

## Case study Multi Seal Integrity

# Through-barrier diagnostics identifies the source of sustained annulus pressure and guides treatment



**Location:** Libya  
**Customer:** Mellitah Oil & Gas B.V.  
**Field:** Abu Attifel  
**Well type:** Oil producer

### Case benefits

- Identified the active formation acting as the source of sustained annulus pressure
- Revealed the flow path and cement channelling in the B-annulus
- Guided plan for remedial action that restored the annular seal and eliminated annulus pressure
- Diagnostics enabled restoration of well to safe and productive operation

### Challenge

The operator of this North African oil producer was planning a workover to replace a leaking production string. As part of the work process, the client wanted to locate and eliminate the sustained annulus pressure (SAP) in the B-annulus between the 7-in. and 9 $\frac{5}{8}$ -in. casings. SAP indicates an underlying integrity problem. In this case, pressure was building to approximately 100 psi over a period of 10 hours, indicating a progressive annular leak that could become worse over time.

Accessing the B-annulus and making repairs, such as cement squeeze operations, is much easier when the tubing has been removed. The main challenge was accurately identifying the leak source and flow path associated with the SAP. Conventional

temperature measurements can indicate flow behind casing but they lack precision, especially when the source is in an outer annulus and the sensor is located inside the tubing. Accurately determining the source of the SAP would be the first step to planning and implementing a successful remediation.

### Solution

The operator selected TGT's Multi Seal Integrity solution to evaluate the well and locate the source of B-annulus pressure. TGT engineers and analysts used the True Integrity system to locate leaks and validate seals throughout the well.

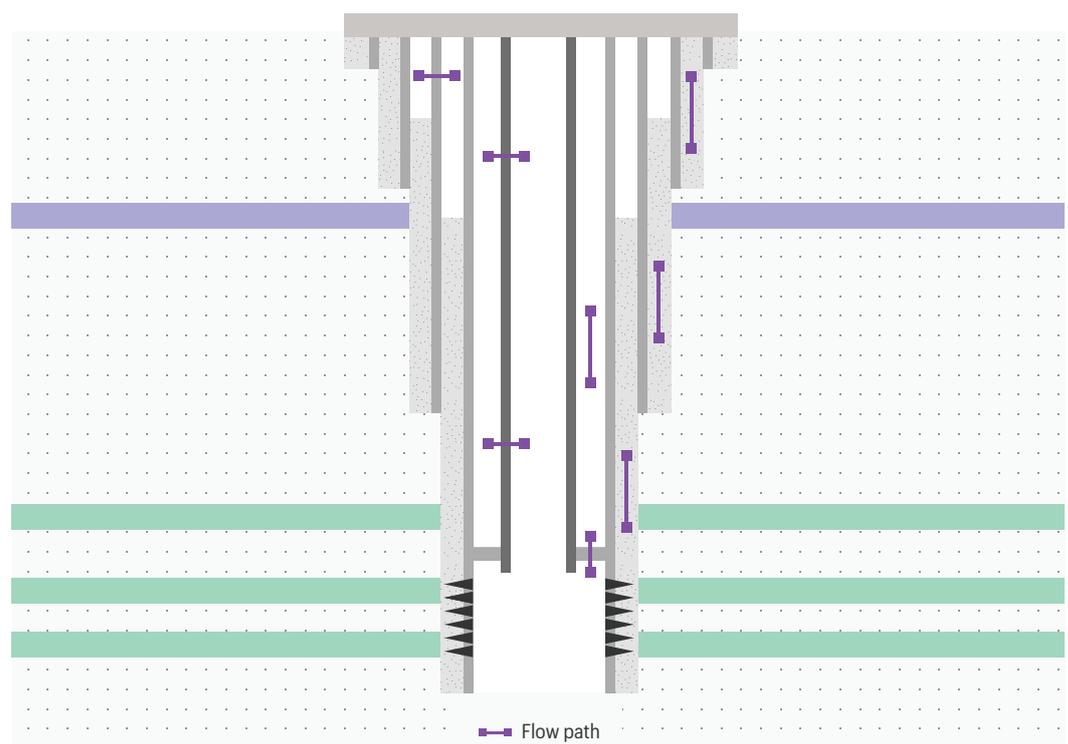
The True Integrity system combines Chorus acoustic sensing and analysis technology with high-precision temperature surveys

### Multi Seal Integrity example well sketch.

Multi Seal Integrity evaluates the seal performance of multiple barriers, locating leaks and flowpaths throughout the well system, from the wellbore to the outer annuli.

Delivered by our True Integrity system with Chorus, Indigo and Maxim technology, Multi Seal provides a clear diagnosis of leaks and rogue flow paths so the right corrective action can be taken.

Multi Seal is used in a targeted fashion to investigate a known integrity breach anywhere in the well system. Barriers can also be validated proactively to confirm integrity. Either way, Multi Seal provides the insights needed to restore or maintain a secure well.



provided by Indigo. The Chorus Acoustic Power Spectrum (APS) can reveal flow activity in and around the well system, particularly fluid flow through restrictions or between zones that have high differential pressure. For example, it can identify fluid movement into or out of permeable formations and characterise fluid movement within the well completion.

The well was surveyed under both shut-in and B-annulus bleed-off conditions. The survey was designed to reveal flow dynamics and fluid flow occurring in the B-annulus, which would identify the source of SAP along the wellbore and the flow paths between active formations and the B-annulus.

### Result

The Chorus APS revealed flow activity opposite the perforations during the shut-

in survey. This suggested the presence of active crossflow in the formation layers at that depth. The Indigo temperature survey also confirmed flow activity at the depth of the target reservoir during the shut-in survey.

During the B-annulus bleed-off survey, additional flow was observed from the target reservoir towards the surface. The low-frequency content of this acoustic signal is characteristic of cement channel flow (Figure 1). The Multi Seal Integrity survey identified the source of the SAP as the target reservoir, with the flow path extending through cement channels in the B-annulus.

Using this information, the operator was able to conduct an effective cement repair and recomplete the well, bringing it back to safe, clean and productive operation.

Multi Seal Integrity diagnostics located the source and traced the flow path of the fluid that was causing sustained pressure in the B-annulus.

