PRODUCTION DATA AS AN INDICATOR OF GAS RESERVOIR COMPARTMENTALIZATION IN THE VICKSBURG S SANDSTONES (OLIGOCENE), MCALLEN RANCH FIELD, HIDALGO COUNTY, TEXAS

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ABSTRACT

To assess reservoir heterogeneity in low–permeability Vicksburg "S" sandstone reservoirs in McAllen Ranch gas field, production and pressure histories of 49 wells were analyzed.These histories were compared both fieldwide and in local areas defined by faults or facies. Production is through casing perforations, which commonly extend over 600 ft gross intervals within vertically stacked potential reservoir sandstones. Predominant well spacing is 320 acres.

The S reservoir comprises five sand–rich intervals that together have produced 249 Bcf of gas since 1965. Cumulative production per well ranges from 39 Bcf in 24 years to 0.8 Bcf in 11 years. Average cumulative production is 6.3 Bcf per well. To date the largest average monthly production for a well is 110.8 Mcf; the mean for average monthly production for all wells is 30.5 Mcf. Trends of greatest monthly production parallel faults, and the most productive wells are completed in distributary channel facies on higher fault blocks of rollover anticlines. There is poor correlation among gross thicknesses of perforated intervals and cumulative productions (R=0.024). Well–head shut–in pressures range from 12,500 psi on completion to 1,300 psi at abandonment. Maps of cumulative production and normalized BHP/Z show good production/pressure correlations. The slopes of regression curves for (1) monthly production decline histories and (2) periodic tests of daily production of adjacent well pairs show no change when an adjacent well is initially completed or later refractured, even where well spacing is less than 1,000 ft. Graphs of pressure histories of the same well pairs also show no pressure decreases. In fact, monthly production in a newly completed or refractured adjacent well commonly exceeds the last production rate of the older well.

Production and pressure histories in adjacent well pairs demonstrate that limited communication occurs between S sandstone reservoirs of paired wells. These sandstone reservoirs appear to behave as isolated compartments as a result of stratigraphic/diagenetic heterogeneity and low permeability with consequent limitation of drainage radius.

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