



Maximizing Opportunity, Managing Risk: Integrated decision-based modelling for the value optimization of production

Author: ¹Rashad Ramjohn, Elizabeth Sookal, Nigel Robertson, Pichate Rattananon, Leon Erriah
¹rashad.ramjohn@shell.com & Elizabeth Sookal- presenters, Shell Trinidad & Tobago

Theme: HR: Brownfield development

Key Words: Integration, Decision-based Modeling

Early in the production life of a single well development, it became apparent the reservoir behaviour was outside of expectation based on the observed reduction in bottom hole flowing pressure. Pressure transient analysis suggested that either there were faults very close to the well or there was a significant deterioration in reservoir quality away from the well.

There were no indications of crossing faults while drilling and no faults observed on seismic at the time. There is a known gas water contact approximately 130ft below the well and as the geological model did not support the observed behaviour, there was an increased risk of Early Water Breakthrough. An opportunity arose to ramp up the well to capitalize on the gas market price adding value across the Integrated Gas Value chain. Due to the concern that increasing the rate could accelerate water coning and the low confidence in the current model predictability, a reverse engineering approach was attempted where geological scenarios were replicated dynamically in simplified reservoir models.

Scenarios included lower gas in place, a more homogeneous reservoir, reduced vertical and lateral connectivity and enhanced vertical connectivity. These scenarios allowed the team to differentiate the sensitivity and impact in terms of water breakthrough and ultimate recovery. Although the different realizations showed a wide range in ultimate recovery as expected, the analysis illustrated that there was low sensitivity to the actual well offtake rates within the same realization and as a result that a higher rate would give a higher life cycle value. This approach helped the team to differentiate decision related impacts (controllable action) from the uncertainty of the subsurface realizations (it is what it is) and facilitated the subsequent informed decision.