

**ATTACHMENT A: SUMMARY OF REQUIREMENTS,  
CLASS VI OPERATING AND REPORTING CONDITIONS**

Facility name: Kansas Small Scale Test Wellington Field  
KSS191GS0001

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Well location: Sumner County, Kansas  
Latitude 37.319485, Longitude -97.4334588

**Injection Well Operating Conditions:**

<b>PARAMETER/CONDITION</b>	<b>LIMITATION or PERMITTED VALUE</b>
Maximum Injection Pressure	
Surface	1,200 psi <sup>1</sup>
Bottomhole	2,651 psi
Annulus Pressure	0 psi
Annulus Pressure/Tubing Differential	1,200 psi
CO <sub>2</sub> Injection Temperature	-30°F - +10°F
Maximum CO <sub>2</sub> Injection Rate	300metric tons/day

<sup>1</sup> The surface pressure during injection shall not exceed 1,200 psi. During periods when injection is not occurring, it may be possible that CO<sub>2</sub> in gaseous phase temporarily exceeds this limit at the surface.

The injection pressure will be measured at the wellhead and with a gauge installed downhole in the injection well:

- The maximum bottomhole injection pressure, which serves to prevent confining-formation fracturing, was limited to 2,651.25 psi. This value is 70% of fracture gradient of 0.75 psi/ft at 5,050 ft (bottom of the Arbuckle). As noted in the Operating Plan for Safe and Efficient Injection (included in the Emergency and Remedial Response Plan, Attachment F of this permit), a conservative limit of 70% of the fracture gradient was established for maximum downhole pressure in order to minimize the potential for induced seismicity. Maximum bottomhole pressure was calculated using the following formula:

$$P_{bottomhole} = [(70\% \text{ of fracture gradient}) \times (\text{Bottom of Arbuckle})]$$

$$= (0.70 \times 0.75 \text{ psi/ft}) \times 5,050 \text{ ft} = 2,651.25 \text{ psi}$$

This is the pressure that would trigger a cessation of CO<sub>2</sub> injection by the SCADA system.

- The surface maximum injection pressure of 1,200 psi maintains the well integrity and the following approach provides an example for calculation of the surface pressure:

The surface pressure required to inject CO<sub>2</sub> into the formation is a function of (a) the bottomhole pressure, and (b) the density of the CO<sub>2</sub>. In general, the lower the density, the higher the required surface pressure. Similarly, the higher the bottomhole injection pressure, the higher the required surface pressure. In order to obtain conservative results, it is assumed that the bottomhole pressure can reach the maximum allowable pressure of 2,651.25 psi. With respect to density, the specific gravity at the surface will be approximately 1.0 for a pressure of 150 psi (at -15°F) in the CO<sub>2</sub> storage tanks. The density will be lower at the bottom of the well (with a specific gravity of approximately 0.9) corresponding to a pressure of 2,651 psi and a conservative bottomhole temperature estimate of 80°F. Under these conservative assumptions, the surface pressure is estimated to be:

$$P_{surface} = 2,651.25 \text{ psi} - (0.9 \times 0.4333 \text{ psi/ft} \times 5,050 \text{ ft}) - 14.6 \text{ psi} = 667.3 \text{ psi}$$

### **Routine Shutdown Procedure:**

Under routine conditions (e.g., for well workovers), Berexco will gradually reduce CO<sub>2</sub> injection at a rate of 20 psi/hr to ensure protection of health, safety, and the environment.

The programmable logic controller (PLC) or well controller will be programmed to keep a running total of the injected CO<sub>2</sub> and Berexco will cease operations within a 24-hour period if the injection exceeds more than 300 metric tons or the bottomhole pressure exceeds 2,651 psi.

### **Routine Injection Rate:**

The planned rate of CO<sub>2</sub> injection is 150 metric tons per day. However, depending on the formation properties and the need to maintain the CO<sub>2</sub> in a liquid state at the pump (which will require a certain minimum pressure based on the temperature), an operating rate of 0–300 metric tons per day may be injected during batch operations during a 24-hour period to achieve the desired daily injection volume, as long as the operating conditions above are not exceeded.

**Class VI Injection Well Reporting Frequencies:**

<b>ACTIVITY</b>	<b>MINIMUM REPORTING FREQUENCY</b>
CO <sub>2</sub> stream characterization	Semi-annually
Injection pressure, injection rate, injection volume, pressure on the annulus, annulus fluid level, and temperature	Semi-annually
Corrosion monitoring	Semi-annually
External MITs	Within 30 days of completion of test
Pressure fall-off testing	In the next semi-annual report

Note: All testing and monitoring frequencies and methodologies are included in Attachment C (the Testing and Monitoring Plan) of this permit.

**Class VI Project Reporting Frequencies:**

<b>ACTIVITY</b>	<b>MINIMUM REPORTING FREQUENCY</b>
Ground water quality monitoring	Semi-annually
Plume and pressure-front tracking	In the next semi-annual report
Monitoring well MITs	Within 30 days of completion of test
Financial responsibility updates pursuant to H.2 and H.3(a) of this permit	Within 60 days of update

Note: All testing and monitoring frequencies and methodologies are included in Attachment C (the Testing and Monitoring Plan) of this permit.