

3-D Exploitation of Nod Mex Reservoirs Phase Four Field, Wharton County, Texas

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Phase Four field is located in the "expanded" or "downdip" Yegua exploration trend in south-central Texas, where reservoirs are developed within the lowstand systems tracts of at least six high-frequency type-one sequences. Phase Four Field is actually a complex of multiple small isolated reservoirs (<200 acres), which are stratigraphically and structurally compartmentalized. The four stratigraphic sequences containing productive reservoir sands in the field range from upper to lower Yegua in age. Shelf-edge deltaic sand lowstand prograding complexes provide the reservoirs in the Phase Four field complex. These deltas formed along a growth-faulted paleo-shelf margin and display extreme lateral variations in thickness. Sand distribution was primarily controlled by incised valley feeders which channeled sediment across the shelf and formed distributary channel complexes within the lower reaches of the valley mouths at the faulted shelf edge.

Phase Four Field was discovered using 2-D seismic data and

virtually no subsurface well control. Field development was difficult due to the ineffectiveness of the 2-D seismic data in imaging the complex stratigraphy and faulting. In 1994, Cox and Perkins and its partners shot approximately 12 square miles of 3-D data in the Phase Four field area, followed in 1995 by an additional, partially overlapping, 18 square miles of data. In addition to the full offset, DMO migrated volume; near-offset, mid-offset, and far-offset migrated volumes were created for AVO interpretation. A comparison of pre- and post-3-D interpretations and 2-D versus 3-D seismic show the effectiveness of the 3-D seismic and the 3-D AVO method in rapidly analyzing the existing and potential reservoirs. Test wells were targeted in the optimum parts of the reservoirs, resulting in higher sustained rates and quicker payouts. The 19 wells drilled based on interpretation of the 3-D data yielded a 79% commercial success rate versus 24% from 21 wells drilled prior to the 3-D survey.