Completion Solutions

Intelligent Completion Technology Enables Selective Injection and Production in Mature Field Offshore China

Location: South China Sea - Vietnam

Overview – Pressure maintenance support in mature fields where permeability/ heterogeneity is present, requires proper distribution of injected water into the respective zones of interest. This process can be extremely challenging if no method for allocating the proper amount of water into each zone is available. One operator in the South China Sea was operating in a mature field that had been producing for approximately seven years, and had experienced a relatively steep production decline. The legacy single-string completions installed in the water injector wells prevented the operator from distributing injection rates across the heterogeneous reservoir. This affected the pressure maintenance of the field, resulting in a decline of the reservoir pressure at a higher rate than desired.

Solution – Halliburton deployed a two-zone stacked horizontal intelligent completion. In order to maximize hydraulic horsepower at the surface for water injection, it was necessary to understand the water injection profile that was expected for these two zones. Sensitivity analysis of the injectivity performance with and without zonal control was performed using Nodal analysis. Based on this analysis, a suitable choke trim for the HVC interval control valve (HVC-ICV) was selected to address the range of reservoir uncertainties expected. The solution included discrete choke positioning ICVs for zonal control, a lower shrouded HVC-ICV, and upper HVC-ICV with deflector to control and optimize distribution of the injected water across the heterogeneous reservoir. Standalone screens were used for sand control, while an openhole Swellpacker® system in the annulus and a sealbore inside the screens was utilized to provide zonal isolation between the two zones of the reservoir.

Result – This was the first intelligent completion the operator had installed, and as it turned out, the injection performance of the well was in line with what the initial modelling had predicted. A two-zone stacked intelligent completion not only addressed the declining reservoir pressure challenge, it addressed the space limitations and minimized any reengineering that was required. The results gave the operator confidence in Halliburton's intelligent completion technology, and five additional wells were subsequently targeted for intelligent completions.

Reference technical paper IPTC-17080-MS

CHALLENGES	SOLUTIONS	RESULTS
• **Declining reservoir pressure**	• **Two-zone stacked** intelligent completion	• **Zonal control** of the compartments (two zones)
• **No zonal control**	• **HVC-ICV** to control and optimize distribution of the injected water across the reservoir	• **Optimized distribution** of the injected water – target total rate 5000 bwpd

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