by John J. Farrelly, Julie A. D'Ablaing,
BP, Houston, Texas,
Gary Grubitz, and Michael Moore,
BHP Petroleum Americas, Houston, Texas

Into the unknown: a history of the discovery of the giant fields of the western Mississippi Fan foldbelt, Gulf of Mexico

Abstract

Over the last 15 years, several giant petroleum accumulations have been discovered in the Mississippi Fan foldbelt, deepwater Gulf of Mexico. In the mid 1980s, initial work was driven by interest in the nature of sections at the edge of, and immediately inboard of, the Sigsbee Escarpment. Outboard and counter-regional dip beneath an allochthonous salt canopy was recognized in early speculative 2D seismic transects.

In the first area-wide sales in 1984 and 1985, all but the exclusively subsalt features of the foldbelt were leased. Progress in assessing the foldbelt slowed with the oil price collapse of 1986. In 1987, Shell drilled the first foldbelt structure in Atwater Valley Block 471. The well mitigated the chief concern, a lack of reservoir, but dampened hopes due to a lack of petroleum. By mid-1994 only four of the trend's features remained leased.

In 1993, BP's regional work suggested that the potential of these very large structures merited another look. In addition to Neptune, which appeared to be of substantial size, several other features were leased, including Atlantis and Mad Dog.

Rumors of the 1995 Neptune discovery re-ignited interest in the area. Pre-merger Amoco had established a position in the very competitive 1996 and 1997 sales and further leveraged into the trend in 1998 by bringing a rig to expiring acreage. In 1998, three wells were drilled in the trend. The Neptune appraisal well was drilled in Atwater Block 574, the Atlantis discovery was drilled in Green Canyon Block 699 and the Mad Dog discovery was drilled in Green Canyon Block 826.

Seismic imaging was key in exploring the area. A combination of shallow salt sheets, significant seabed topography, and steep dip panels within the folds themselves created a significant imaging challenge. Integrated teams seismic contractor and oil company personnel addressed the issue aggressively, working with both proprietary 3D post-stack and pre-stack depth seismic volumes for the initial discovery at Neptune. Subsequent studies have utilized proprietary 3D seismic volumes.

Biographical sketches

John J. Farrelly is a subsurface team leader for BP. He attended the University of Texas at Austin receiving BS and MS degrees in 1984 and 1987. John joined the industry in 1988. He has worked in exploration and appraisal across the deepwater Gulf of Mexico and several other regions including Trinidad, Colombia, the northwest shelf of Australia, and New Zealand.

Julie d'Ablaing is a geologist at BP, Houston, Texas. She received a BSc degree in geology from Hull University, England in 1984 and an MSc degree in micropalaeontology from University of London, England in 1985. Julie began her career in BP Exploration in 1985 at Sunbury Research Center, transferring to Houston in 1989. Since moving to Houston, Julie has worked in deepwater exploration for BP, including exploration and early appraisal of the Mississippi Fan foldbelt trend prospects for six years. She recently began to work on the appraisal of the deepwater BP Amoco Crazy Horse discovery.

Gary Grubitz graduated from the University of Oklahoma in 1979 with a BS in geology and joined Cities Service Oil Co. Since 1981, he has worked in exploration for BHP Petroleum in Oklahoma City, Houston, and Melbourne. In 1995, he became BHP's exploration team leader for the Atwater fold belt.

Mike Moore graduated from the University of Alaska at Fairbanks in 1979 with an MS degree in geology. He went to work for Exxon holding several exploration and development positions, mainly in the Gulf of Mexico. Mike joined BHP in 1993 and has been involved in the exploration and appraisal of the Western Mississippi Fan foldbelt for the past five years.

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