SPE 71824 A Model-Based Approach to Assist Operation of a Gas-Constrained Multizone Intelligent Completion in the Ness Formation

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A horizontal well with three downhole control valves has been in use for the past year and the objective is to history match the well model to the data. The modelling methodology to be undertaken will assess the impact of the downhole flow control on production performance as well as problems of zonal allocation and valve settings selection.

The well produces from three different sands. The middle and lower sands are the main producers while the upper sand aids the lift performance. There are a number of advantages to commingling the production from all of the layers, the main ones are:

1. Use of slot son the platform can tap multiple targets
2. Production is accelerated when compared with a sequential approach
3. The use of the in-situ gas can aid lift under high wellhead pressures

The first step in matching the well performance was to test each zone and then control the gas production. As no simulation model was available, each of the zones were treated as separate tanks and the well performance was analysed in the following way:

1. Determine if well could produce comingled fluids with flow control
2. Analyse the effects of comingling the fluids without flow control
3. Produce each layer sequentially (so non-comingled)

Having history matched the well and understood the well formation, predictive simulations were carried out for various choke settings to determine the best way to keep the GOR below a requisite value.

CONCLUSION:

The impact of downhole flow control on well production performance was assessed using a consistent modelling methodology. It was found that non-controlled comingled production would be too risky due to the uncertainty in the pressure communication between the individual channel sands and the main reservoir. The selected modelling methodology also provided estimates of the zonal contributions which highlighted that the middle zone had been the main oil producer while the top zone was the main gas producer so valve settings could be determined based upon this information.