

**CO<sub>2</sub> INJECTION WELL STIMULATION PLAN**  
**40 CFR 146.82(a)(9)**

**Bluebonnet Sequestration Hub**

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**1.0 Facility Information**

Facility name: Bluebonnet Sequestration Hub (Bluebonnet Hub or the Project)  
Bluebonnet CCS 1, Bluebonnet CCS 2, and Bluebonnet CCS 3 Wells

Facility contacts: **Claimed as PBI**  
[REDACTED]

Well location: **Claimed as PBI**  
[REDACTED]

**Claimed as PBI**

**2.0 Stimulation and Cleanout Plan**

Pursuant to 40 CFR §146.82 (a)(9), this CO<sub>2</sub> Injection Well Stimulation Plan describes the operations that Bluebonnet Sequestration Hub, LLC would execute in the CO<sub>2</sub> Injector Wells, Bluebonnet CCS 1, Bluebonnet CCS 2, and Bluebonnet CCS 3 to enhance or regain injection capabilities.

Stimulation and cleanouts to enhance or regain the injection potential of the Frio and Hackberry Sandstones in the CO<sub>2</sub> Injector Wells include coil tubing cleanouts, stick pipe cleanouts, matrix acid stimulation, and water flushes.

The need for stimulation and cleanouts will be determined once the characterization data from the Bluebonnet Sequestration Hub is completed, and the wells are available and have been evaluated (i.e., results of geophysical logs, core analyses, and hydrogeologic testing, operating conditions).

Bluebonnet Sequestration Hub, LLC will notify and submit the proposed stimulation or cleanout procedures in writing to the Underground Injection Control (UIC) Program Director at least 30

days in advance of performing the stimulation or workover in accordance with 40 CFR. § 146.91(d)(1) and 40 CFR § 146.91(d)(2). Bluebonnet Sequestration Hub, LLC will carry out the stimulation or cleanout according to the EPA approved procedures. The procedures will describe all fluids being pumped and demonstrate that there will be no loss of containment due to the stimulation.

While this CO<sub>2</sub> Injection Well Stimulation Plan sets forth the intended procedures for stimulation of the injection wells at the Bluebonnet Sequestration Hub, changes to the plan may be required based on technical, operational, or safety conditions encountered during operations. Bluebonnet Sequestration Hub, LLC will notify the UIC Program Director if substantial deviations from this Plan are required.

### **3.0 Stimulation and Cleanout Procedures**

If injection rates decline below or injection pressures increase above expected values during the project's life, the Bluebonnet Hub will investigate the cause to determine if a stimulation or cleanout may be required. Investigation activities include, without limitation, the following:

- Logging operations, including but not limited to, evaluation of the injection profile, mechanical spinner surveys, caliper logging, gauge runs, downhole camera investigation, distributed temperature sensing (DTS), distributed acoustic sensing (DAS), tracers and injection profile logging (IPL), etc.
- Collecting downhole samples when necessary or feasible with wireline, slickline, or coiled tubing conveyed sampling equipment, to be followed by analytical testing, as appropriate to determine remediation options.

The equipment to implement the stimulation procedures or cleanouts include, but is not limited to, coil tubing units, workover units, snubbing units, pumping units, wireline, and slickline, amongst others.

The following are standard procedures for matrix acid stimulations, water flush, and sand and solids clean out.

#### ***3.1 Matrix Acid Stimulation:***

- The maximum bottom hole pressure is 90% of the injection zone fracture pressure. Job will be pumped below the maximum bottom hole pressure.
- Bottom hole pressure and/or surface pressure will be monitored throughout the job.
- Compatibility testing should be performed on all fluids prior to pumping to ensure compatibility with the formation and its fluids.
- Verify acid blend is correct before pumping.

1. Conduct and document a safety meeting.
2. Close in injection line.
3. Spot in acid pump truck, acid transport, and frac tanks.

4. Hook up tubing and pressure test lines to 5,000 psi.
5. Open well and pump pre-flush.
6. Pump acid blend.
7. Pump flush and close in well.
8. Rig down tubing.
9. Open injection line and resume injection.

### ***3.2 Water Flush Treatment:***

- The maximum bottom hole pressure is 90% of the injection zone fracture pressure. Job will be pumped below the maximum bottom hole pressure.
- Bottom hole pressure and/or surface pressure will be monitored throughout the job.
- Compatibility testing should be performed on all fluids prior to pumping to ensure compatibility with the formation and its fluids.

  

1. Conduct and document a safety meeting.
2. Close in injection line.
3. Spot in pump truck and frac tanks.
4. Hook up tubing and pressure test lines to 5,000 psi.
5. Open well.
6. Pump water with additives.
7. Close in well.
8. Rig down tubing.
9. Open injection line and resume injection.

### ***3.3 Coil Tubing Cleanout:***

- The maximum bottom hole pressure is 90% of injection zone fracture pressure. The job will be performed below the maximum bottom hole pressure.
- Bottom hole pressure and/or surface pressure will be monitored throughout the job.
- Compatibility testing should be performed on all fluids prior to pumping to ensure compatibility with the formation and its fluids.

  

1. Conduct and document a safety meeting.
2. Close in injection line.
3. Move in and rig up coil tubing unit.
4. Kill well or if well is dead pump buffer fluid.
5. Make up bottom hole assembly (BHA).
6. Run in hole (RIH) with BHA to just above top perforation.
7. Break circulation and wash down to plug back total depth (PBTD). Utilize gel sweeps as necessary to keep the hole clean.
8. Once PBTD is reached, circulate additional gel sweeps and bottoms up until returns are clean.

9. Pull out of hole with coil tubing and BHA.
10. Rig down coil tubing unit.
11. Open injection line and resume injection.

### ***3.4 Stick Pipe Cleanout:***

- The maximum bottom hole pressure is 90% of injection zone fracture pressure. The job will be performed below the maximum bottom hole pressure.
- Bottom hole pressure and/or surface pressure will be monitored throughout the job.
- Compatibility testing should be performed on all fluids prior to pumping to ensure compatibility with the formation and its fluids.

1. Conduct and document a safety meeting.
2. Close in injection line.
3. Move in and rig up pulling unit.
4. Kill well and nipple up the blowout preventors (BOPs).
5. Make up bit on work string.
6. Run in hole (RIH) with bit to just above top perforation.
7. Break circulation and wash down to plug back total depth (PBTD). Utilize gel sweeps as necessary to keep the hole clean.
8. Once PBTD is reached, circulate additional gel sweeps and bottoms up until returns are clean.
9. Pull out of hole with work string and bit. Lay down same.
10. Nipple down the BOPs.
11. Rig down pulling unit.
12. Open injection line and resume injection.

## **4.0 Stimulation and Cleanouts Fluids**

At the Bluebonnet Hub, the project team may use acid blends for matrix stimulation or perforation cleanouts that are typical of the industry. These include, but are not limited to, mixtures of acetic, hydrochloric, hydrofluoric, and/or other organics acids. These blends have been historically proven to remove near-wellbore damage caused by mineral scales, drilling muds, completion fluids, and clay fines while minimizing negative impacts to permeability.

There is also potential for near-wellbore halite precipitation in the CO<sub>2</sub> Injector Wells, which may require remediation by periodic flushes with less saline water.

During the characterization of the site, the project team identified that the Frio and Hackberry Injection Zones tend to produce sand due to the unconsolidated condition of these formations. The project team plans to incorporate preventive and correctives cleanouts, as described in the previous section. During cleanout operations, the project team may use brines that might include a KCL

and/or NACL solution to control the well along with a gelling additive to increase viscosities in the fluids and remove the sand from the wellbore.

All chemical treatments will be evaluated and selected for compatibility with the formation and installed equipment downhole.

Additives may be utilized with the stimulation fluids to aid matrix stimulation while mitigating corrosion of tubulars and potential damage to the sequestration zone. These additives include, but are not limited to, corrosion or acid inhibitors, scale inhibitors, clay stabilizers, biocides, demulsifiers, chelating agents, mutual solvents, iron sequestrants, retarders, and/or surfactants.

Brines and gelling additives will be included during wellbore cleanouts to improve efficiency while cleaning solids out of the wellbores.

Compatibility of these additives and stimulation fluids, with the installed tubulars and reservoir, will be confirmed prior to their use in any stimulation activities.

## **5.0 Ensuring Containment:**

Except during stimulation, the project team will ensure that injection pressure does not exceed 90 percent of the fracture pressure on the injection zone(s) to ensure that the injection will not initiate new fractures or propagate existing fractures in the injection zones(s). In no case will the injection pressure initiate fractures in the confining zones(s) or cause the movement of injected or formation fluids that endanger the USDW, 40 CFR §146.88 (a).

The injection pressure will be monitored continuously during stimulation operations. Chemicals and fluids used during stimulation or cleanouts will be selected to ensure no damage in downhole equipment and formation(s).