RESERVOIR CHARACTERIZATION IN THE SPRABERRY TREND, MIDLAND BASIN, TEXAS: DELINEATION OF TARGET AREAS FOR ADDITIONAL OIL RECOVERY USING "OLD" GAMMA-RAY AND NEUTRON LOGS

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ABSTRACT

Correlation and lithological interpretation of more than 200 gamma-ray/neutron logs recorded mostly in the 1950's and 1960's permitted mapping of submarine-fan, sand-rich intervals (operational units) containing oil reservoirs of the Spraberry Formation (Lower Permian, Leonardian) in a 60-mi^2 area in the east-central Spraberry Trend, Midland Basin, West Texas. Isolith maps constructed using a fixed cutoff value on unnormalized gamma-ray logs indicate the reservoirs were deposited mainly in belts 1 to 3 miles wide subparallel to the basin axis. Log-facies maps suggest aggradational sand-rich channel and overbank facies transecting mud-rich, progradational fan facies.

Sandstone-shaliness and effective-porosity maps were prepared using 90 of the logs that were standardized to a log chosen because of its easily identifiable markers, constant borehole environment, and areally representative log response. The data indicate that (1) sandstone thicknesses on isolith maps are greater than those on shaliness maps, partly reflecting different methodologies, (2) several thick, clean sandstones have low effective porosity, and (3) the best effective porosities appear to correspond to sandstones having intermediate clay contents. Petrographic data suggest that local discrepancies in areal distributions of sandstone depositional axes and effective porosities result at least partly from carbonate cementation and feldspar dissolution. The study indicates that combined isolith and porosity maps constructed using "old" logs (commonly main sources of data in mature fields) allow higher grading of prospective areas for additional recovery.

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