CASE STUDY

CHALLENGE
Design and install well completions capable of delivering up to 400 MMcf/d of gas from each of three wells without sand production or further intervention.

SOLUTION
Collaborated with BP to design, test, and deploy openhole completion design that included the QUANTUM MAX HPHT gravel- and frac-pack packer.

RESULTS
Simplified completion operations, reduced installation time, and delivered three wells with production up to 870 MMcf/d—at the time, the highest of any BP-operated field worldwide.

“"All three Cannonball wells were delivered with zero NPT attributable to Schlumberger. This is no mean achievement on what has turned out to be the three biggest-producing wells in BP. I really appreciate all the help and support we received from your team during the planning and execution of these challenging openhole gravel-pack wells.”

Eamon O’Connell
Completions manager
BP Trinidad and Tobago

Solids production increases risk of damage to completion hardware and surface equipment
BP Trinidad and Tobago discovered reserves of about 1 Tcf of gas in the Cannonball field offshore Trinidad. The target formation was about 280 ft [85.3 m] thick, with high permeability and porosity. The formation pressure was slightly higher than 6,400 psi [44.1 MPa], with a temperature of 220 degF at 12,350-ft TVD [104.4 degC at 3,764.3-m TVD].

Because of high rock strength at the reservoir, the operator knew that sand production would be small; however, at the high production rates planned (up to 400 MMcf/d in each of the three wells), any solids production could damage the completion hardware and the surface equipment. BP planned to complete at least three wells to ensure sufficient production to meet contractual obligations of 1 Bcf/d.

Openhole gravel-pack completions mitigates risk of equipment damage
After careful study, BP opted for a Schlumberger openhole gravel-pack completion. The companies collaborated closely to create an optimal design that incorporated knowledge gained while working in the area, standardized to prevent surprises that might jeopardize the job execution.

One of the parameters decided upon was to eliminate the use of a separate production packer. For this completion design, the QUANTUM MAX packer served as the production packer, a factor central to the development plan. Developed for BP, the 10¾-in QUANTUM MAX packer was the first-ever ISO V0-certified gravel-pack packer. A special system integration test was performed for the packer and the wellhead and tree.

Other elements of the completion design included a water-base drill-in fluid, premium Alternate Path screens for sand control, an FIV formation isolation valve, and the QUANTUM MAX packer with antiswab capability for horizontal wells. In addition, pressure and temperature recording devices were deployed.

BP achieves combined record production
The Cannonball project was completed under cost and within budget. The QUANTUM MAX packer was central to this achievement, because it eliminated the need for production packers and the associated costs of purchase, testing, and installation. Partly because of this streamlining, the second and third wells took 9.5 days less than anticipated to finish. The prolific field became the highest-producing BP-operated field worldwide at the time, producing 870 MMcf/d. Production was constrained by surface equipment capacity, but removal of those constraints meant that the three wells could be produced at combined rates totaling 1.2 Bcf/d.

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