AAPG Annual Convention
Salt Lake City, Utah
May 11-14, 2003

Edward B. Coalson[1], Richard F. Inden[2] (1) Cabot Oil & Gas Company, Denver, CO (2) LSSI, Inc, Denver, CO

Analysis of Facies and Permeability from Cores, Cottonwood Creek Area, Wyoming

Full-diameter cores from the Permian Phosphoria (Park City) Formation in the Cottonwood Creek area reveal important geologic controls on reservoir quality in a tidal flat carbonate deposit. This complex of tidal flat and shallow marine parasequences has produced over 80 MMBO since its discovery in 1954. During the 1990's, 84 full-diameter cores were cut during an infill drilling program that down-spaced part of the field to 80 acres. The close-spaced Cottonwood Creek cores make this one of the most densely sampled tidal flat deposits in the Rocky Mountains.

All cores were described macroscopically for lithofacies (low-energy supratidal to open marine; see Coalson and Inden, 1990), matrix-porosity types (mainly fenestral, vuggy, and intercrystalline), and fracturing. Minipermeameter measurements were performed on all cores (mostly moving averages based on ten measurements per foot), allowing comparison to conventional core-plug and whole-core analyses, and also differentiation of the reservoir system into a number of distinct petrophysical rock types. Rock and reservoir attributes were recorded using a numerical coding system, allowing for the easy merging of these data with engineering data and utilization in mapping and cross-section software packages.

Mapping of the lithofacies revealed a well-organized pattern of carbonate tidal flat, barrier island, and subtidal facies tracts that relate to reservoir performance. High-stand deposits of the intertidal facies tract display the best porosity and permeability. Low-stand carbonates have suffered from exposure to arid-climate diagenesis that degraded porosity and permeability. Detailed cross sections show facies and permeability distributions that could form the basis for a reservoir model not easily attainable from well-log data alone.