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# **Citronelle Dome: A Giant Opportunity for Multi-Zone Carbon Storage and Enhanced Oil Recovery in the Mississippi Interior Salt Basin of Alabama**

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## **ABSTRACT**

The Citronelle Dome is a giant, salt-cored anticline in the eastern Mississippi Interior Salt Basin of South Alabama that is located near several large-scale, stationary carbon emitting sources in the greater Mobile area. The dome forms an elliptical, four-way structural closure containing opportunities for EOR (enhanced oil recovery) and large capacity saline reservoir CO<sub>2</sub> sequestration.

The Citronelle oil field, which is on the crest of the dome, has produced more than 169 million bbl of 42-46° API oil from channel sandstone bodies in the Lower Cretaceous Rodessa Formation. The top seal for the oil accumulation is a thick succession of shale and anhydrite, and the reservoir is under-filled such that oil-water contacts are typically elevated 100 to 200 ft above the structural spill point. Approximately 37% of the original oil in place has been recovered by primary and secondary methods, and CO<sub>2</sub>-enhanced oil recovery has the potential to increase reserves by up to 20%.

Structural contour maps of the dome demonstrate that the area of the structural closure increases upward in section. Saline reservoirs of Upper Cretaceous age may also provide more than a century of CO<sub>2</sub> sequestration capacity. Sandstone units providing prospective carbon sinks include the Massive and Pilot sands of the lower Tuscaloosa Group, as well as several sandstone units in the upper Tuscaloosa Group and the Eutaw Formation. Many of these sandstone units are characterized by high porosity and permeability and low heterogeneity. The Tuscaloosa-Eutaw interval is capped by up to 2000 ft of chalk and marine shale that are proven reservoir seals in nearby oil fields. Therefore, the Citronelle Dome can be considered a major geologic sink where CO<sub>2</sub> can be safely stored while realizing the economic benefits associated with EOR.