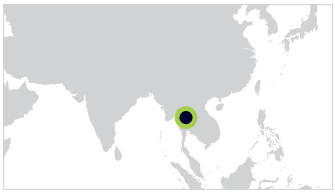
TGT

Case study Reservoir Flow

Detailed characterisation of flow contributions enables operator to optimise waterflood performance



Location: Thailand
Well type: Oil producer
Reference: SPE-191011

Case benefits
- Identified active layers using Chorus acoustic platform
- Calculated flow contributions in the producer
- Provided information for potential zonal isolation or recompletion programs that would enable the operator to optimise waterflood performance

Challenge

Waterflooding involves injecting water into a reservoir, usually to increase pressure and thus stimulate production. However, when this action is being performed in a multi-layer reservoir it requires constant monitoring to identify the potential for water breakthroughs and target intervals not flowing, that may affect fluid production. The operator's main goal was to gain a quantitative assessment of the flow contributions from each layer in the producer well, particularly in the under-saturated reservoir areas which hold free gas behind the tubing and casing.

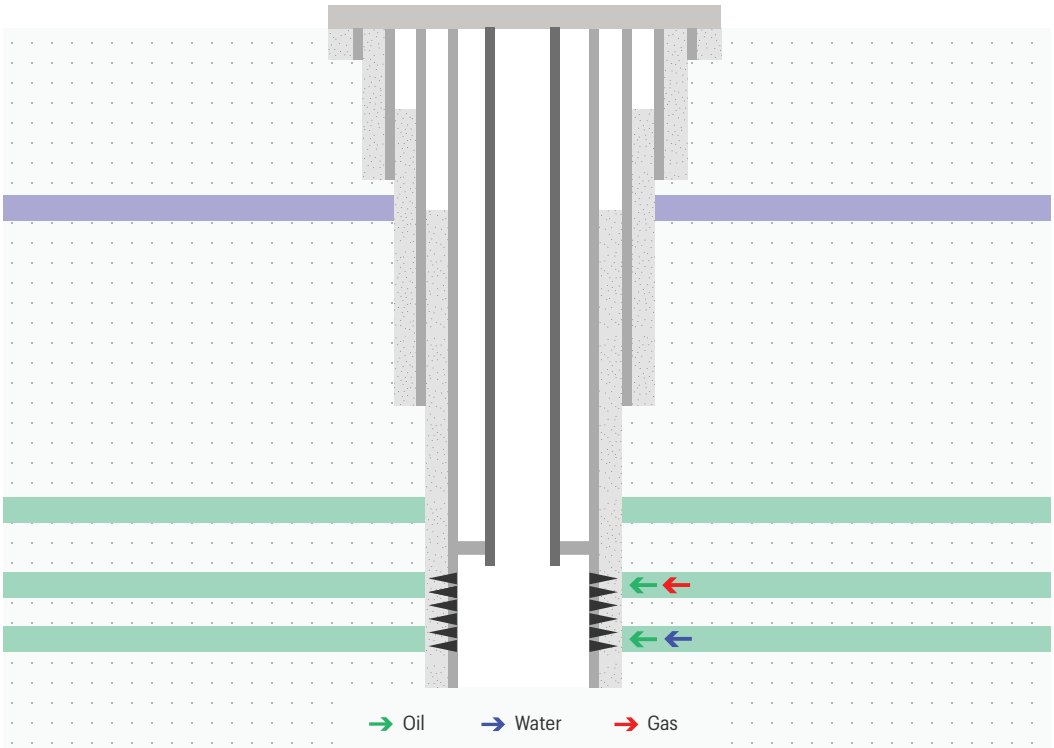
Solution

The operator selected TGT's Reservoir Flow product which is delivered by the True Flow diagnostic system, using Chorus (acoustic) and Cascade (thermal) technology. Reservoir Flow complements conventional Wellbore Flow (conventional production logging) diagnostics by evaluating flow profiles behind casing.

The diagnostic programme for data acquisition involved two passes for flowing and shut in surveys. The Chorus surveys revealed the flow contribution from each layer, which is a significant advantage over conventional production logging (PLT).

Result

The producer under investigation was completed for separate production from two sections of the multi-layer reservoir, with the upper section gathering production through the sliding sleeve door (SSD).



Reservoir Flow example well sketch.

Reservoir Flow locates flow profiles behind casing at the well-to-reservoir interface.

Delivered by our True Flow system with Chorus and Cascade technology, Reservoir Flow provides the clarity and insight needed to manage well system performance more effectively.

Reservoir Flow is commonly used to diagnose unexpected or undesirable well system behavior, but it can also be used proactively to ensure the well system is working properly.

The diagnostics were performed across the target reservoir (Figure 1). Chorus (acoustic) platform captured multiple high-amplitude, broadband, depth-specific acoustic signals across the most permeable layers in both the flowing and shut-in regimes showing the fluid flow through the reservoir layers. The acoustic signals observed in the long shut-in regime indicated the presence of multiple wellbore crossflows, due to formation pressure differences between the layers and the heterogeneity of the oil displacement.

Cascade platform made it possible to estimate the production profiles across both sections of the multi-layer reservoir, including the one behind the tubing, which was not possible by using PLT data alone.

The diagnostic results provided the answers the operator needed to plan an effective workover. Plan included the zonal isolation of water filled layers and a well recompletion that would improve waterflooding performance and increase recovery.

True Flow system uses a combination of Chorus, Cascade and PLT to reveal phase segregation and downhole contributions in this producer.