Case Study

PRE-ABANDONMENT LEAK DETECTION - INFORMING STAGE 2 WELL OPERATIONS

THE CHALLENGE

A large integrated energy operator was undertaking well decommissioning operations on a platform in the Northern North Sea, which has been producing since the early 1970's. Having already completed phase one abandonment, with a cement plug placed in the casing to isolate the reservoir and the completion tubing cut in preparation for retrieval, one of the wells was recording an unexpected pressure build-up.

To locate, isolate and remediate the source of the fluid ingress, a leak detection survey was required before abandonment of the well could be completed. However, a tubing cut presents a high risk of stuck tools when deploying and retrieving standard intervention equipment, so an alternative technique was required. A rapid turnaround was also necessary to keep the work programme on track and avoid knock-on delays to other planned operations.

This operator had not used FLI previously but, based on the benefits and proven track record of the technology, were confident to commission Well-SENSE to provide a solution.

THE SOLUTION

One Well-SENSE engineer attended the platform to deploy a dual temperature and acoustic FiberLine Intervention - BI-FLI. The compact equipment was shipped in a mini-container and was set-up in the sack store to avoid the use of deck space while other well services were ongoing at other wells.

With just a two-week turnaround, from placing the order to receipt of the findings, the FLI solution enabled the operator to make timely remediation decisions to avoid lengthy delays and additional cost.

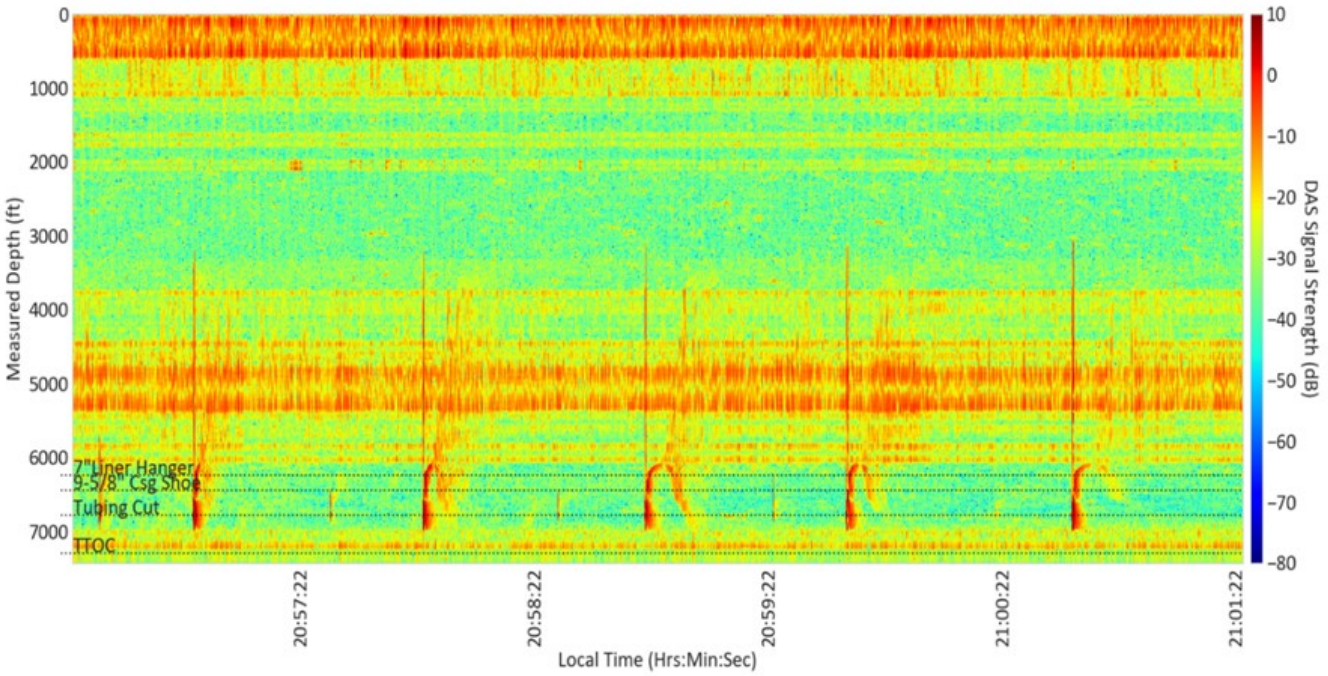
The equipment was prepped onshore prior to shipping and the Well-SENSE engineer arrived at the platform on a Friday, just a week after receipt of the customer order. The rig-up, deployment and start of the survey took place on Saturday and well monitoring was continued overnight into Sunday.

Preliminary results were provided on the Sunday before the equipment was rigged down. The engineer was demobilised on the Monday and the final analytical report was delivered that Friday. The Well-SENSE service delivered significant cost savings with this project costing just a five-figure sum.

To conduct the survey, the well pressure was stabilised and a baseline distributed acoustic sensing (DAS) data set was acquired to establish the ambient signature in the well. The leak was then activated by bleeding off pressure and DAS data was recorded during the bleed off and subsequent recharge.

This detected acoustic events which showed the location of the leak activation and fluid flow. Distributed temperature sensing (DTS) data was also recorded throughout the process to look for high volume or persistent fluid movement.
The data provided evidence that the reservoir was the source of the pressure build-up in the well, with fluid moving up the well annulus and entering the well bore at the top of the 7" liner hanger.

Repeatable acoustic signatures were observed as the leak activated from below the cement plug and dispersed at the depth of the liner hanger. The data also showed that the leak path was outside the existing wellbore and not related to previous side-track operations or the reservoir isolation cement plug.



FOLLOW-UP

Based on the data findings, the subsequent remediation work, rig operations and phase 2 abandonment work was completed shortly after the survey.

The client has since deployed FLI in a further six wells to support abandonment operations across three platforms, saying: "It's been really beneficial and is a great piece of technology".

VALUE

- **Rapid Turnaround** - One week from receipt of order to mobilisation and one week from mobilisation to delivery of results.
- **Low Cost** - Offshore FLI survey cost a five-figure sum.
- **Low POB** – One engineer mobilised offshore.
- **Low Risk** – A tiny wellsite footprint using compact portable equipment.
- **High Efficiency** – An offline project with no impact on other well operations.
- **High Quality** – Distributed acoustic and temperature data provides clear and reliable insights.
- **Versatile** – FLI can be deployed in wells where conventional solutions may be compromised.