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Developing a Marginal Field Using New Techniques: South Monagas Unit, Venezuela

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In 1992, the Venezuelan national oil company, PDVSA, awarded operating service agreements to foreign oil companies for reactivation of marginal oil fields. The South Monagas Unit contains three oil and gas fields, Uracoa, Bombal, and Tucupita, that were not producing prior to the award of the contract. As of November 1996, production from Uracoa exceeded 40 Mbbls/day of heavy oil from 20 vertical, 17 deviated, and 37 horizontal wells.

Initial uncertainties about heavy oil treatment capability, water and gas production, oil flow rates, and ultimate recoverable reserves led to a phased development plan that has incrementally reduced the risk of financial exposure over time. The first phase of development utilized conventional geologic techniques and vertical wells to test treatment facilities, mud and gravel-pack technologies, and flow rates. Positive results led to the next phase of development which focused on reservoir performance and well optimization. A horizontal drilling program was implemented in December 1993. A milestone in this program was the first gravel-pack horizontal well in Venezuela, completed in February 1995. A pilot 2-D seismic program in late 1994 confirmed that high-quality seismic could be acquired to significantly enhance the development of Uracoa. A 175 sq. km. 3-D survey was shot and processed in mid-1995. Concurrently, borehole imaging logs were acquired in vertical wells to determine internal reservoir heterogeneity and sand depositional models. The sequence stratigraphic model that evolved, based on outcrop field analogs, 3-D seismic stratigraphy, and regional well control, is being used to optimize field development. In addition, new exploration concepts are being tested without risk using strategically located water injection wells as test wells.

Since this talk was given to the AAPG conference last May, an additional 196 sq. km. of 3-D seismic has been acquired over the Bombal and Tucupita fields. A pilot horizontal well drilled at the Tucupita field resulted in an initial high-volume pump rate of 23,482 BOPD with no water.

Biographical Sketch

Thomas M. Skirvin received a B.S. degree in geology from Indiana University in 1985. Upon graduation, he worked at the Indiana Geological Survey for one year as a field geologist in a water resource assessment project. In 1989, he received his M.S. degree in geology from the University of New Mexico. He worked in the Deepwater Division of Shell Offshore Inc. from 1989 until the spring of 1994. At SOI, he worked with 3-D seismic data for the evaluation of prospects in federal lease sales and wildcat drilling, including Auger Field and nearby prospects.

Mr. Skirvin is currently employed with Benton Oil and Gas Company as the operations geologist and geophysicist for the South Monagas Unit in southeastern Venezuela. He has been using 2-D and 3-D seismic to coordinate the drilling of over 50 deviated and horizontal wells at Uracoa Field, where production has risen from 10,000 to over 45,000 BOPD since 1995.