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Southern Arkansas CO_2–EOR and Saline Storage Assessment

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ABSTRACT

This study evaluated the potential to revitalize several depleted southern Arkansas oil fields and improve the State's declining oil production while simultaneously storing CO_2. Advanced Resources International, Inc.'s oil field database was analyzed using reservoir and economic models to determine the potential for CO_2–EOR in terms of oil recovery and potential CO_2 demand. Of the 39 large oil reservoirs evaluated in southern Arkansas, 13 met the criteria for miscible CO_2–EOR. EOR modeling results predict 280 million barrels of potential oil recovery, requiring a CO_2 demand of 1980 BCF. This purchased CO_2 volume, equivalent to 104 million metric tons, is ultimately stored in the oil reservoirs. Further, shallow and/or heavy oil reservoirs may be candidates for EOR, given the successful 1970s–1980s demonstration of immiscible CO_2–EOR in the Lick Creek oilfield. In addition to EOR, there are multiple stacked saline reservoirs with the capacity to store CO_2 unassociated with oil recovery. The highest capacity candidate for CO_2 saline storage is likely the Reynolds oolitic limestone, in the Smackover formation, due to its excellent reservoir characteristics and overlying anhydrite seal (Buckner formation). The reservoir exhibits a maximum porosity of 26% and an average permeability of 1500 millidarcies. It has an estimated storage capacity of 1.2 to 3.2 million metric tons of CO_2 per square mile. Together, the considerable CO_2–EOR potential, saline reservoir storage capacity and industrial CO_2 sources increase the viability of carbon capture, utilization, and storage in southern Arkansas.

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