

Completion Solutions

Complex Subsea ESTMZ™ System and Intelligent Completion Technology Saves Customer Major Setbacks

Location: Indonesia

Overview

An operator wanted to exploit the gas resources in the northern Indonesian waters. The reservoir had gas accumulation over 1,200 feet in eight separate zones; however, only six zones were commercially viable. Initial data suggested that 40% of the gas resources were located in one zone, while another zone had a high risk of early water breakthrough. The initial school of thought was to target the different zones in this reservoir with three subsea wells using conventional completion and openhole standalone screens (OHSAS) or single-trip cased hole fracpacks (CHFP) as a means of sand control in the payzone section. Unfortunately, the estimated cost for drilling and completing the three subsea wells was over 50 MM USD. Moreover, the well with high gas water content (GWC) would have to be shut-in if the water production from this well exceeded the capabilities of the production facility.



Additional study concluded that drilling one subsea well and using intelligent completion technology for zonal control and monitoring of all six zones helped reduce CAPEX, OPEX, and provided maximum gas recovery from the field. Since all six zones would be gravel packed, the intelligent completion equipment needed to be installed inside of the gravel pack screens.



Map of Indonesia

The initial vendor contracted to install the completion had equipment issues that could not be resolved, consequently, leaving the project on hold while rig costs mounted. Halliburton was given the opportunity to evaluate the challenges ahead and offer a customized solution.

Solution

Since the reservoir required sand control and varying degrees of stimulation, Halliburton proposed the Enhanced Single Trip Multizone (ESTMZ™) cased hole frac-pack system to treat all six zones in one trip. A six-zone direct hydraulics (N+1) intelligent completion system was placed inside the ESTMZ system. HS (on/off) interval control valves (ICVs) were installed in each zone for zonal selectivity and shut off when water breakthrough occurred. Six dual sensor ROC™ reservoir monitoring systems were installed in each zone to measure temperature and pressure (annulus/tubing). For zonal isolation, seal assemblies with the ability to bypass the umbilicals were deployed as part of the intelligent completion string and spaced out to land inside the seal bores of the ESTMZ system.

Result

Due to the previous vendor's equipment issues, Halliburton only had six months to develop a solution and have the equipment ready for installation in the wellbore. Halliburton rose to the challenge. A customized solution and equipment was expedited to meet the required timeline. Since system installation experience was limited in this area, competent personnel and subject matter experts were made available to execute this complex completion design to meet the desired objective. This tailored solution and flawless execution led this operator to complete five additional wells in the same field using Halliburton technology.

Moreover, the operator saw the time savings offered by the intelligent completions during subsequent well testing. Different zones could be simultaneously shut-in, for pressure build up, and flowed without downtime during well testing operations.

(Reference SPE-165899-MS and OTC-24879-MS)

| CHALLENGES | SOLUTIONS | RESULTS |
|--|---|--|
| Multiple zones with the potential for water coning | Single trip sand control treatment utilizing ESTMZ™ system | Job planning and equipment delivery were completed in the required lead time |
| Reduce CAPEX / OPEX | Six-zone intelligent completion | Successful execution of complex subsea ESTMZ system and intelligent completion |
| Aggressive lead time | HS on/off ICVs for zonal control and dual sensor ROC™ gauges for monitoring | Time savings during subsequent well test operations |