

Case Study: Monitoring for injectivity and integrity

Applying DTS to understand packer integrity and outflow performance with changing flow control device setting.

Well Data

Location: Williston, North Dakota
Well Type: Lateral Oil Producer
Date: October 2021



The water injection well is horizontal and cuts across three main formations in the reservoir. To control outflow, it is completed with three swellable packers and ICVs. Permanent fibre optic cable clamped to the tubing string is also installed to capture distributed temperature sensing (DTS) data.

In order to plan future field development, the operator needed to understand the performance of the current well.

The Challenge

There were three main challenges the client had with this well

- Confirm the validity of percentage outflow to the different zones calculated using nodal analysis software from a different source (in this case DTS)
- Confirm that changing the ICV settings is producing the desired result down-hole
- Confirm the swellable packers still hold pressure within the zone and are not leaking

TAQA Solution

The cost of doing an intervention in a subsea well can be prohibitive and since there was already a DTS system in place, TAQA’s reservoir engineer can use this to answer all the questions the client had about the well, thus eliminating the need for an intervention.

The Software FloQuest was used for data processing. The processing carried out included trimming off excess data before the well head and depth shifting the traces so that recorded events align with the completion diagram.

After completing the data processing, the outflow modelling tool was then used to calculate an outflow profile for the well.

Project Results

The outflow profile for two different periods in the well were provided and it showed that when ICV position changed, the outflow profile in the well changed accordingly.

It also confirmed that the deepest isolation packer was leaking because the ICV in that zone was closed but injected fluid still made its way there.

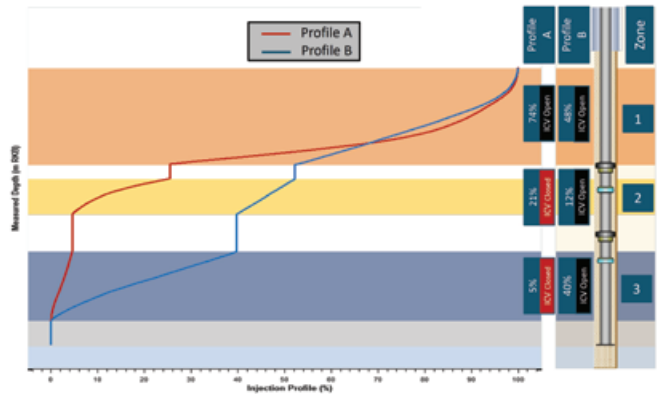


Figure 1 Outflow profiles

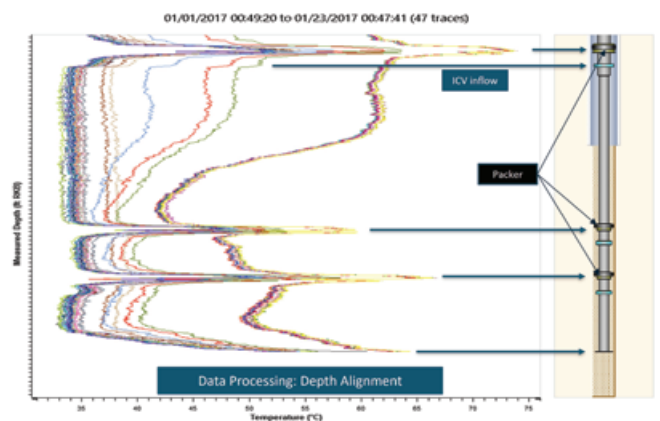


Figure 2 Depth alignment