World Academy of Science, Engineering and Technology
International Journal of Energy and Power Engineering
Vol:14, No:05, 2020

Targeting and Developing the Remaining Pay in an Ageing Field: The Ovhor Field Experience

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Abstract : Understanding the complexity in the distribution of hydrocarbon in a simple structure with flow baffles and connectivity issues is critical in targeting and developing the remaining pay in a mature asset. Subtle facies changes (heterogeneity) can have a drastic impact on reservoir fluids movement, and this can be crucial to identifying sweet spots in mature fields. This study aims to evaluate selected reservoirs in Ovhor Field, Niger Delta, Nigeria, with the objective of optimising production from the field by targeting undeveloped oil reserves, bypassed pay, and gaining an improved understanding of the selected reservoirs to increase the company's reservoir limits. The task at the Ovhor field is complicated by poor stratigraphic seismic resolution over the field. 3-D geological (sedimentology and stratigraphy) interpretation, use of results from quantitative interpretation, and proper understanding of production data have been used in recognizing flow baffles and undeveloped compartments in the field. The full field 3-D model has been constructed in such a way as to capture heterogeneities and the various compartments in the field to aid the proper simulation of fluid flow in the field for future production prediction, proper history matching and design of good trajectories to adequately target undeveloped oil in the field. Reservoir property models (porosity, permeability, and net-to-gross) have been constructed by biasing log interpreted properties to a defined environment of deposition model whose interpretation captures the heterogeneities expected in the studied reservoirs. At least, two scenarios have been modelled for most of the studied reservoirs to capture the range of uncertainties we are dealing with. The total original oil in-place volume for the four reservoirs studied is 157 MMstb. The cumulative oil and gas production from the selected reservoirs are 67.64 MMstb and 9.76 Bscf respectively, with current production rate of about 7035 bopd and 4.38 MMscf/d (as at 31/08/2019). Dynamic simulation and production forecast on the 4 reservoirs gave an undeveloped reserve of about 3.82 MMstb from two (2) identified oil restoration activities. These activities include side-tracking and re-perforation of existing wells. This integrated approach led to the identification of bypassed oil in some areas of the selected reservoirs and an improved understanding of the studied reservoirs. New wells have/are being drilled now to test the results of our studies, and the results are very confirmatory and satisfying.

Keywords : facies, flow baffle, bypassed pay, heterogeneities, history matching, reservoir limit
Conference Title : ICOGR 2020 : International Conference on Oil and Gas Research
Conference Location : Montreal, Canada
Conference Dates : May 18-19, 2020