A petrophysical integration methodology has been developed to evaluate low resistivity pay zones in both thin carbonates and laminated sand-shale sequences. This technique utilizes information from porosity and resistivity logs with additional data from formation pressure and downhole fluid sampling analysis.

Thin-bedded laminated reservoirs occur in many hydrocarbon zones. The technique described in this paper provides an alternative method for evaluating these formations and reduces uncertainty in water saturation calculations.

Petrophysical evaluation of hydrocarbons in some carbonate formations is often challenging due to heterogeneity of the host rock. Despite the significant impact this heterogeneity has on log measurements for hydrocarbon saturation calculations, the industry has generally extended the same interpretation models applied in sand-shale sequences to carbonates.

This study proposes a pore and fluid distribution model that explains the complex resistivity and pressure gradient behaviors in carbonates. These phenomena create zones of very low resistivity pay that respond like water zones to both resistivity and pressure gradient measurements.

Real-time downhole fluid analysis identifies mobile oil, and these zones flow dry or nearly dry oil when put on production.

The analytical approach presented here leads to proper quantification of hydrocarbon volumes and recovery. Several examples of thin-bedded low resistivity pay zones are shown in this paper to illustrate the approach.