

## Enhanced Oil Recovery Potential of Residual Oil Zones in the Permian Basin of Southeastern New Mexico

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The purpose of this study is examine the potential for Residual Oil Zone (ROZ) production in southeastern New Mexico, and to differentiate areas with high medium, or low potential for significant production through CO<sub>2</sub> flooding.

Residual Oil Zones are formations that contain oil at saturations too low to be produced by primary production or waterflood<sup>1</sup>. These zones are typically the oil saturated intervals below producing oil water contacts that have been swept by natural water flooding processes. Studies have shown that the reservoir characteristics and oil saturation profiles in ROZs are similar to that of the main pay zone (MPZ) after it has been water flooded, thus CO<sub>2</sub> enhanced oil recovery (EOR) may be a viable means of mobilizing a significant amount of the remaining oil.

Three ROZ fairways have been identified in southeast New Mexico<sup>2</sup>. These are the Artesia, the Roswell and the Slaughter fairways, and the San Andres Outcrop serves as the present day recharge area sustaining the tilted oil water contacts. Another region of particular interest is the west side of the Central Basin Platform that has both fresh and saline water flushing the formation. Each fairway has unique geologic and reservoir characteristics that determine the extent of ROZ development. This extent depends on the access to flush waters, formation thickness and extent of lateral continuity development from source to discharge to allow sweep.

For this work, case studies of fields that represent average characteristics along each fairway will be used to characterize CO<sub>2</sub> EOR in the ROZ. Actual geologic models will be generated for fields with known geologic and reservoir properties, otherwise synthetic models will be used. With different assumptions of producing oil-water contacts, depths, remaining oil saturations and pressure profiles, the oil in place and production response can be estimated. A number of scenarios will be used to assess CO<sub>2</sub> flooding performance under different injection schemes. Results of the case studies will be extended to project possible reserve and production potentials from the residual oil zones along the respective fairways.

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<sup>1</sup>Definition per SPE gulf coast section Permian Basin Study Group

<sup>2</sup>Bob Trentham ( March 2010); Residual oil Zones From Science to Commercial Exploitation, UTPB/CEED