

Plan revision number: Revision 1
Plan revision date: December 2024

APPENDIX D

PRE-OPERATIONAL TESTING PROGRAM 40 CFR 146.82(A)(8) AND 146.87

Jasper County Storage Facility

1 FACILITY INFORMATION

Facility Name: Jasper County Storage Facility

Facility Contact: Claimed as PBI
501 Westlake Park Blvd., Houston, Texas 77079
Claimed as PBI

Well Location: Jasper County, TX

Claimed as PBI

2 INTRODUCTION

On June 28, 2023, BP Carbon Solutions LLC (BP) submitted this section of the Class VI application for the Jasper County Storage Facility (Site), and the application was deemed administratively complete on November 22, 2023. In this Revision 1, the Pre-Operational Testing Program has been refined based on technical changes to the application. The Area of Review (AoR) model has been updated to incorporate additional appraisal and offset well data, providing an enhanced understanding of the subsurface. This update is expected to reduce project risk by moving away from known faults within the AoR, minimizing the AoR extent, optimizing injection well operations, and reducing interactions with legacy wells.

BP intends to sequester carbon dioxide (CO₂) via Claimed as PBI

is estimated to be stored at the Site during the injection period. The calculations and supporting documentation for injection rates and volume are provided in **Appendix B** (Area of Review and Corrective Action Plan).

This Pre-Operational Testing Program describes the actions that BP will take in accordance with 40 CFR 146.82(a)(8) and 146.87 for the Site. The pre-operational formation testing program will be implemented at each injection well to assess the chemical and physical characteristics of the injection zone and confining zone, in compliance with 40 CFR 146.87. The data gathered in the pre-operational testing phase will be used to guide the scope of testing at each injection well and in-zone monitoring well during the injection and post-injection phases.

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The testing activities at the Site described in this section are limited to the pre-injection phase, with specific procedures referenced in **Appendix E** (Testing and Monitoring Plan). The Testing and Monitoring Plan also outlines testing and monitoring activities during the injection and post-injection phases.

The results of the testing activities will be documented in a “Pre-Operational Testing Narrative” report prepared by a knowledgeable log analyst and submitted to the Underground Injection Control (UIC) Program Director after the well drilling and testing activities have been completed and before the start of CO₂ injection operations.

After completing the pre-operational characterization and testing, the testing boreholes will be completed as injection wells. Mechanical integrity tests (MIT) will verify well construction and integrity.

The Site will include **Claimed as PBI**

and infrastructure related to construction, operations, and post-injection site care and closure.

Technologies and methodologies outlined in this Plan reflect current Best Available Techniques and Best Environmental Practices. Future technological advances and changes in scientific understanding may facilitate changes to the testing approach outlined in this Plan. If changes to the Best Available Techniques and Best Environmental Practices are planned, these changes will be communicated to the UIC Program Director prior to implementation.

3 PRE-INJECTION TESTING PLAN—INJECTION WELLS

The following tests and logs will be conducted during drilling, casing installation, and after casing installation of the injection wells in accordance with the testing required under 40 CFR 146.87(a), (b), (c), and (d).

3.1 Deviation Checks [40 CFR 146.87(a)(1)]

Deviation measurements will be conducted on each stand of drill pipe (approximately 90 feet) during construction of the injection well. Additionally, surveys will be completed for wellbore deviation if a pilot hole is to be used prior to reaming to a larger diameter and at final well total depth (TD). These surveys will include depth, inclination, and azimuth.

3.2 Tests and Logs During Drilling [40 CFR 146.87(a)]

During drilling of the surface casing hole section, spontaneous potential, gamma ray, resistivity, and density log data will be collected to TD to allow for formation evaluation and base of underground source of drinking water (USDW) determination and assessment. Additionally, measurement while drilling (MWD), mud logs, and cuttings data will be collected during drilling.

During drilling of the production hole sections across the confining and injection zones, BP will acquire gamma ray, resistivity, density, neutron, sonic, and fracture finding logs. Additionally, MWD, mud logs, and cuttings data will be collected during drilling of these sections.

Table 1 (Injection Well Data Acquisition Plan) below summarizes the types of drilling data acquisition planned for each hole section in the injection well.

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3.3 Tests and Logs Before, During, and After Casing Installation [40 CFR 146.87(a)(2)-(3)]

Resistivity, spontaneous potential, and caliper logs will be completed before the surface casing is installed and upon installation. Cement bond logs, variable density logs, and temperature logs will be completed for the injection well after the surface casing has been cemented in place. Before the long-string casing is installed and upon installation, resistivity, spontaneous potential, porosity, caliper, gamma ray, and fracture finder logs will be completed. Cement bond logs, variable density logs, and temperature logs will be completed for the injection well after the long-string casing has been cemented in place. Log data will be managed in accordance with the quality assurance procedures outlined in **Section B.10** (Data Management) of **Appendix E** (Quality Assurance and Surveillance Plan).

Additionally, necessary baseline mechanical integrity testing will be performed to demonstrate internal and external mechanical integrity of the casing of the injection well. These logs will provide a baseline measurement for the Site that will be used to measure against for future injection measurements. Further details on procedures for specific tests and logs can be found in **Section 8.2** (Testing Details – Description of MITs That May Be Employed) of **Appendix E** (Testing and Monitoring Plan).

3.4 Demonstration of Mechanical Integrity [40 CFR 146.87(a)(4)]

Below is a summary of the MIT and pressure fall-off tests to be performed prior to injection as required under 40 CFR 146.87(a)(4). The MIT will be performed during and at the end of well construction to demonstrate internal and external mechanical integrity of the well. Proposed external MIT testing procedures can be found in **Section 8** (External Mechanical Integrity Testing) of **Appendix E** (Testing and Monitoring Plan). Proposed pressure fall-off testing procedures are provided in **Section 9** (Pressure Fall-Off Testing) of **Appendix E** (Testing and Monitoring Plan).

BP will notify the UIC Program Director at least 30 days prior to conducting the logging and testing described in **Table 2** (Pre-Operational Testing Schedule) and will provide a schedule and detailed description of the testing and logging procedures, in accordance with 40 CFR 146.87(f). Notice and the opportunity to witness these tests/logs will be provided to the UIC Program Director at least 48 hours in advance of a given test/log.

Table 2. Pre-Operational Testing Schedule

Class VI Rule Citation	Rule Description	Test Description	Program Period
40 CFR 146.89(c)(2) and 146.87(a)(4)	MIT—External	Temperature Log Using Wireline	Prior to operation
40 CFR 146.89(c)(2) and 146.87(a)(4)	MIT—External	Noise Log	Prior to operation
40 CFR 146.89(c)(2) and 146.87(a)(4)	MIT—External	Oxygen Activation	Prior to operation
40 CFR 146.87(e)(1)	Reservoir	Pressure Fall-Off Test Procedure	Prior to operation
40 CFR 146.87(a)(4)	MIT—Internal	Annulus Pressure Test	Prior to operation

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Class VI Rule Citation	Rule Description	Test Description	Program Period
40 CFR 146.87(a)(4)	MIT—External	Casing Inspection Log	Prior to operation
40 CFR 146.87(e)(2) and (3)	Reservoir	Injectivity or Pump Test	Prior to operation

Notes:

MIT – mechanical integrity testing

3.5 Core from the Injection and Confining Zones [40 CFR 146.87(b)]

Whole-core and rotary sidewall core plugs were acquired across the injection and confining zones in the appraisal well (BP America A469 #1). Over 500 feet of whole core was acquired across the confining zones and primary injection zone and over 100 rotary sidewall cores. The data obtained from these cores is necessary to inform the ability to safely inject and store CO₂ into the prospective formations within the AOR and has been incorporated into the AOR model.

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However, if geologic anomalies are identified, BP may consider acquiring additional core data.

As required by 40 CFR 146.87(b), BP will submit to the UIC Program Director a detailed report prepared by a log analyst that includes well log analyses, core analyses, and formation fluid sample information.

3.6 Annulus Pressure Test Procedures for Injection Well

Following each injection well's completion, which includes the installation of tubing, packer, and annular fluid, the internal mechanical integrity of each well will be tested by conducting a Standard Annulus Pressure Test (SAPT). The SAPT is a short-term test where the fluid in the annular space between the tubing and casing is pressurized, the well is shut-in, and the pressure of the annular fluid is monitored for leak-off.

3.7 Pressure Fall-Off Test for Hydrogeologic Characteristics of the Injection Zone [40 CFR 146.87(e)]

Baseline pressure fall-off tests and/or injectivity tests will be conducted according to the procedures in **Appendix E** (Testing and Monitoring Plan). Each test will be conducted after well completion but prior to operation of the well. The objective of this testing is to establish the baseline near wellbore performance to be able to periodically monitor for changes that would impact injectivity or cause injection pressures to increase.

4 PRE-INJECTION TESTING PLAN—DEEP MONITORING WELLS

At the time of the submission, pre-injection testing for deep (i.e., in-zone and/or intermediate) monitoring wells is not a requirement. However, if requested by the UIC Program Director, BP will provide a specific plan for the deep monitoring wells.

5 RESERVOIR PRESSURE, FRACTURE PRESSURE, AND FORMATION FLUID MEASUREMENTS [40 CFR 146.87(c) AND (d)]

The reservoir pressure, fluid temperature, pH, conductivity, and static fluid levels of the injection zones will be measured during the construction of the injection wells. The formation fluid samples from the injection zone will be collected using a bottomhole sampler or swabbing the well. The samples will be collected, transported, and analyzed in accordance with the quality assurance procedures outlined in **Section B.3** (Sample Handling and Custody) of **Appendix E** (Quality Assurance Surveillance Plan). The samples will be analyzed for salinity, pH, and conductivity. Additional parameters may be used to identify specific physical and chemical characteristics of the fluids and injection zone.

The reports prepared for each injection well in accordance with 40 CFR 146.87(a) will provide a summary of observations from the logs, core data, and various measurements, including measurements or estimates of fracture pressure and other physical/chemical characteristics of the confining and injection zones and fluids.