

## Mature Field Rejuvenation Using Hydraulic Fracturing: A Case Study of Tight Mature Oilfield with Reveal Simulator

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**Abstract :** The main characteristics of unconventional reservoirs include low-to ultra low permeability and low-to-moderate porosity. As a result, hydrocarbon production from these reservoirs requires different extraction technologies than from conventional resources. An unconventional reservoir must be stimulated to produce hydrocarbons at an acceptable flow rate to recover commercial quantities of hydrocarbons. Permeability for unconventional reservoirs is mostly below 0.1 mD, and reservoirs with permeability above 0.1 mD are generally considered to be conventional. The hydrocarbon held in these formations naturally will not move towards producing wells at economic rates without aid from hydraulic fracturing which is the only technique to assess these tight reservoir productions. Horizontal well with multi-stage fracking is the key technique to maximize stimulated reservoir volume and achieve commercial production. The main objective of this research paper is to investigate development options for a tight mature oilfield. This includes multistage hydraulic fracturing and spacing by building of reservoir models in the Reveal simulator to model potential development options based on sidetracking the existing vertical well. To simulate potential options, reservoir models have been built in the Reveal. An existing Petrel geological model was used to build the static parts of these models. A FBHP limit of 40bars was assumed to take into account pump operating limits and to maintain the reservoir pressure above the bubble point. 300m, 600m and 900m lateral length wells were modelled, in conjunction with 4, 6 and 8 stages of fracs. Simulation results indicate that higher initial recoveries and peak oil rates are obtained with longer well lengths and also with more fracs and spacing. For a 25year forecast, the ultimate recovery ranging from 0.4% to 2.56% for 300m and 1000m laterals respectively. The 900m lateral with 8 fracs 100m spacing gave the highest peak rate of 120m<sup>3</sup>/day, with the 600m and 300m cases giving initial peak rates of 110m<sup>3</sup>/day. Similarly, recovery factor for the 900m lateral with 8 fracs and 100m spacing was the highest at 2.65% after 25 years. The corresponding values for the 300m and 600m laterals were 2.37% and 2.42%. Therefore, the study suggests that longer laterals with 8 fracs and 100m spacing provided the optimal recovery, and this design is recommended as the basis for further study.

**Keywords :** unconventional, resource, hydraulic, fracturing

**Conference Title :** ICSFR 2017 : International Conference on Shale Fuel Reserves

**Conference Location :** London, United Kingdom

**Conference Dates :** October 19-20, 2017