

## **Geological Modeling of Carbon Dioxide Storage in Osage County, Oklahoma**

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### **Abstract**

This study aims at identification of sweet spots for potential CO<sub>2</sub> storage projects in Arbuckle Group in Osage County, Oklahoma. Osage county has been very silent in terms of seismicity despite a huge volume of water disposal that has being taken in place over decades that makes this county unique in the state. A total of 124 well logs and existing core datasets were used to build a 3D geological model. Existing injection data were used to validate the geological model. Three criteria were used to examine the safe and permanent CO<sub>2</sub> subsurface storage, including presence of a minimum supercritical depth (>2500 ft) for the target formation, sufficient thickness of porous and permeable rock to store CO<sub>2</sub>, and presence of an impermeable caprock.

These criteria were considered for the Arbuckle group in Osage county and turns out that the west side of Osage meets the criteria and potentially can store between 35 to 96 million metric tons of CO<sub>2</sub>. Two sweet spots at west and northwest part of the county were identified. Interestingly, there is an active CO<sub>2</sub> EOR into the shallower formation in the same part of county that takes its CO<sub>2</sub> from the nitrogen fertilizer plant in Coffeerville, Kansas and can reduce the cost of potential storage projects since the CO<sub>2</sub> infrastructure (including pipelines and compression units) already exist in the region; the existing CO<sub>2</sub> EOR project can be considered as the contingency plan, in case needed in the future. The significance of this study demonstrates huge potential for storing CO<sub>2</sub> in Arbuckle formation in Osage county permanently and cost-efficiently that can reduce carbon emission from the fertilizer plant and other CO<sub>2</sub> sources in the region.

Carbon Capture, Utilization, and Sequestration in the Rockies

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