FLUID-FLOW CHARACTERIZATION OF DOLOMITIZED CARBONATE-RAMP RESERVOIRS: SAN ANDRES FORMATION (PERMIAN) OF SEMINOLE FIELD AND ALGERITA ESCARPMENT, PERMIAN BASIN, TEXAS AND NEW MEXICO

F. JERRY LUCIA, CHARLES KERANS, AND FRED P. WANG
Bureau of Economic Geology
*The University of Texas at Austin, Austin, Texas 78713-8924*

**ABSTRACT**

In carbonate-ramp reservoirs, stacking of rock-fabric facies within a high-frequency, sequence stratigraphic framework provides the most accurate framework for displaying the distribution of petrophysical rock properties of porosity, permeability, relative permeability, and capillarity. Rock-fabric facies are defined on the basis of grain and crystal size and sorting, interparticle porosity, separate-vug porosity, and the presence or absence of touching vugs. Outcrop geostatistical studies of the Algerita Escarpment suggest little spatial correlation of permeability within rock-fabric facies, and petrophysical properties can be averaged at rock-fabric-facies scale. An outcrop reservoir model has been constructed by mapping rock-fabric facies and using average petrophysical values for each rock-fabric facies. Experimental waterflood simulations show that performance depends upon the stacking of the rock-fabric facies, the dense layers, and the location of production and injection wells.

In the subsurface, high-frequency cycles can be observed in cores and calibrated with wireline log response. Grain and crystal size and sorting and separate-vug porosity can be determined from gamma-ray, porosity, acoustic, and resistivity logs. Permeability profiles can be calculated using rock-fabric-specific transforms between interparticle porosity and permeability. A reservoir model of part of the Seminole San Andres Field was constructed using these methods. Three-dimensional waterflood simulations using this model result in a more realistic display of remaining oil saturation than the traditional layered model and show the importance of thin, dense mud layers in controlling vertical migration.