

Application Number: 45054
Plan Revision: December 2025

ATTACHMENT E

PRE-OPERATIONAL WELL TESTING PLAN

1. FACILITY INFORMATION

Facility name: River Parish Sequestration – RPN 1
RPN-1-INJ

Facility contact: Andrew Chartrand, VP, Regulatory and Environmental
1333 West Loop South, Suite 810, Houston, TX 77027
832-696-0052, andrew.chartrand@blueskyinfrastructure.com

Well name/location: RPN-1-INJ, Ascension Parish, Louisiana

Table 1-1: Proposed well locations in RPS North Fairway

Well Name	Latitude (NAD27)	Longitude (NAD27)
RPN-1-INJ	30° 6' 09.04" N	91° 3' 45.37" W
RPN-1-AZ	30° 6' 09.42" N	91° 3' 44.97" W
RPN-1-WS1	30° 6' 30.32" N	91° 3' 16.35" W
RPN-1-WS2	30° 5' 45.04" N	91° 3' 34.04" W
RPN-1-WS3	30° 6' 10.34" N	91° 4' 19.84" W

2. INTRODUCTION

The RPN-1-INJ will be a newly drilled well that will be constructed to Environmental Protection Agency (EPA) and Louisiana Department of Conservation & Energy (C&E) Class VI standards. The testing activities at the RPN-1-INJ facility described in this attachment satisfy the requirements of LAC 43:XVII.3617.B and 40 CFR 146.87 and are restricted to the pre-injection phase. RPS will provide a descriptive report prepared by a knowledgeable log analyst that includes an interpretation of the results of the tests and logs described herein, as required by LAC 43:XVII.3617.B.1 and 40 CFR 146.87(a). Testing and monitoring activities during the injection and post-injection phases are described in the Testing and Monitoring Plan (**Attachment F**), along with other non-well related pre-injection baseline activities such as geochemical monitoring. The locations of the injection well and monitoring wells are given in **Table 1-1**.

3. PRE-INJECTION TESTING PLAN – INJECTION WELL

The following tests and logs will be conducted during drilling and casing installation, as well as after casing installation in accordance with the testing required under LAC 43:XVII.3617.B and 40 Code of Federal Regulations (CFR) 146.87(a), (b), (c), and (d). The tests and procedures are described below and in Section 5 of the **Application Narrative**.

3.1. **Deviation Checks**

Deviation measurements will be conducted approximately every 500 feet during construction of the well.

3.2. **Coring**

Conventional whole cores will be collected from the injection zone and confining zone. At least three sections at approximately 30-60 ft long, 4-in diameter, will be collected and analyzed externally for petrophysical and geomechanical properties. Whole cores will be collected from at least the primary upper confining layer, the first injection interval, and the basal confining layer. The exact depths and footage will be determined based on acquisition and drilling information.

3.3. **Tests and Logs**

Tests and logs to be performed during drilling of the injection well are given in **Table 3.3-1**, including each test's target data objectives. Tests and logs to be performed during and after casing installation in the injection well are given in **Table 3.3-2**, including each test's target data objectives.

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Table 3.3-1: Injection Well Open Hole Logging Plan

CARBON SEQUESTRATION / INJECTION WELL					
RPN-1-INJ					
OPEN HOLE LOGGING PLAN					
Trip	Hole Section	Logging Suite	Target Data Acquisition	Open Hole Diameter	Depths of Survey
1	Surface Casing	Gyro Survey	Directional survey	17-1/2 in	Surface – 2,800 ft
		(Survey - prior to POOH)			
2		Gamma Ray	Identification of Rock Properties		
		HDIL/SP (Resistivity)			
		Density Log			
		Pulse Neutron Log			
		Temperature			
		Mud Logging			
3		Deep Shear-Wave	Dynamic Geomechanical Properties Synthetic Ties Aid in Cement Calcs		
		Sonic/Acoustic			
		Orientation Log			
		Multi-Arm Caliper			
	Gamma Ray				
	Temperature				
4	Production Casing	Gyro Survey	Directional survey	12-1/4 in – 10-3/4 in	2,800 ft – 10,385 ft
		(Survey – prior to POOH)			
5		Spectral Gamma Ray	Identification of Rock Properties		
		HDIL/SP (Resistivity)			
		Density Log			
		Neutron Log			
		Temperature			
		Mud Logging			
6		Deep Shear-Wave	Synthetic Ties Deep Shear-Wave Imaging Aid in Cement Calcs		
		Sonic/Acoustic			
		Orientation Log			
		Multi-Arm Caliper			
		Gamma Ray			
		Temperature			
7		Rotary Sidewall Cores	Augment Whole Core Data	12-1/4 in – 10-3/4 in	2,800 ft - 10,385 ft
8		Extended-Range Resistivity Imaging	Structural Dip Analysis		
		Ultrasonic Borehole Imaging	Max and Min Stress Regimes		
		Gamma Ray			
		Temperature			
		9	Magnetic Resonance		
Formation Lithology	In-Situ Minerology				
Gamma Ray					
Temperature					
10		Formation Fluid Sampling			
11		Formation Pressure Testing			

ft: foot or feet

HDIL/SP: high-definition induction log/spontaneous potential

in: inch or inches

POOH: pull out of hole

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Table 3.3-2: Injection Well Cased Hole Logging Plan

CARBON SEQUESTRATION / INJECTION WELL					
RPN-1-INJ					
CASED HOLE LOGGING PLAN					
Trip	Hole Section	Logging Suite	Target Data Acquisition	Casing Dimension	Depths of Survey
1	Surface Casing	Radially Investigative Cement Bond Log	Cement Bond Investigation	13-3/8 in	Surface – 2,800 ft
		Gamma Ray			
		CCL			
		Temperature			
2		Radially Investigative Cement Bond Log	Cement Bond Investigation		
		Gamma Ray			
		CCL			
		Temperature			
3	Production Casing	Caliper	Roundness and Ovality	9-5/8 in x 7 in (Tapered String)	10,385 ft - Surface
4		Magnetic Flux Leakage	Corrosion Identification (Carbon Steel)		
5			Fiber Optic Cable Location		
6		Ultrasonic Casing Inspection	Corrosion Identification (CRA)		
7	Tubing & Packer	Pulse Neutron	Gas Movement Behind Pipe		
		Multi-Barrier Casing Inspection	Corrosion Identification (Through Tubing)	7 in	4,620 ft – Surface

CCL: casing collar log

CRA: corrosion resistant alloy

3.3.1. Open Hole Formation Fluid and Mini Fracture Testing

Before setting the production casing string, samples of the injection zone formation fluid and the fracture pressure of the primary confining zone will be obtained by running an open-hole fluid recovery tool and conducting a mini fracture test. Fluid recovery sections will be determined based on open-hole evaluations. The reservoir pressure and static fluid level of the injection zone will be recorded. Fluid samples from the injection zone will be analyzed by an external laboratory for salinity, pH, conductivity, and other potential properties of interest to determine physical and chemical characteristics of the formation fluids. The mini fracture test will be performed within the primary confining layer interval. Additional confining layers may also be tested, depending on results from mini fracture testing at the stratigraphic test well.

The open-hole fluid recovery tool will be chosen based on vendor recommendation. The most recent open-hole fluid recovery tools are modular systems that typically consist of a hydraulic sonde and probe module, pumpout and flow control modules, a real-time fluid analyzer module, and one or more sample chamber modules. Liquid components are identified using near-infrared spectroscopy, and gas is detected with the measurement of polarized light reflection. The primary probe modules may contain variable-rate and volume pretest chambers, flowline fluid resistivity measurement, temperature sensors, and pressure gauges. Sample fluids and mud filtrate levels are accurately monitored in the flowline by the fluid analyzer modules. The basic tool can be combined with one or more sample chamber modules to accommodate varying sample quantity and volume requirements. Since these tools are fully modular, they will run a dual-packer configuration, which is inflatable by the pumpout modules, or in some cases, controllable from the surface. These packers allow an interval of formation to be isolated, creating a greater drawdown area. This reduces the load on the formation, which could aid in pumping out invaded filtrate with a lower risk of collapsing the sand face, as well as reduces the chance of making a localized pressure

decrease that goes below the formation fluid bubble point. The isolation of an interval of the formation allows for mini fracture tests to be performed.

After identifying a zone from which the fluid sample is to be recovered, and communication has been made to the formation, sampling will be conducted by pumping formation fluid through the tool to the borehole until an uninvaded reservoir fluid sample is reached, and then subsequently flowing the uninvaded reservoir fluid into the sample chambers within the tool. The first fluid to flow is typically mud filtrate from the near-borehole environment. Depending on a number of factors, such as the filtrate invasion depth and time spent pumping, the sample will contain a mixture of mud filtrate and virgin formation fluid. The objective is to obtain formation samples with sufficiently low levels of mud filtrate contamination (uninvaded) for pressure, volume, and temperature (PVT) analysis. To do so, the tool's real-time fluid analyzer modules can use a combination of visible and near-infrared absorption spectrometry to record the intensity of light transmitted through flowline fluid at various wavelengths. Photodiode detectors measure the reduction in light intensity due to the fluid flowing in the flowline. The observed light transmission is controlled by the amount of light both scattered and absorbed in the fluid sample. In the spectrometer measurement, the transmission is characterized by the optical density of the fluid. The reduction in light transmission scales exponentially with the optical density of the fluid.

As the formation for wellbore/drilling fluid invasion is deep, a large volume of mud filtrate may have to be removed before sufficient representative formation fluid is pumped into the sampling tool. The pump is operated until the optical spectrometer measurements indicate that the mud filtrate level has stabilized at a low value. At that time, the flowline fluid is routed to the sample chamber.

Once collected, this tool configuration allows samples to be brought to the surface at reservoir conditions. The technique involves over-pressuring the samples after they are taken at reservoir conditions. Sample chambers are pressurized with a nitrogen gas chamber, thereby allowing compensation for the temperature-induced pressure drop as the samples are returned to the surface. The nitrogen will be isolated from the sample chamber and act on the sample through a piston floating on a buffer fluid. This avoids any nitrogen contamination of the sample fluid. The pressurized gas charge maintains pressure in the sample chamber, ensuring that the sample remains above the bubble point line. Once brought to the surface, sample chambers are transported to the PVT laboratory for analysis.

An open-hole interval within the primary confining layer will be isolated to perform a mini fracture test to evaluate fracture pressure. The mini fracture test will be conducted according to vendor standard operating procedures. Using the onboard pump-out modules and a high precision pressure gauge, the pressure of fluid between the packers will be increased until microfractures are created, with the pressure recorded. Once fractured, the pumps will be shut off and the following pressure decrease will be measured as a pressure fall-off test. Following the test, the packers will be released and the tool moved to the next identified testing interval, if applicable.

3.4. Demonstration of Mechanical Integrity

Table 3.4-1 provides a summary of the mechanical integrity tests (MITs) and other tests to be performed prior to injection.

Table 3.4-1: Pre-Operational Testing Schedule

Class VI Rule Citation	Rule Description	Test Description	Program Period
LAC 43:XVII.3627.A.1.a and 40 CFR 146.89(a)(1)	MIT - Internal	Annulus pressure test	Prior to operation
LAC 43:XVII.3627.A.1.a and 40 CFR 146.87(a)(4)	MIT - External	Temperature log	Prior to operation
LAC 43:XVII.3627.A.1.a and 40 CFR 146.87(a)(4)	MIT - External	Noise Log	Prior to operation
LAC 43:XVII.3627.A.1.a and 40 CFR 146.87(a)(4)	MIT - External	Pulse Neutron-Capture (PNC)/Residual Saturation Tool (RST)	Prior to operation
LAC 43:XVII.3627.B.5.c and 40 CFR 146.87(e)(3)	Testing prior to operating	Step rate injectivity test	Prior to operation

3.4.1. Internal Mechanical Integrity Testing – Annulus Pressure Test

River Parish Sequestration, LLC (RPS), will conduct an annular pressure test (internal MIT) after the well has been completed before the start of injection. The annular pressure test will demonstrate mechanical integrity of the casing, tubing, and packer. This test will be conducted by pressuring the annulus to a minimum of 500 psi fluid pressure, then using a block valve to isolate the test pressure source from the test pressure gauge upon test initiation, with all ports into the casing annulus closed except the one monitored by the test pressure gauge. The test pressure will be monitored and recorded for a minimum duration of 60 minutes using a pressure gauge with sensitivities that can indicate a loss of 5%. A lack of mechanical integrity is indicated by any loss of test pressure exceeding 5% during a minimum elapsed period of 60 minutes.

Annulus Pressure Test Procedures for Injection Well:

1. RPS will comply with all reporting and notification provisions.
 - a. UIC Director and EPA will be notified 30 days in advance of planned testing efforts per LAC 43:XVII.3617.B.6 and 40 CFR 146.87(f).
2. Mobilize onto location with test unit and Nitrogen (N₂) system.
3. Conduct pre-job job safety analysis (JSA) over wellsite conditions and operational hazards.
4. Record initial N₂ pressure on annulus, then isolate and disconnect the N₂ bottle bank from casing annulus
5. Take a fluid shot to verify the inhibited fluid level in the annulus, record level
6. Rig up N₂ system to wellhead casing annulus.

7. Slowly pressure casing to 500 psig in a controlled manner through a choke or other valving to ensure the casing is not overpressured. Once at 500 psig begin test.
 - a. A block valve will be used to isolate the test pressure source from the test pressure gauge upon test initiation, with all ports into the casing annulus closed except the one monitored by the test pressure gauge.
8. Monitor and record test on chart recorder for a minimum duration of 60 minutes using a pressure gauge with sensitivities that can indicate a loss of 5%.
 - a. A decline of test pressure exceeding 5% over 60 minutes indicates a lack of mechanical integrity.
9. Bleed off annulus pressure to 0 psi.
10. Rig down N₂ system and reconnect the N₂ bottle bank.
11. Reestablish annulus pressure to the value recorded in step 4.
12. Demobilize.

3.4.2. External Mechanical Integrity Testing

RPS will perform an external MIT by conducting a temperature log via wireline and the fiber optic cable installed behind the 9-5/8-inch x 7-inch-long string casing. Temperature logs will be run before initiating injection operations to establish a baseline against which future logs can be compared. The well will be shut in for a duration of approximately 36 hours before running the temperature logs to allow temperatures to stabilize. Additional wireline logs will be collected to provide a baseline for alternate MITs conducted during and post-injection. These logs include a noise log and pulsed neutron-capture (PNC)/residual saturation tool (RST) log. Satisfactory mechanical integrity is demonstrated by proper correlation between the baseline and subsequent logs.

Testing Method

The following general procedure will be followed for wireline logs:

- Move in and rig up wireline logging unit. Assemble the temperature, noise, or pulse neutron-capture logging tools.
- Rig up wireline pressure control equipment and test for leaks.
- Run in the hole with tools to plug back total depth and log to surface per industry-cased hole logging standards.
- Recover tools and rig down.
- Interpret log results.

3.4.3. Pressure Fall-off Testing

RPS will perform a required pressure fall-off test every five years. Following the commencement of injection, the first fall-off test will be performed within a year from the start of injection in RPN-1 through the first stage perforations between 9,987 and 10,157 ft MD. RPS may change the first stage perforation interval after it determines the optimal interval from logs that it will collect from RPN-1. RPS will continue monitoring the pressure fall-off until sufficient data has been collected to analyze the radial flow regime. The test will measure near-wellbore formation properties and monitor for near-wellbore environmental changes that may impact injectivity and result in pressure increases.

Testing Method

The well's injection rate will be held as constant as possible before the beginning of the test, and continuous data will be recorded during testing. Once the well has been shut in, RPS will measure continuous fall-off pressures via the casing-conveyed pressure gauges. The fall-off period will end once the pressure decay data has stabilized, indicating radial flow conditions have been reached.

RPS will notify the UIC Director and EPA at least 30 days before conducting the test and provide a detailed description of the testing procedure. Notice and the opportunity to witness these tests/logs shall be provided at least 48 hours in advance of a given test/log.

3.4.4. Initial Step Rate Injectivity Test

Before commencing CO₂ injection, RPS will conduct a step-rate injectivity test to measure the fracture gradient at RPN-1-INJ through the first stage perforation interval between 9,987 and 10,157 ft MD. The casing-conveyed pressure and temperature gauge will continuously record the downhole pressure and temperatures before and throughout the injectivity test.

Testing Method

The injection rates will be stepped up incrementally up to a rate of 50% above the maximum permitted rate, with a goal of at least three measurements taken both below and above the estimated formation fracture initiation pressure, which is determined once reservoir properties have been established. Each stage will require a hold duration for a minimum of 30 minutes. Upon reaching a stabilized pressure after completing the final step, RPS will shut down the pumps and continue recording pressures at a high frequency for a period indicated by the step-up phase of testing to calculate the rate of pressure bleed off.

RPS will notify the UIC Director and EPA at least 30 days before conducting the test and provide a detailed description of the testing procedure. RPS will provide notice and the opportunity to witness these tests/logs at least 48 hours in advance of a given test/log.

Initial Step Rate Injectivity Test Procedure:

1. Before testing, shut in the well long enough (not less than 48 hours) to allow the bottom hole pressure to stabilize at or near the shut-in formation pressure.
 - a. Downhole pressure will be recorded via the casing conveyed pressure gauges for the duration of the shut-in to confirm stabilization.

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2. Set the required number of 500-barrel frac tanks to complete the test per the proposed schedule.
 - a. Fill with clean brine water.
3. Rig up pumps and iron.
 - a. Move in and rig up kill trucks/frac pumps and lay iron.
 - b. Pumps will be positive displacement with digital recording of rate.
 - c. Pumps, iron, and flow control will be sized so that steps in rate will not create pressure or rate transients, other than those caused by the intended steps.
4. Rig up surface flow meter and verify downhole, casing conveyed, pressure gauges are recording pressure. If not already in place, install surface pressure gauge with a continuous readout.
5. If surface pressure indicates that fluid level is beneath the surface, fill hole with brine at a constant rate of 0.3 barrels per minute.
6. Once the well is full, stop pumping and allow the pressure to descend to 0 psi, indicating that fluid level is at surface.
7. An injection rate schedule will be developed with the following goals:
 - a. Begin at sufficiently low rates to ensure there are at least three steps below fracture pressure.
 - b. Continue to high enough rates to ensure a minimum of three steps over the fracture pressure.
8. Begin test at the initial injection rate for 30 minutes.
9. Step up rates per the predetermined rate schedule.
 - a. Bottomhole pressure versus rate will be plotted in real time. If necessary, the rate schedule may be adjusted during the test to ensure three steps below and three steps above the fracture pressure.
 - b. Injection rate will not exceed the recommended limit of 30 feet per second in the tubing.
 - c. Surface pressure will not exceed 80% of the maximum pressure rating of the wellhead at any time.
 - d. Changes in flow rate will be made over the shortest possible intervals.
 - e. Injection rates will be controlled with a constant flow regulator.

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- f. All injection flow rates, including hole conditioning treatments prior to the test, will be documented on service company forms.
 - i. Re-fill frac tanks as needed.
 - g. An estimated minimum of three fluid samples will be collected throughout the test, at the beginning, middle, and end.
 - i. The density of the samples will be read by an in-house method and recorded for later reference.
10. Upon completion of the final injection stage, the line valve will be closed to stop injection immediately. This will allow the pressure to bleed off into the formation.
- a. Ensure that pressure values are recorded at the highest obtainable frequency during shut-in.
 - b. Continue to capture fall-off pressure data until stable bottomhole pressure is achieved.
11. Conclude test, rig down, and move out pumps .

4. PRE-INJECTION TESTING PLAN – MONITORING WELLS

Monitoring wells will be evaluated during the pre-injection period. The following testing and logging plans apply to all wells listed in **Table 4-1**.

Table 4-1: Monitoring Well Descriptions

Well Type	Monitoring Location	Well Name
Above-zone Monitoring Well	Above-zone	RPN-1-AZ
USDW Monitoring Well	USDW Groundwater - Updip	RPN-1-WS1
USDW Monitoring Well	USDW Groundwater - Updip	RPN-1-WS2
USDW Monitoring Well	USDW Groundwater - Downdip	RPN-1-WS3

USDW: underground source of drinking water

4.1. Deviation Checks

Deviation measurements will be conducted approximately every 500 feet during construction of the wells.

4.2. Coring

No whole cores are planned to be collected during drilling of any monitoring wells.

4.3. Tests and Logs

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Tests and logs to be performed during drilling of the above-zone monitoring well and USDW monitoring wells are given in **Table 4.3-1** and **Table 4.3-2**, respectively, including their target data objectives. Tests and logs to be performed during and after casing installation of the above-zone monitoring well and USDW monitoring wells are given in **Table 4.3-3** and **Table 4.3-4**, respectively, including their target data objectives.

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Table 4.3-1: Above-Zone Monitoring Well Open Hole Logging Plan

CARBON SEQUESTRATION /ABOVE-ZONE MONITORING WELL					
RPN-1-AZ					
OPEN HOLE LOGGING PLAN					
Trip	Hole Section	Logging Suite	Target Data Acquisition	Open Hole Diameter	Depths of Survey
1	Surface Casing	Gyro Survey (Survey - prior to POOH)	Directional survey	12-1/4 in	Surface–1,500 ft
2		Triple Combo (Gamma Ray, Resistivity, Porosity)	Identification of Rock Properties		
		Mud Logging			
3	Production Casing	Gyro Survey (Survey - prior to POOH)	Directional survey	7-7/8 in	1,500–4,153 ft
4		Triple Combo (Gamma Ray, Resistivity, Porosity)	Identification of Rock Properties		
		Mud Logging			
5		Formation Fluid Sampling			

Table 4.3-2: USDW Monitoring Wells Open Hole Logging Plan

CARBON SEQUESTRATION / USDW MONITORING WELLS					
RPN-1-WS1, RPN-1-WS2, & RPN-1-WS3					
OPEN HOLE LOGGING PLAN					
Trip	Hole Section	Logging Suite	Target Data Acquisition	Open Hole Diameter	Depths of Survey
1	Production Casing	Gyro Survey (Survey - prior to POOH)	Directional survey	8-1/2 in	Surface–895 ft
2		Triple Combo (Gamma Ray, Resistivity, Porosity)	Identification of Rock Properties		
		Mud Logging			
3		Formation Fluid Sampling			

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Table 4.3-3: Above-Zone Monitoring Well Cased Hole Logging Plan

CARBON SEQUESTRATION / ABOVE-ZONE MONITORING WELL					
RPN-1-AZ					
CASED HOLE LOGGING PLAN					
Trip	Hole Section	Logging Suite	Target Data Acquisition	Casing Dimension	Depths of Survey
1	Surface Casing	Radially Investigative Cement Bond Log	Cement Bond Investigation	8-5/8 in	Surface-1,500 ft
		Gamma Ray			
		CCL			
2	Production Casing	Radially Investigative Cement Bond Log	Cement Properties Investigation	5-1/2 in	Surface-4,153 ft
		Gamma Ray			
		CCL			
3	Production Casing	Caliper	Roundness and Ovality	5-1/2 in	Surface-4,153 ft
4		Magnetic Flux Leakage	Corrosion Identification		
5		Pulse Neutron	Gas Movement Behind Pipe		

Table 4.3-4: USDW Monitoring Wells Cased Hole Logging Plan

CARBON SEQUESTRATION / USDW MONITORING WELLS					
RPN-1-WS1, RPN-1-WS2, & RPN-1-WS3					
CASED HOLE LOGGING PLAN					
Trip	Hole Section	Logging Suite	Target Data Acquisition	Casing Dimension	Depths of Survey
1	Production Casing	Radially Investigative Cement Bond Log	Cement Properties Investigation	4-1/2 in	Surface-895 ft
		Gamma Ray			
		CCL			

5. WITNESSING OF PRE-OPERATIONAL WELL TESTING

In compliance with LAC 43:XVII.3617.B.6 and 40 CFR 146.87(f), RPS will submit a schedule of the proposed tests and logs at least 30 days before conducting the first test to allow the UIC Director and EPA the opportunity to witness these tests. Changes to the testing schedule will be submitted at least 30 days prior to the next scheduled test.