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The Challenges and Advantages of Openhole Completions in the Manati Gas Field

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Abstract

The offshore northeast Brazil Manati field is located in the Camamu Bay with water depths less than 50 m. The sandstone gas reservoirs in this field have net pays with a thickness greater than 300 m and an average true vertical depth (TVD) of 1,400 m.

The original development project for this field did not include sand control for the initially forecasted production rates. However, the possibility of expanding the gas production rates of each well to more than 1 MMm³/D increased the associated sand production risk and led to the need for evaluating the best sand-control solution while considering the cost/benefit ratio.

This paper explains why an openhole gravel-pack completion was the best option in spite of some challenges such as large vertical net pays and high hydrostatic pressures of the sodium formate-based reservoir, drill-in fluid, and the sodium-potassium formate completion brine.

Compared with other alternatives such as cased hole gravel-pack or frac-pack completions, the openhole gravel-pack option has several advantages such as eliminating the need to run a liner, which requires good cementing isolation at the top; eliminating the cost of perforating long intervals; reducing the number of operations; and saving more than 10 days of rig time.

Introduction

The Manati field is located in the southern portion of the Bahia state and approximately 10 km offshore, where water depth varies from 35 to 50 m. This area is extremely environmental sensitive (**Fig. 1**)

The field was discovered in 2000, through a prospect based on the seismic interpretation. The reservoir is constituted by the tabular fluvial sands of the Sergi Formation, capped by the shales of Itaípe Formation and sealed laterally at north and east by the shales of Morro do Barro Formation, which were deposited in the space created by the erosive unconformity of the Tinharé Canyon, of Rio da Serra age. At east and south, the Mutá fault (north-south) and yet another northeast-southwest fault seal the accumulation through the contact with the same shales of Morro do Barro Formation (Filho, 2005).

During the drilling of a pilot well, a 187-m free-gas reservoir was initially identified. Perforating other exploratory wells showed a gas/water contact at 1,570 m vertical depth and net pay from 230 to 370 m in a reservoir with very good petrophysics properties. The evaluation of those data increased the initial reserves forecast for the Manati field, making it the largest gas reservoir in the north-northeast Brazilian region.