

USGS Assessment of Undiscovered Deep Gas Resources in Lower Miocene and Older Strata, San Joaquin Basin, California

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The Deep Fractured Pre-Monterey Assessment Unit (AU) of the Eocene-Miocene Composite Petroleum System includes mainly gas and condensate accumulations in tectonically fractured, overpressured, pre-Monterey Formation sandstone reservoirs within footwall anticlines and fault traps below 14,000 ft on the west side of the San Joaquin Basin. Principal reservoir units are sandstones within the Oligocene to Miocene Temblor Formation or the Eocene Point of Rocks Sandstone Member of the Kreyenhagen Formation. The AU is bounded on the west by the San Andreas Fault, on the south by the White Wolf Fault, and on the east by the limit of fold-thrust deformation near the basin axis.

Potential reservoirs in the Temblor include sandstone members ("Gibson," Wygal-"Phacoides," "Bloemer," and Agua) that might be prograding deltaic wedges within a transgressive sequence. Drilling at East Lost Hills has demonstrated the presence of 400 ft of "Gibson" sand of shallow-water character, with 5-10% porosity (D. Fowler, oral communication, 2003); such Temblor sands could be widespread at depth. The Carneros Sandstone Member of the Temblor, a highstand submarine fan deposit, has less favorable reservoir character, but is also prospective.

Submarine fan sandstones of the Point of Rocks are the most important pre-Temblor potential reservoirs in the deep basin by virtue of their thickness, favorable reservoir character, and wide extent. Other possible reservoirs are sands in the Tumey, Domengine, and Lodo Formations.

To constrain gas volumes within the AU, we identified about 75 potential traps on Temblor and Point of Rocks structure maps. Calculated volume of gas-in-place, assuming porosity of 5%, is about 10 TCF, if all traps held gas, with a median accumulation size of about 100 BCF. Because only a small fraction of the potential traps probably hold gas accumulations, we estimated that the number of discoveries will probably be less than 20 and that most of them will be a few BCF to a few tens of BCF, with a small chance of accumulations up to about 1 TCF.