Case Study

FIBERLINE INTERVENTION

FLI IDENTIFIES THE SOURCE OF SUSTAINED ANNULUS PRESSURE IN A, B AND C ANNULI IN LESS THAN 12 HOURS.

THE CHALLENGE

A major international operator was experiencing sustained annulus pressure (SAP) in three horizontal oil and gas producing wells at an unmanned offshore platform in South East Asia. The pressure ingress was believed to originate from shallow gas sand formations around the upper casing, however the operator wished to identify the source so this could be monitored and assessed over the life of the wells.

The small leak rate at this platform had been measured by the operator to be less than 1 scf/min for all wells, equating to 1,400 scf/d or 0.028 cu.m/day and the pressure accumulated in the annuli was between 4.7 – 8.9 bar (70 and 130 psi). For context, the industry standard API-14B specifies that an acceptable gas leak rate through a sub-surface safety valve is 15 scf/min.

The facility was an unmanned platform which could only be accessed by boat for daytime operations.

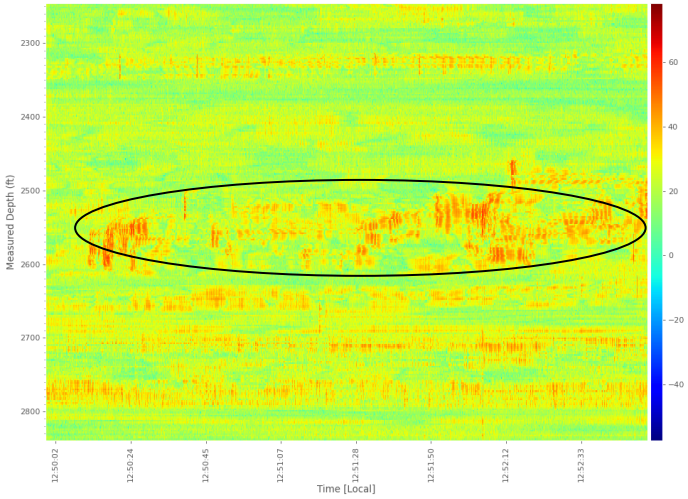
THE SOLUTION

FiberLine Intervention (FLI) was selected as the ideal technology to perform a well integrity survey at this site due to its high sensitivity, compact footprint and rapid survey times. A single engineer was accommodated on a nearby vessel and travelled to the rig each morning as personnel were not permitted to stay on the platform overnight. Distributed acoustic sensing (DAS) and distributed temperature sensing (DTS) were used during the intervention to map the leak paths and locate the source of the SAP.

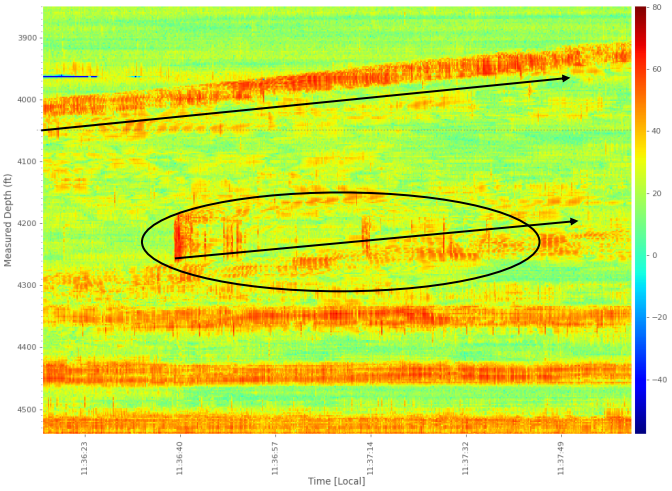
THE RESULTS

On each well, the system was rigged up, deployed, conducted a survey and was rigged down within a single 12 hour shift and the leak source was successfully located in all three wells. In one well the SAP source was found within the A, B & C annulus from a single probe deployment and was completed in less than ten hours.

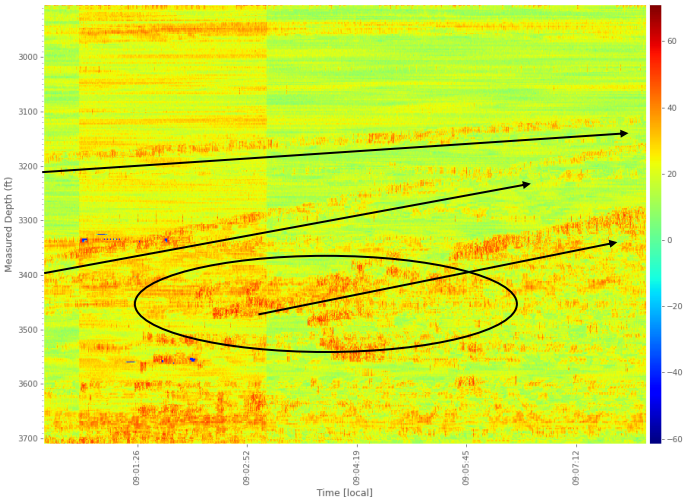
In the plots below, we can observe indications of acoustic events associated with fluid ingress into their respective annular spaces caused directly by the bleed down of pressure at surface (circled). Additionally, we can see indications of the upward movement of these fluids associated with these leak sources over time, as defined by the arrows.



(Above) A-annulus leak activated with pressure bleed down from 4.7 bar



(Above) B-annulus leak activated with pressure bleed down from 4.8 bar



(Above) C-annulus leak activated with pressure bleed down from 8.9 bar

VALUE

- FLI was highly efficient in identifying leaks in all three annuli of one well during a single offshore day shift.
- FLI's unrivalled bare fibre sensitivity is able to map the smallest leak paths.
- Our compact and rapid surveying technique is uniquely suited to unmanned offshore facilities.
- In-well fibre surveys, with pressure bleed-off, provides feedback on the location and connectivity of flow paths.
- Compared to wireline or slickline deployed fibre, FLI has a tiny footprint and does not require the same surface equipment spread.
- Compared to wireline logging, FLI is able to show distributed data across the entire wellbore and beyond, plus the direction and velocity of acoustic events.
- Transporting a reduced equipment weight, quick operations and limited personnel combine to reduce the carbon footprint by at least 90% compared to wireline leak detection operations.