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Modeling a Structurally Complex Reservoir — Boquerón Field – Eastern Venezuelan Thrust Belt

Summary

A structural and reservoir model was constructed for Boquerón Field in order to plan locations for development and injection wells. Four wells were drilled which tested the validity of assumptions used for the model. The deterministic approach for building the model was satisfactory in terms of predicting the geometry and distribution of the reservoir in areas close to well control. However, in flank areas the structural geometry was not accurately modeled. Depth conversion of the seismic did not originally incorporate complex velocity variations in the imbricated Carapita shale above the reservoir. The structural model was corrected by creating a time-depth cube that accounted for these velocity variations.

Introduction

Boquerón Field is located in the Eastern Venezuela Basin along the El Furrial Trend approximately 20km north east of El Furrial Field (Figure 1). The field, discovered in 1989, has cumulative production of about 44 million barrels (12/2004). Current daily production averages between 8,000 and 10,000 barrels of 28-33 API high asphaltene oil. The depth of the reservoir ranges between 15800 and 17200 ft. TVDSS. ■



Location map Eastern Venezuela

Biographical Sketch

CATHY FARMER is currently a senior exploration geologist for BP's Gulf of Mexico deep gas exploration team. Prior to that, she was the lead geologist for all of BP's production and exploration business in Venezuela. She has twenty-eight years of experience in the oil and gas industry. Most of her career has been focused on worldwide exploration for oil and gas in



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locations such as Venezuela, Trinidad, Norway, West Africa, and the Middle East. In 2000 she was the project geologist responsible for BP's Red Mango gas discovery. Before Trinidad, she spent six years as an expatriate in Stavanger, Norway where she coordinated a project to revise the reservoir model for Amoco's Valhall Field and explored in the Norwegian sector of the North Sea. In the late 1980's, she was assigned to Amoco's Africa and Middle East Division where she generated exploration prospects in the Congo, Jordan and the United States.

She has spoken at technical conferences sponsored by the American Association of Petroleum Geologists, the Geological Society of London, the Society of Exploration Geophysicists, and the European Association of Geoscientists and Engineers. Her talk on Boqueron Field was invited for the "Best Case Histories" session at the SEG (Houston, 2005), and was presented to the London Geological Society in February 2006 for their conference on modelling structurally complex reservoirs.

Farmer studied geology and geological engineering at the Colorado School of Mines where she received her Master of Science degree in geology in 1981, and her Bachelor of Science degree in geological engineering in 1979. She received numerous scholarships and awards from Colorado School of Mines the most notable being "Most Outstanding Geology Graduate, 1979".