

**AAPG Annual Meeting
March 10-13, 2002
Houston, Texas**

Saibal Bhattacharya¹, Alan Paul Byrnes¹, Paul Gerlach², Ricardo Olea¹ (1) Kansas Geological Survey, Lawrence, KS (2) Charter Development Corp, Wichita, KS

Reservoir Characterization to Inexpensively Evaluate the Exploitation Potential of a Small Morrow Incised Valley-fill Field

Morrow sandstone estuarine incised-valley fill reservoirs produce over 21% of the oil in Kansas. Many of these fields are operated by small independent operators and are at, or near, their primary economic limit. This study demonstrates the use of cost-effective tools to characterize, simulate, and evaluate the viability of initiating secondary or enhanced recovery technologies in one such field.

Lithofacies distribution was determined using a freeware program that correlated lithofacies between wireline logs using the gamma ray-total porosity response signature. Manual correlation confirmed the validity of the faster computer-based correlation technique. A spreadsheet-based pattern-recognition technique, Super-Pickett analysis, was used to map petrophysical properties. Wireline log and core revealed three dominant lithofacies: tidal channel, intertidal, and channel bank. Increasing argillaceousness was associated with a factor of 5.6 decrease in permeability for any given porosity, an increase in the average Archie cementation exponent from 1.74 to 1.81, and an increase in water saturation at 75 feet above free water level of 15-40 water saturation percent. Lacking complete relative permeability data, effective permeabilities at end-point saturations were integrated with data from a rock catalog to develop relative permeability and capillary pressure curves for a suite of porosity-permeability pairs. Use of these curves in PC-based reservoir simulation demonstrated the applicability of this curve modeling technique. Areas with remaining potential were mapped after history matching. Based on reservoir simulations, various field management plans were evaluated allowing the operator to compare performance and return on investment.