during any hearing. The Commission shall post the response to comments on the Commission's internet.

At the hearing, you may provide oral statements regarding the Draft Class VI UIC Permits, and those statements will become part of the administrative record. The RRC will provide individuals up to two (2) minutes for comments to allow sufficient time for all commenters and may provide additional time depending upon the number of interested commenters. The RRC will treat written and oral comments the same.

We encourage those who wish to provide oral comments at the public hearing to pre-register, however, pre-registration is not required to provide comments at the hearing. Spanish interpretation services will be available at the hearing. The hearing will be transcribed and made available to the public.

What happens next in the permit process?

After the close of the public comment period, the RRC will review all comments before making a final decision on whether to grant the permits. The RRC will respond to all significant comments on the draft permits when the RRC makes a final permit decision.

Issuance and Effective Date of Permit:

If the RRC receives no protest regarding an application for a new permit or for the amendment of an existing permit for a geologic storage facility from a person notified pursuant to subsection (a) of this section or from any other affected person, the director may administratively approve the application.

The permit would become effective immediately upon issuance if no public comments are received that request a change in the draft permits. However, if the RRC receives public comments and decides to issue final permits, then the permits would become effective 45 days after the date of issuance.

In accordance with 16 TAC 5.206(o), the permits would be in effect for the duration of the project unless they are otherwise modified, revoked and reissued, or terminated as provided at 16 TAC §5.202(d). Authorization to inject under the permits may be granted following well construction and compliance with additional requirements as outlined in the permits and regulations at 16 TAC §5.203.

If the director administratively denies the applications for a geologic storage facility, upon the written request of ExxonMobil, the director will schedule a hearing. After hearing, the Hearings Examiners will recommend a final action by the Commission.

Administrative Record:

The full administrative record, including all data submitted by ExxonMobil in support of its permit application, is available for public review at the RRC's District 03 Office at the following address:

Railroad Commission of Texas
District 03 Office
1919 N Loop West, Suite 620
Houston, TX 77008
houston@rrc.texas.gov

The office is open 8:00 a.m. – 5:00 p.m., weekdays. To review the administrative record or for additional information please contact Peter Fisher (Director of RRC Oil and Gas Division – District 03) at phone: 713-869-5001, fax: 713-869-9621.

On the Web:

For more information about the project and draft Class VI UIC

Permits: <https://www.rrc.texas.gov/oil-and-gas/applications-and-permits/injection-storage-permits/co2-storage/co2-notices>