

Usari BQI Paradigm Shift: 7,000 to 45,000 BOPD in 9 Months, Offshore Nigeria

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The BQI (1-US1) is the largest in place volume and shallowest (~3600' TVDss) reservoir in the Usari field. The 70' thick oil column has a gas cap. Due to its shallow depth, the oil is more viscous (5.6 cp; 20° API) and has relatively low solution gas-oil ratio (183 scf/STB). The trap is a four-way closure at the Base Qua Iboe (BQI) Unconformity with reservoir units subcropping the BQI. The reservoir consists of channel sands (with occasional minor tidal influence), having good lateral continuity, high permeability and a moderate-to-strong water drive.

The reservoir was developed in 1999-2001 with four horizontal wells located at approximately the mid-oil column. Completion lengths ranged from 1500 to 2000 feet. The wells were completed with 27/8" tubing, which restricted total liquid production to 3,000 bopd. The initial development concept involved low production rates to minimize water cut, 2000' or shorter horizontal lengths (no contribution expected beyond 2000'), inherently low recoveries due to the crude's viscosity and conventional 805m spacing. At year-end 2004, these wells produced ~3,000 bopd with an average 50 % water cut.

In 2004, the evaluation of analogous Australian and Nigerian fields suggested much higher recoveries possible by increasing horizontal completion lengths (up to 4000'), maximizing rates through the use of larger tubing, decreasing well spacing and maintaining production until water cuts exceeds 90%. Using the analog information and an updated geologic model, a BQI simulation model validated some of these concepts. In 2005 within 9 months, seven horizontal wells were drilled, completed and each flowed ~7,000 bopd (the four pre-existing wells were re-drilled and re-aligned at a regulatory spacing of 800m and three new wells were also drilled). This resulted in a shift in paradigm of production from 7,000 bopd to ~45,000 bopd over a period of 9 months.