

## **The Greater Angostura Development Project, Republic of Trinidad and Tobago: A Case Example of Successful Exploration and Fast-Track Development**

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### **ABSTRACT**

The Greater Angostura Development Project is part of Trinidad Offshore Block 2c, located in 36-46 m of water on the continental shelf about 37 km east of the Republic of Trinidad and Tobago in the eastern (Trinidadian) sector of the Eastern Venezuela Basin. Talisman (25%) and Joint Venture (JV) partners BHPBilliton (operator, 45%) and Total (30%), signed a Production Sharing Contract on April 22, 1996, and acquired a 3D seismic survey in 1997. By the spring of 2002, the JV had drilled four exploration and three appraisal wells and discovered significant oil and gas resources within a large faulted structure named the Greater Angostura Structure. A second 3D was acquired in late 2001 to better image the target reservoir, refine the oil in place, and derive locations for development drilling.

The core development area comprises four main fault blocks. Oil reserves are essentially located in two relatively thick oil columns within the Kairi and Canteen fault blocks, whereas the bulk of the gas reserves reside in the Angostura and Aripo fault blocks. The reservoir is within the Oligocene-aged Angostura Formation and composed of a thick succession of interbedded sandstones, conglomerates and shaly strata deposited primarily from sediment gravity flows in relatively deep water. The succession has been divided by three shaly units that occur laterally across the Greater Angostura area. The shaly units separate laterally continuous thick sandy packages with both sheet and lobate forms. The latter could limit lateral reservoir connectivity while the shaly units would create vertical permeability barriers. Conversely, vertical open fractures have been observed in core and these and sub seismic faulting could improve vertical transmissibility. Reservoir porosity is secondary and its distribution and quality is difficult to predict. Core would suggest that flow paths will be tortuous and affected by baffles and barriers at a variety of scales.

The area is active tectonically and has been disrupted by strike-slip, extensional and thrust faults. Fault mapping from seismic is challenging and uncertainty exists as to the location and mechanism(s) of compartmentalization. The basin's complex structural, depositional and diagenetic history leads to uncertainties in terms of reserves and production expectations. Estimates of reserves discovered to date in the core development area range from 110 MMstb and 1.467 tcf (P90) to 198 MMstb and 1.755 tcf (P10).

The fast-track development plan called for first oil production 24 months following project sanction. Development drilling, with plans for up to 20 horizontal wells, 10 deviated pilot holes (for gas re-injection) and 1 observation well, commenced in October 2003. First oil is expected in 1Q, 2005 at an initial rate of about 65-80 mstb/d. Oil development facilities to be constructed include a central processing platform, 4 wellhead platforms with associated in-field gathering and distribution lines, an 18 inch main oil export trunk line to onshore Trinidad, onshore storage tanks and a SBM offloading facility. A second development phase will target the gas reserves.