Sedimentological and Ichnological Characterization of Reservoir Types in a Transgressive Systems Tract, Cretaceous (Albian) Basal Colorado Interval, South-Central Alberta

M. Scott Leroux*
PanCanadian Energy, 150-9th Ave. S.W., Calgary, Alberta, Canada
scott_leroux@pcenergy.com

and

James A. MacEachern
Department of Earth Sciences, Simon Fraser University, Burnaby, B.C., Canada.
jmaceach@sfu.ca

The Albian Basal Colorado Sandstone constitutes a secondary hydrocarbon exploration target disconformably overliying the Mannville Group, and recording a complex history of transgression in south-central Alberta. The study area was transgressed from the southwest by the Boreal sea, which flooded south along the Rocky Mountain belt and expanded northeasterly as sea-level continued to rise. The interval contains three reservoir-related facies associations.

The basal facies association reflects fluvial channels incised into the Mannville Group, recording initial transgressive back-fill of river systems. Channel sandstones are 5-25m thick, with 10-25% porosity and 1-1000md of permeability. The sandstones are trough cross-stratified and unburrowed. Moderate production is associated with the incised valleys and they continue to be a good exploration target.

The second facies association comprises shore-parallel, fining-upward, trough cross-stratified pebbly sandstones and conglomerates, interbedded with dark mudstones containing a restricted mixed *Skolithos-Cruziana* ichnofacies. Coarse-grained units are less than 10m thick and constitute the main reservoir type with 5-29% porosity, and 0.5-1700md of permeability. Wells have produced up to 42Bcf of gas, and have averaged 8.1Bcf/well. This facies association corresponds to deposition within a restricted embayment complex.

The third facies association constitutes a series of back-stepping, northwest-southeast trending, embayed, coarsening-upward transgressive shorefaces. These deposits are generally less than 5m thick and preserved as erosional remnants. Facies grade from offshore silty shales to lower shoreface bioturbated muddy sandstones having 5-25% porosity and 1-700md of permeability. Trace fossil assemblages correspond to the *Cruziana* ichnofacies with some *Skolithos* ichnofacies elements. Production from this facies association averages 1.5-2.0 Bcf/well.