SUCCESSFUL APPLICATION OF 3D SEISMIC TRANSFORM MODELS TO PREDICT STRATIGRAPHY, OFFSHORE EASTERN TRINIDAD

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ABSTRACT

Stratigraphy in the Columbus Basin, as in most clastic marine basins, is characterized by episodes of shelf progradation and retrogradation in response to shifting shorelines. Often it is difficult to assess the location of sand-prone shelfal versus shale-prone facies at any one time in the basin's history. Amoco has developed a new 3D seismic transform model that is useful for delineating faults and stratigraphic features (Bahorich and Farmer, 1994, US and foreign patents pending). This technique can be used for demarcating more high-quality, sand-prone reservoir intervals, based on the density-driven impedance differences between sand and shale in the Columbus Basin. These differences generate 3D transform variations which can be horizon-slice mapped to illustrate migrating depocenters through time.

Horizon-based slices of 3D seismic data were taken in the East Mayaro area, offshore eastern Trinidad. These slices showed a boundary between high and low value areas of the 3D transform that migrated to the west with increasing depth across the study area. This information was combined with existing well data which reflected deep marine, laminated sands and shales associated with the more eastward low transform value areas. Predictions were made employing a geologic model that suggested the presence of time equivalent, higher quality sands deposited in a shelf environment to the west. The prediction was successful with subsequent wells encountering high quality reservoir sands 150 meters (450 feet) thick. Reservoir presence, and favorable structure and migration history, combined to result in a very successful discovery.