

Recent Characterization of the Monterey Formation In The San Joaquin Basin, CA

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Abstract

One hundred years after the first production from the Monterey Formation, exploration, appraisal, and development continues. The quest for migrated and in-situ hydrocarbons in porous and fractured quartz porcelanite and chert is ongoing in and around the giant oil fields in the west-side fold belt Buttonwillow depocenter, San Joaquin Basin, California.

Moderate Total Organic Carbon (TOC) volumes are found throughout the Monterey in the San Joaquin. Maturity in the west-side fold belt anticlines is low. A 3D basin model indicates that the synclinal strata are sufficiently buried to mature the organic matter, and would be entering the oil generation window below approximately 12,000ft tvdss. Monterey quartz porcelanite reservoirs in the crest and upper flanks of Belridge and Lost Hills contain migrated intermediate to light grade hydrocarbons in matrix and bed confined fractures. Matrix oil saturations range from low to moderate, with porosity ranging from 17 to 30 percent. Live oil was observed on open fractures in core. Monterey reservoirs in synclinal settings are cherty quartz porcelanite with bedding plane parallel and complex high angle fracture networks. These units contain intermediate grade API hydrocarbons. Matrix oil saturations range from moderate to high, with porosity less than 10 percent. Some oil stain was observed on fresh fractures in core. Burial depth influences the matrix rock properties (decreasing porosity and permeability with depth in moderately over-pressured reservoirs). Remaining in-situ hydrocarbons are lower gravity residuals, the lighter hydrocarbons having migrated into adjacent structural and stratigraphic traps.