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Operational Sequence Stratigraphy for 3-D Reservoir Modeling of Seminole San Andres Unit (SSAU), Permian Basin, West Texas

SSAU is a mature CO_2 flood and one of the ten largest fields in the Permian Basin, with 615 MMBO cumulative production. Recent reservoir characterization integrated over 12,000 ft of core, 630 wells, 3-D seismic, and 40+ years' production history into an integrated, 3-D reservoir management tool. Twelve facies range from deep subtidal argillaceous dolomudstone and fusulinid wackestone, to peritidal laminites and microkarst residuum. Principal reservoir facies are fusulinid dolowackstone, fusulinid-peloid dolopackstone, and coated-grain dolograinstone. Depositional facies control reservoir properties with the exception of pore-plugging by late anhydrite. Five facies groups were predicted in uncored wells using fuzzy-logic constrained by available log data and facies proportion curves.

A cycle-hierarchy consistent with the outcrop-based stratigraphic framework of Kerans and Fitchen was first defined in 1D and 2-D from cored wells, then tested through 3-D well-log correlation. Both paleo- and present-day structures are complex differential compaction features over antecedent shelf-margins and buildups. Facies maps demonstrate paleostructural control starting with *crestal* and ending with *peripheral* concentrations of grain-dominated reservoir facies. Fifteen correlation surfaces form the deterministic framework within which facies and rock properties were geostatistically distributed. A "mini-model" was up-scaled and history-matched midway through full-field modeling to test whether the model effectively captured rock properties and flow units.

Although simulation work on up-scaled models is ongoing, the 5,760,000 cell fine-scaled static model and its associated full-field correlation framework currently enhance reservoir management by facilitating: 1) quantitative estimates of remaining reserves, 2) better understanding for CO_2 and water conformance, and 3) future project evaluation.