INFLOW CONTROL

TENDEKA

in collaboration with interwell

Case Study:

A Collaborative Approach to Maximise Recovery and Reduce Intervention Footprint

Reduction in gas-oil ratio ensures long term oil production in gas-cap blowdown application

Well Data

Location: North Sea, UK

Reservoir Type: Chalk

Application: Gas Blow Down

Date: May 2021

Background

A major UK North Sea operator was looking to maximise recovery from a subsea field during the 'blowdown' stage of its lifecycle, but also reduce their carbon footprint by reducing the need for future well interventions.

The field is a fractured chalk reservoir which has been developed over the past 20+ years through waterflood. To maximise economic recovery for the final phase of development, the field has entered blowdown.

The Challenge

In blowdown, the gas cap will expand, and the oil and water columns will slump, requiring the completed interval of each well to be gradually moved deeper over time to enhance oil recovery. When carried out conventionally, this process requires multiple interventions over time to isolate the shallower perforations as they gas out, which in a subsea well can prove to be economically prohibitive.

The solution would need to restrict gas production from an upper zone whilst ensuring reservoir energy was maintained for oil production from the lower perforated intervals.

As the operation was being carried out from a Light Well Intervention Vessel, the solution also had to be prepared with optional configurations to match production and saturation logging data gathered on location, be set in 5" liner, and be capable of passing through a 5½" completion with a 4.267" minimum restriction ID.

The Solution

Working in collaboration with Tendeka, Interwell proposed a custom Multi-Run Anchored Production Straddle (APS) with a 3.89" OD that would directly interface with a sub designed to house Tendeka's FloSure Autonomous Inflow Control Devices (AICDs).

Unlike conventional Inflow Control Devices, AICDs react autonomously to the fluid properties at each perforation interval and allow initial oil production but restrict production from perforations with high gas flows as they develop by introducing an additional pressure drop.

Due to the potential risk of damage to the liner from blowdown, the operator wanted to ensure that they had sufficient primary and contingency equipment to give them the best chance of operational success, therefore a contingency Custom Multi-Run APS with a smaller 3.60" OD was also mobilised.

The AICD Subs directly interfaced with both the 3.89" and 3.60" OD APS solutions. The AICD Subs could house up to 40 AICDs with the ability to change out blanks and AICDs depending on the results of the production and saturation logging.

Prior to the APS being deployed, a Drift and Multi Finger Caliper run was carried out to identify if there were any unknown restrictions in the wellbore to ensure that the larger 3.89" OD straddle could be run to the required setting depth.

This was followed by a Production and Saturation log run being carried out and the data gathered was used to determine that the AICD Sub should be assembled with 8 AICDs.

The Mutli-Run APS lower module was run and correlated to a setting depth below the upper perforated interval determined by the logging data using e-line and then set using the Electronic Setting Tool (EST) with real-time activation from surface.

The upper module, made up to the AICD Sub, was then run on e-line. Once the upper APS module stinger had engaged in the lower APS module female latch, the upper module was also set up using an EST with real-time activation from surface, positioning the AICD Sub with 8 AICDs over the upper perforated interval.

Project Results

Once the well was brought back online, results showed that the system had successfully restricted gas and significantly increased oil production.

Surface facility production constraints were also improved resulting in an increased oil production from the field.

The collaboration of two technologies offers a new way to reduce the intervention carbon footprint by eliminating future well interventions, maximising efficiencies and contributing towards net zero.