# FACT SHEET

## Intent to Issue Class VI Underground Injection Control Permit for Bayou Bend CCS, LLC Houston, TX

## Bayou Bend East SL20220050 Phase 1 Carbon Capture and Storage Project Texas State Waters Offshore Jefferson County, Texas

Bayou Bend CCS, LLC (Bayou Bend) has applied to the Railroad Commission of Texas (RRC) for Class VI Underground Injection Control (UIC) Permit Number 58339 to construct and operate five (5) injection wells for their Bayou Bend East SL20220050 Phase 1 (BBE-P1) Carbon Capture and Storage (CCS) Project. The proposed injection wells will be located at a facility situated within offshore Texas State Waters approximately 5 miles due south of Sabine Pass (Jefferson County, Texas). This seafloor location and associated subsurface pore space to be used for permanent carbon sequestration is owned by the State of Texas General Land Office, and was leased to Bayou Bend in 2022. The locations of the injection wells are shown in Table 1 below.

**Table 1 – Location of Injection Wells**

| Well Name & No. | Latitude (NAD83) | Longitude (NAD83) |
|---|---|---|
| SL20220050 #W 1 | 29.5920225° | -93.89526008° |
| SL20220050 #W 2 | 29.59201108° | -93.89528519° |
| SL20220050 #W 4 | 29.5920358° | -93.89528395° |
| SL20220050 #W 5 | 29.59203393° | -93.89523497° |
| SL20220050 #W 6 | 29.59200921° | -93.89523621° |

Bayou Bend plans to inject a cumulative total of 121.5 million metric tons (MMT) of carbon dioxide (CO2) into the proposed wells over the 20-year injection period of the BBE-P1 Project.

The CO2 that Bayou Bend plans to inject will come from onshore industrial emitters in the Beaumont-Port Arthur area west of the offshore BBE-P1 facility. The CO2 captured at the nearby industrial emitters will be compressed into a supercritical nearly pure carbon dioxide fluid which will then be injected deep below the seafloor through the five injection wells drilled from one offshore platform. Bayou Bend selected the locations of the proposed wells based on its research and used site-specific data to ensure that the carbon dioxide would be safely stored in the proposed injection formation.

In the area of the BBE-P1 facility, the proposed Lower Miocene Fleming injection zone is approximately 2,650 feet in average thickness and includes multiple sands within the Legarto and Oakville Formations (comprising the Fleming Group) ranging in depth between approximately 5,862 to 8,512 feet true vertical depth below sea level. This sequence of stacked sandstone rock layers has excellent porosity and permeability. The upper confining zone (top-seal above the injection reservoir) is the regionally extensive, low-permeability *Amphistegina-B* (*Amph-B*) marine shale layer which will prevent the upward migration of fluids. Bayou Bend will monitor the wells of the geologic storage facility during the 20-year injection period, and for 50 years after injection ceases, or until a demonstration of non-endangerment to underground sources of drinking water/surface water has been approved by the RRC.

***Technical background and details of Bayou Bend's Bayou Bend East carbon storage project:***
The RRC's review of the permit application has determined that the proposed injection will comply with the Class VI UIC regulations. Therefore, the RRC proposes to issue a permit for the BBE-P1 injection facility. RRC regulations require that the RRC Class VI UIC permits for carbon dioxide 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. However, an extensive investigation by the United States Geological Survey (USGS) using subsurface petrophysical formation water salinity data from hundreds of offshore wells, determined that no underground sources of drinking water (USDWs) exist below the seafloor in the area of the BBE-P1 injection facility. 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 are provided below.

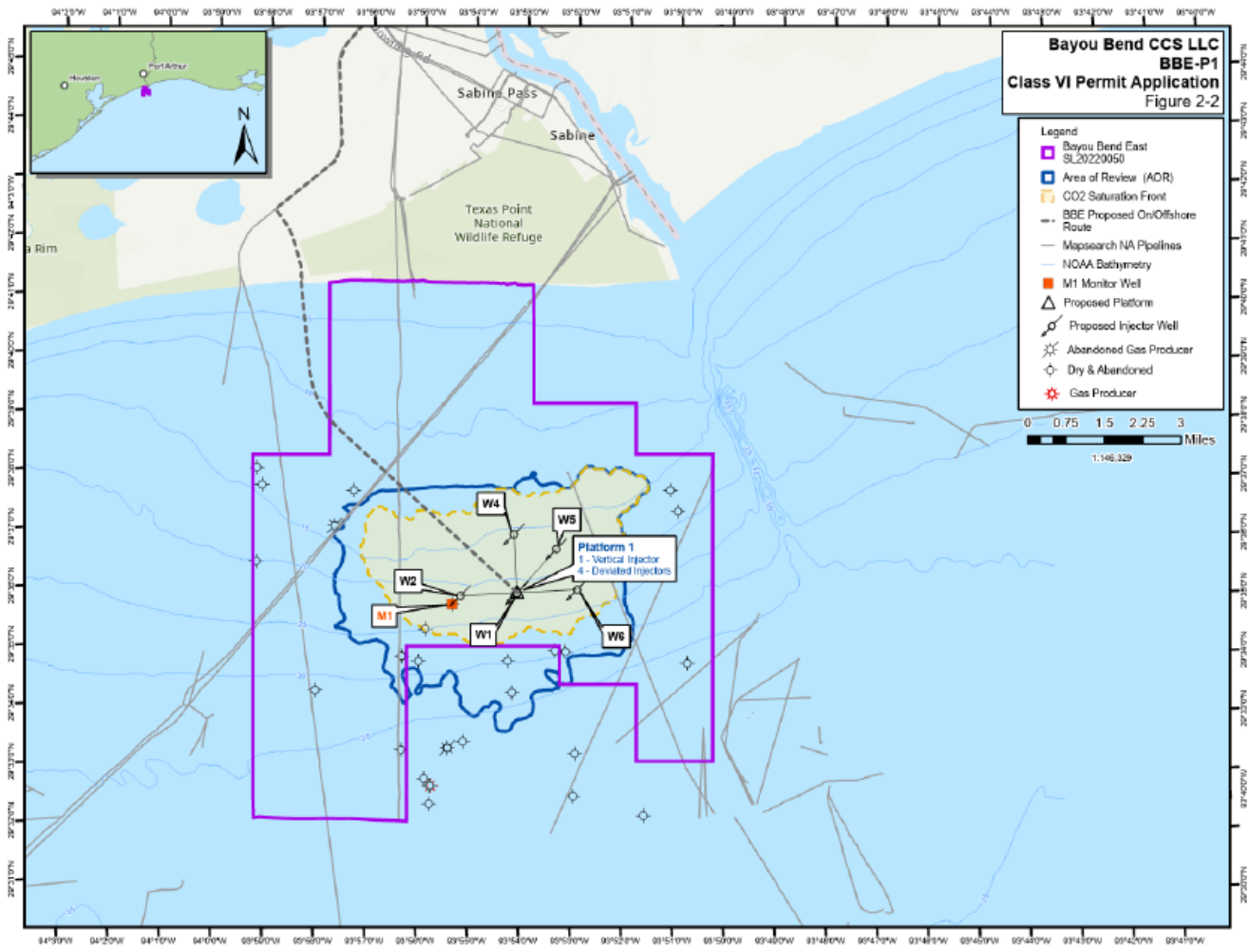
***Area of Review (AoR) and Corrective Action (CA):***
The AoR is the region surrounding an underground geologic storage project where the pressure in the injection/sequestration reservoir is predicted to be high enough to potentially displace CO2 or other fluids, vertically upward through any artificial penetrations (plugged and abandoned wells) to a potential USDW, or in this case the sea water-sea bottom interface. This could occur for example if there were any improperly sealed, improperly completed, or improperly abandoned wells near the injectors that penetrate the confining zone that could provide a vertical conduit for fluid migration. The AoR for the proposed wells encompasses approximately 22 square miles. This AoR was delineated using a detailed computer simulation of the injection reservoir that predicts the movement and final maximum areal extent of the carbon dioxide plume and the vertical endangerment threshold pressure front (defined by a subsurface pressure map isobar contour) based on available information about planned injection operations and the subsurface rock formations as shown below in Figure 1.

Based on Bayou Bend's search of well records and aeromagnetic survey, there are seven (7) pre-existing wellbores that penetrate the top-seal / confining zone within the AoRs. Of these seven (7) wellbores, five (5) wells are predicted to be located within the vertical endangerment threshold pressure front only, and two (2) wells are predicted to be located within both the CO2 saturation front and the vertical endangerment threshold pressure front. One of the two wells located within both the predicted CO2 saturation front and vertical endangerment threshold pressure front, is a stratigraphic test well drilled by Bayou Bend in 2024 for the BBE-P1 facility, which will be re-used by Bayou Bend as a monitoring well for the facility.

Six of the seven wells identified within the modeled pressure front were determined to be plugged in a manner that prevents movement of in-situ formation fluid (brine) to the seafloor, having adequate casing or cement barriers and/or the reported mud weight providing sufficient hydrostatic pressure to withstand the anticipated pressure elevation in the injection zone. One pre-existing legacy well will require Bayou Bend to attempt a subsea wellbore re-entry to confirm plugging integrity before that specific well location is encroached upon by the advancing CO2 injectate plume or pressure front.

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

**Figure 1. Bayou Bend East - Phase 1 Class VI UIC - Area of Review (AoR)**




***Underground Sources of Drinking Water (USDW):***
In 1988, the United States Geological Survey published 'Water-Resources Investigations Report 88-4082: Distribution of dissolved-solids concentrations and temperature in ground water of the Gulf Coast aquifer systems, south-central United States'. This USGS report provides maps and data from offshore wells, showing that no underground sources of drinking water (USDWs) exist below the seafloor in the area of the Bayou Bend BBE-P1 injection facility.

***Well Construction Requirements:***
Bayou Bend proposes to drill five (5) Class VI injection wells for the BBE-P1 facility. All aspects of the proposed design of the Bayou Bend East - Phase 1 injection-wells meet the regulatory criteria stipulated by 16 TAC §5.203(e). All Class VI wells must be constructed with materials and cements that can withstand exposure to carbon dioxide and carbon dioxide/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 USDW.

The BBE-P1 facility injection wells will be equipped with an automatic surface shut-off system that will shut off any of the wells if operating parameters - such as maximum allowable injection pressure or maximum allowable injection rate - diverge from permit limitations. Bayou Bend may not commence construction, including drilling, of any new well until a final W-1 permit has been issued and is effective.

***Injection Fluid:***
CO2 for injection will be sourced from industrial emitters in the area, who will be responsible for the capture and compression of the CO2. The physical and chemical characteristics of the injection stream are projected to be 96.5 mol% CO2, approximately 3 mol% N2 and 0.5 mol% CH4. The CO2 stream will be continuously monitored using an online analyzer downstream of the collection point at each facility. Physical samples of the gas will also be collected and sent to a laboratory.

***Maximum Injection Pressure:***
The Bayou BBE-P1 Project injector wells have maximum allowable bottomhole and surface injection pressures as shown in Table 2 below. These maximum allowable 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 USDW.

**Table 2: Maximum Permitted Injection Pressures**

| Well Name & No. | Top Inj. Interval, TVD (Feet) | Bottom Inj. Interval, TVD (Feet) | Max. Surface Injection Pressure (psi) | Max. Bottom Hole Injection Pressure (psi) |
|---|---|---|---|---|
| SL20220050 #W 1 | 6,240 | 9,118 | 2,725 | 5,526 |
| SL20220050 #W 2 | 6,152 | 8,835 | | 5,407 |
| SL20220050 #W 4 | 6,241 | 9,027 | | 5,501 |
| SL20220050 #W 5 | 6,313 | 9,077 | | 5,569 |
| SL20220050 #W 6 | 6,347 | 9,257 | | 5,629 |

***Monitoring and Reporting Requirements:***
The draft permit will implement an RRC-approved Testing and Monitoring Plan. The permittee is required to analyze the carbon dioxide stream quarterly to provide information about its chemical and physical characteristics. Bayou Bend is also required to demonstrate well integrity before injection begins and periodically throughout the duration of injection operations. Bayou Bend 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 Bayou Bend to start injecting.

After injection begins, Bayou Bend 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 carbon dioxide in the presence of water that could compromise the well.
- Monitor the environment near the wells to verify that the project and the injected carbon dioxide plume are behaving as predicted and that carbon dioxide is not migrating outside the injection formation.
- 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 carbon dioxide plume and pressure front using indirect methods such as time-lapse seismic monitoring to verify that the carbon dioxide plume and pressure front are moving as predicted or to provide early indication if they are not.

Bayou Bend 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 (ERR):***
As required by 16 TAC §5.203(n), Bayou Bend has prepared and submitted to the RRC for approval, a site-specific ERR Plan that identifies key resources/infrastructure in the AoR that must be protected.

The ERR 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 ERR provisions of the permit would facilitate expeditious responses and prevent or mitigate harm to public health and the environment. The ERR Plan will be an enforceable part of the permit.

***Financial Responsibility:***
Bayou Bend has demonstrated, and will maintain, adequate financial responsibility to perform all needed corrective action on wells in the AoR, 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 $121,044,409 in 2026 dollars. Bayou Bend is providing an irrevocable letter of credit 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 carbon dioxide/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 (PISCC):***
Bayou Bend will be required to implement the RRC-approved PISCC Plan. Following the cessation of injection, the permittee will be required to continue to monitor groundwater quality and track the position of the carbon dioxide 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 carbon dioxide plume and pressure front (e.g., that pressures are subsiding after injection ceases). 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 carbon dioxide-compatible materials to ensure they cannot serve as conduits for fluid movement and will restore the site to its original condition.

***Administrative Record:***
The full administrative record, including all data submitted by Bayou Bend 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
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 District Director 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