EWT INTELLIGENT WELL COMPLETION DESIGN CASE STUDY

Tullow Oil

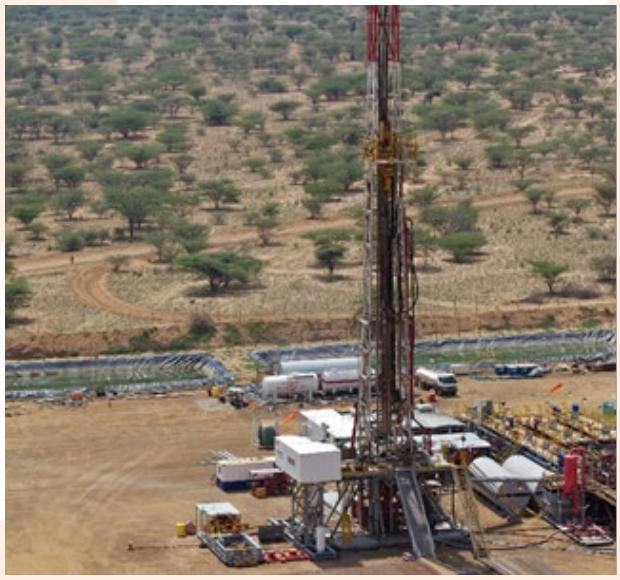
Onshore Turkana Basin, Kenya

AWT DISCIPLINES

Completions Engineering

Equipment Specification & Procurement

Operations Support



PROJECT BACKGROUND

Tullow wanted to acquire interference test data from two discovered fields Amosing and Ngamia, in the Turkana Basin, onshore Kenya. The reservoirs were complex multi-layer sand/shale systems with sub-hydrostatic original pressures and the crude contained 35 – 40% wax content.

AWT WORKSCOPE

The AWT brief was to design a well completion which allowed independent flow and data from individual layers to be acquired while also optimising the use of available drilling units for an extended well test (EWT) campaign.

AWT ADDED VALUE

To satisfy the data acquisition and flow control objectives, the resulting completion incorporated artificial lift via hydraulic rod pump, multiple packers and remotely controlled inflow control valves (ICV), permanent downhole pressure/temperature gauges and distributed temperature sensing (DTS).

The use of intelligent completions in combination with rig-less clean-up and testing for the EWT wells resulted in rig time savings of approximately 25 - 30 days per well compared to Tullow's benchmark timing for completion and testing of previous appraisal wells in the Turkana Basin.

This was equivalent to a cost saving of $7.5MM per well. The benefits of the approach were:

- Rig-less testing allowed acceleration of the drilling programme in conjunction with the well testing activity.
- The data which was captured from the well clean-up flows and the EWT production phases had a significant effect on the formulation of field development plans, particularly with respect to well spacing and identification of the required number of development wells.
- The approach could be applied to field appraisal data gathering in any discovered field, potentially enabling the acceleration of development planning and reduction of the time to first oil production.
- Interference data acquired significantly de-risked reservoir continuity and improved subsurface understanding to narrow the range of uncertainty around field recovery factors

For more information contact:
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The commercial feasibility assessment of the identified fields indicated that:

- The approach can be applied to field appraisal data gathering in any discovered field, potentially enabling the acceleration of development planning and reduction of the time to first oil production.
- Interference data acquired significantly derisks reservoir continuity and improves subsurface understanding to narrow the range of uncertainty around field recovery factors.
- Capture of DTS data is enabling the evaluation of the downhole heater performance in real-time. It is expected that when wells are produced for longer periods the risk of wax deposition related flow assurance problems is reduced (as a result of more residual heat remaining in the wellbore). This could lead to modifications to downhole heating i.e. a reduction in the installed heater length, which could have a significant effect on development well costs.
- The immediate availability of the five permanent completions enables consideration of early production to accelerate the revenue stream from the Amosing and Ngamia fields.
- Combination cases provide better economic outcomes as compared to single field cases. Field aggregation provides significant value for commercialisation, including providing alternatives for commercial stand-alone development using independent new processing plants.
- Further technical optimisation of combination cases is required.

The project is the subject of SPE 178878 which was presented at the SPE/IADC Conference in Fort Worth, Texas in March 2016.

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