

# Characterizing a Morrow Sandstone Reservoir through Stratigraphic Interpretation of 3-D Seismic Data, Sorrento Field, Colorado

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Sorrento field, southeastern Colorado, contains an estimated 21 million bbls of original oil in place in the Pennsylvanian Morrow sandstone. The reservoir consists of a complex of stacked channel sequences within an incised valley. Interpretation of 3-D compressional seismic data has outlined the configuration of the incised valley and provided essential information about the characteristics of the rocks that fill it. This seismic interpretation provides stratigraphic details on the compartmentalization of the four flow units which explain the multiple fluid contacts and variable performance of wells in this field.

The petroleum industry has been challenged to characterize Morrow reservoirs because the sandstone reservoir is encased in marine mudstone; normal compressional seismic data are not capable of imaging reservoir rock because the acoustic impedance is not sufficient to distinguish the two lithologies. Rather, seismic modeling shows that the compressional seismic character of the Morrow interval is the result primarily of high-velocity/high-density nonreservoir rocks. The distribution of these nonreservoir rocks is critical in delineating the reservoir because the channel sandstone is bordered by reflective rocks such as floodplain deposits or high-density facies which lie outside of the valley wall. Nonreservoir rocks that are barriers to flow within the reservoir, such as carbonate-cemented zones, define the compartmentalization.