by Chip Story,
Amoco Corporation,
501 WestLake Park Blvd.,
Houston, Texas

Norphlet Geology and 3D Geophysics of Fairway Field, Mobile Bay, Alabama

Abstract

The Upper Jurassic Norphlet system in the Mobile Bay area has been the subject of considerable exploration intrigue during the last 20 years. Fairway Field, which came on production in December 1991, lies in the restricted access area of the main Mobile Bay shipping fairway leading to the city of Mobile, Alabama and comprises state blocks 113 and 132.

The exploration and exploitation of the area south of Dauphin Island has been based primarily on the geophysical evaluation of a high-quality 3D seismic survey that was shot by an industry consortium in 1986 to image the eolian Norphlet unit at depths between 21,000 and 22,000 ft. An analog bay cable coupled with a 1920-cubic-inch sleeve-gun array was used to record a total of 7000 line miles over an area of about 250 sq. miles. Approximately 253,000 trace bins of 60-fold data in a 164 by 164 ft configuration were recorded over all or parts of 49 state and federal offshore blocks.

The enhancement to the geometric resolution of the lenticular Norphlet dune trends in this area with 3D imaging is significantly better than with 2D data. This imaging has led to a much better regional understanding of the Norphlet and consequently a much improved interpretation of the Shell/Amoco Fairway Field. The Norphlet isopach has been mapped with confidence in areas where the lenses are thick. This has led to the interpretation of a series of northwest-southeast trending longitudinal (linear) dune forms across the survey area. Post 3D exploration methodology has targeted these thick, paleogeomorphic features where they have been enhanced by subjacent salt structure.

Fortunately, Fairway Field has performed volumetrically. Reservoir decline has averaged about 9% per year starting from an initial production rate of about 200 mmcf per day. However, some of the wells have begun to demonstrate production characteristics that may be associated with dune sand heterogeneity and/or water coning. The ultimate recoverability for Fairway Field is projected to be between 50 and 60 percent with low abandonment pressures due to the uniformity and high mechanical strength of the dune matrix.

Biographical Sketch

Chip Story holds a B.S. degree in geological engineering from the South Dakota School of Mines and an M.S. degree in geophysics from the Colorado School of Mines. His career began with Amoco in 1977 with the early efforts in the Wyoming Thrust Belt. Subsequent projects included work in the Paradox Basin and Williston Basin. Project assignments starting in 1983 involved the Gulf of Mexico, onshore and offshore Norphlet Trend, Tuscaloosa Trend, Hackberry Trend, and Santos Basin offshore Brazil. Chip is currently assigned to the International Energy Organization in Amoco's Houston office where he is working the Liuhua Field in the South China Sea. His professional interests involve 3D seismic interpretation, visualization, and reservoir characterization technology. □