

WIRELESS BARRIER MONITORING IMPROVES EFFICIENCY OF SUBSEA TREE CHANGE-OUTS

LOCATION:

North Atlantic

SERVICE:

Deepwater Barrier Verification & Monitoring

BENEFITS:

Well Safety Assurance

Risk Reduction

Reduced Operational Cost

Improved Resource Planning

WIRELESS BARRIER MONITORING

JULY 2015

PRODUCT:

DATE:

CASE STUDY:

1006/01

METROL[®]
APPLIED INTELLIGENCE

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METROL PROVIDED
WIRELESS PRESSURE
MONITORING DATA FROM
BELOW 8 DOWNHOLE
BARRIERS IN 4 WELLS,
ENABLING THE CLIENT TO
SCHEDULE AND OPTIMISE
SUBSEA TREE CHANGE-
OUTS OVER 2 SUMMER
SEASONS TO MEET THE
NEW SUBSEA TREE AND
FPSO DELIVERY SCHEDULE

CHALLENGE

After more than a decade working West of Shetland, a Floating Production Storage and Offloading vessel (FPSO) had reached the end of its service life and, along with a significant amount of subsea architecture, needed to be replaced. Part of the project scope was to change out four subsea trees located approximately 500 metres apart in 360 metres of water.

Conventional procedure dictates subsea trees are changed out one after the other, with minimal time spent between removal of the old tree and installation of the new tree. Hostile weather in the region, means work can only be performed during the summer season. Many factors such as long lead tree delivery, equipment mobilisation, favourable weather windows, vessel availability and on-going field operations all have to be carefully managed before tree change out can take place.

Subsea intervention is time consuming and expensive. It is therefore important to increase efficiency both in terms of time, safety and expenditure. Metrol's wireless telemetry was required to reduce operational and commercial risk by monitoring the well barrier envelope as an offline activity. Monitoring the barriers allowed the client to react if their integrity status changed at any point throughout the campaign.

METHOD

Metrol:

- Successfully and safely installed wireless downhole gauges and subsea telemetry with multiyear lifespan.
- Performed the work scope from a light well intervention vessel for both the wireline and subsea tree change-out phases with no harm to personnel or environment.
- Monitored the integrity of 12 downhole barriers over the course of 2014/2015.
- Acquired data from multiple wells and multiple locations in each well.
- Verified the integrity of production and annulus barrier elements at time of deployment.
- Wirelessly interrogated barrier monitoring data from client supplied vessel of opportunity during winter suspension.
- Provided modular downhole monitoring equipment, requiring no penetrators or feed-throughs through existing and qualified barrier elements.
- Supplied ROV deployable subsea telemetry equipment which required no alterations to existing subsea infrastructure (see Fig. 1).



Fig. 1 TRITON wireless sonar module.

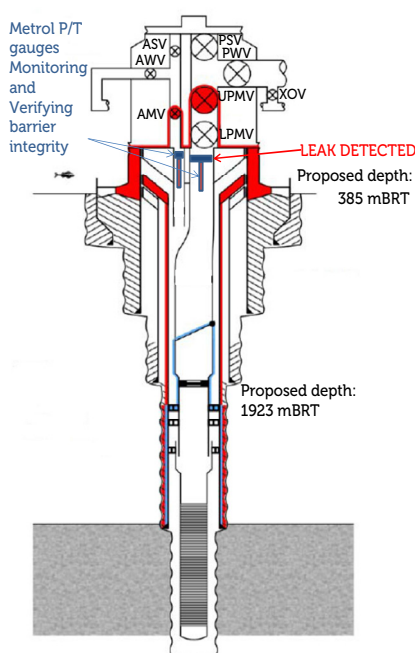
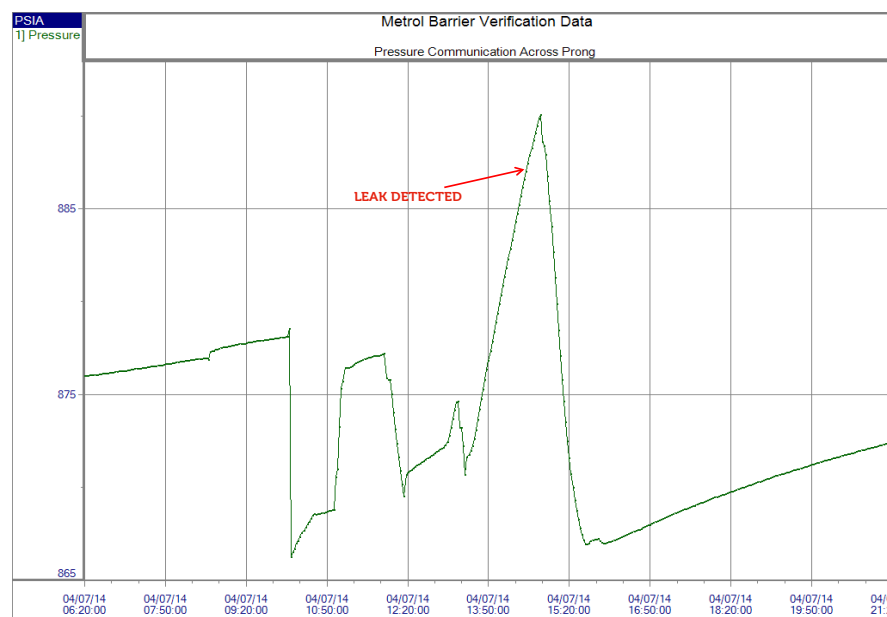


Fig. 2 Short term barrier verification reveals leak at upper barrier



RESULTS

Metrol's wireless monitoring of well barrier integrity provided the opportunity to reduce operational risk in key areas of the project. It enabled operations to be split over two seasons, avoiding bad winter weather and optimising rig time. It provided certainty in decision making, and reduced risk by avoiding the need for wire in the well by conducting data acquisition as a wireless offline activity.

The long lifespan of the system allowed multiple years of monitoring with only a single installation run.

During an installation pressure test operation, Metrol's data identified an issue during barrier setting– this was highlighted immediately and corrective action taken (see Fig. 2).

During the execution of this project Metrol data were used to confirm barrier element integrity, providing the client significant financial and operational risk reduction benefits:

- > the manufacture, delivery and installation of the 4 new trees could be executed in time for the FPSO arrival and commissioning
- > the useful lifespan of the existing trees could be extended

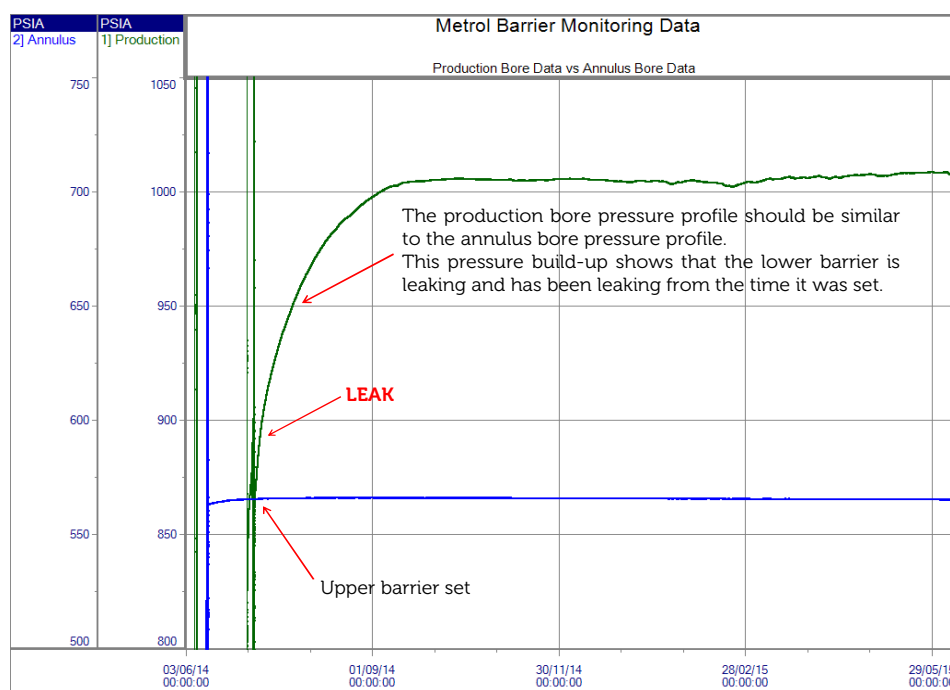
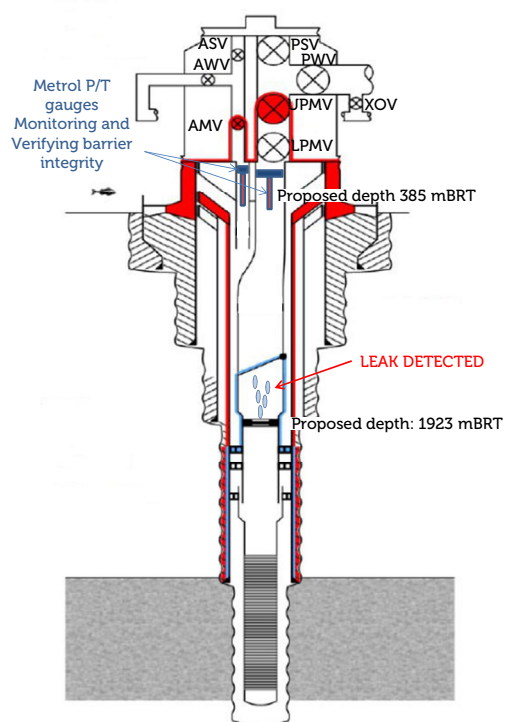
Early in 2015 two of the four subsea wells were interrogated by retrieving data via the ROV deployable module. The operation was conducted offline from a vessel, with 9 months of data from multiple gauges collected from each well.

In one of the wells the pressure below the shallow set packer had steadily built-up over a 9 month period, indicating the deep set barrier was impaired.

Knowledge of this failure ahead of phase 2 intervention operations allowed the client to plan, manage change efficiently and apply for impaired barrier exemption prior to arriving on location (Fig. 3).

The success of the Metrol wireless barrier monitoring system ensured that the client could confidently leave the 4 offshore wells suspended over winter with the knowledge that they were meeting all HSE, legal and industry good practice standards.

Fig. 3 Long term wireless monitoring reveals leak at lower barrier



CASE STUDY INDEX

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