

Case study Multi Seal Integrity

Powerful diagnostics locate multiple seal breaches in complex well failure scenario, enabling P&A to secure well



Location: Libya
Customer: Zallaf
Field: Chadar
Well type: Oil producer

Case benefits

- Eliminated uncontrolled release of fluids
- Avoided further pollution and safety hazards
- Enabled safe and secure P&A of a 60-year old well
- Comprehensive diagnosis of complex barrier failure scenario

Challenge

A 60-year old well in the Chadar field, Libya was exhibiting a leak at surface and sustained pressure in all three annuli – A, B and C. The age of the well coupled with the symptoms suggested a complex multi-barrier failure scenario that needed to be diagnosed quickly and accurately so that the well could be secured safely.

Solution

The customer selected TGT's 'Multi Seal Integrity' diagnostic product to locate the source of pressure and associated flowpaths. Multi Seal Integrity diagnostics are delivered using TGT's proprietary True Integrity system, leveraging a combination of key technology platforms applied by diagnostic experts using a methodical workflow. In particular, Chorus acoustic and Indigo multisense

technology were utilised to precisely locate seal failures and associated flowpaths throughout the well system, from the reservoir, through barriers to the wellbore.

The critical first step in applying the True Integrity system involves developing a customised diagnostic programme that would 'stress-test' the well whilst Chorus and Indigo sensors recorded the resulting well dynamics downhole. Data acquired during the programme was then processed and analysed by experts using a third platform, the Maxim digital workspace.

The diagnostic programme involved activating the well in four well state scenarios; one shut-in, and the others bleeding-off each of the three annuli.

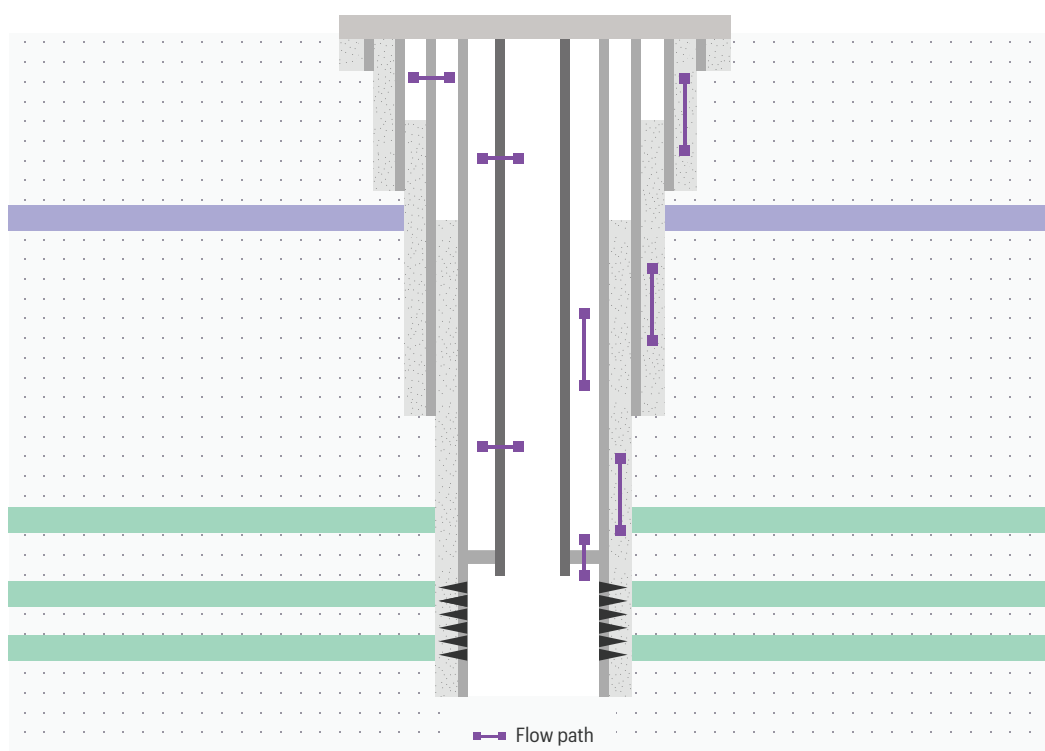


Multi Seal Integrity example well sketch.

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.



In the shut-in state, pressurised fluids from inside the tubing enter the A-annulus at three distinct points – X2000 ft, X4800 ft and X6400 ft. The fluid then enters the B- and C-annuli at X3600 ft via failures in the 7" and 9-5/8" casings. Fluid in the C-annulus then re-enters the formation via a failure in the 13-3/8" casing at X0900 ft.

Result

The True Integrity system successfully identified the sources of pressure and revealed a highly-complex geometry of interconnected flowpaths between several formation layers and through multiple tube and cement barriers.

Equipped with a complete diagnosis, the operator was able to design and execute an appropriate P&A programme to secure the well permanently, eliminating any further risk to people and the planet.

In the B-annulus bleed state, fluid from within the tubing follows the same flowpaths as in the shut-in state but in addition, formation fluid is entering the C- and B-annuli at X3600 ft.

