Case Study

FIBERLINE INTERVENTION

FLI'S FIRST OFFSHORE PUMP-DOWN DEPLOYMENT IN A HIGHLY DEVIATED WELL DELIVERS AN INTEGRITY SURVEY IN HALF THE TIME.

THE CHALLENGE

At a platform in the Northern North Sea, a water injection well had started to experience pressure build-up in the B-annulus. The operator was keen to perform a well integrity survey to locate the source of the fluid ingress. The field has been producing for 40 years and enhanced oil recovery operations utilise water injection to maximise production. To enable injection to be reinstated in this well, a sidetrack and recompletion were planned. The operator was looking to identify the source of the integrity issue and effectively abandon the existing borehole alongside these planned rig-based operations.

This was a deviated well, with a trajectory of around 74 degrees along most of the 5,930m/ 19,500ft wellbore. Any survey solution would therefore require a tractor-based or a pump-down intervention to be able to reach the required depth.

This international operator had previously used FiberLine Intervention (FLI) in other well integrity surveys with great success, so approached Well-SENSE to provide a solution.

THE SOLUTION

The deviation of this well was beyond the normal free-fall range of FLI, so a pump-down operation was planned. FLI has been pumped down into more than 100 land wells in North America, but this was its first offshore pump-down.

Prior to the operation, Well-SENSE undertook a variety of planning and simulation exercises, using proprietary FLI-SIM software. This indicated a smaller sized pump-down cup could be used to deploy the probe to the bottom of the production tubing and ensure navigation of internal well restrictions.

Treated sea water was also pre-selected as a suitable pumping fluid. The fluid would be circulated down the well, through a tubing cut and back up the annulus to the surface. To avoid any concern over the safe disposal of polymer-based friction reducers, a lubricant more commonly used in wellbore clean-up operations was selected to aid deployment.

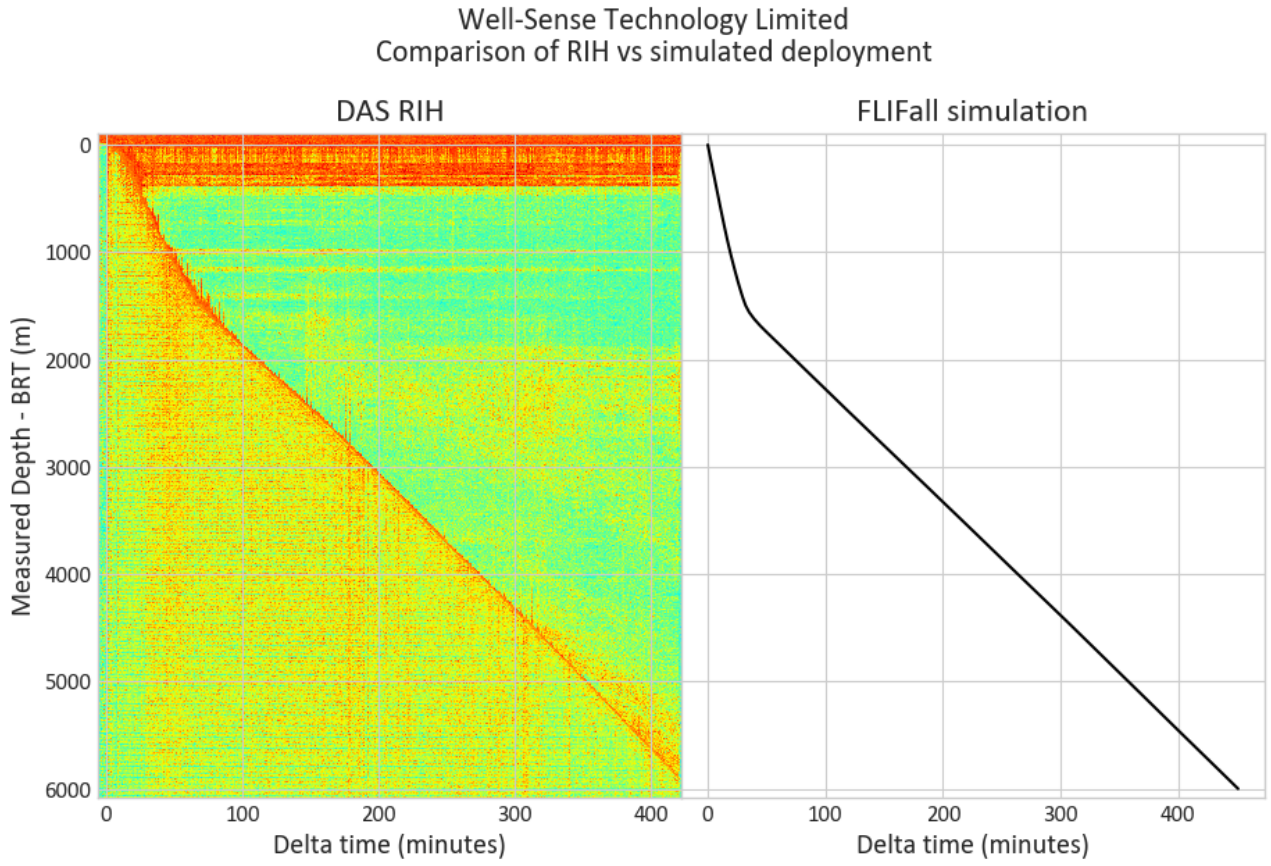
For the offshore operations, the lightweight, compact FLI system was mobilised in a standard mini-container, to be deployed offshore by two Well-SENSE engineers providing 24hr coverage. The equipment consisted of a 2.75" Bi-FLI probe with 5.7" pump down cups, containing two DAS fibres, plus FLI's standard plug and play pressure control wellhead equipment.

THE RESULTS

After launch of the FLI probe into the well, the pumps were started and held at a steady rate throughout the operation. The probe took under seven hours to travel 19,500 ft along the wellbore, deploying bare fibre behind it - faster than using a wireline tractor. The total survey time was 18½ hours, which is close to half the amount of time required for a wireline tractor log in the same well. Once the probe was at the bottom of the well a conventional leak detection survey was performed using distributed acoustic sensing.

The operations were completed flawlessly, with rapid, high-quality data acquisition and no lost time incidents. The FLI-SIM models proved to be highly accurate as shown in the graphs below. Well-SENSE analysis of the data confirmed reservoir isolation and identified a flowing formation which was likely to be affecting the B-annulus pressure.

The project demonstrated that the pump-down method of deployment can be applied in an offshore environment for through -tubing operations.



VALUE

- A pump-down deployment of FLI's probe can access highly deviated and horizontal wells, extending the range of wells suitable for FLI surveys.
- FLI's pump-down technique can reduce survey time by around 50% compared to tractor deployed wireline surveys.
- Distributed fibre sensing provides a complete profile of the well, monitoring changes in temperature and acoustics in real-time.
- A pump-down deployment of FLI's probe can access extended reach and deviated wells without any detrimental effect on the fibre.