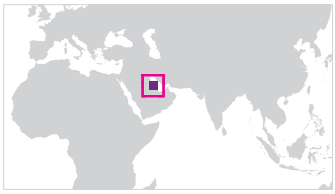
Case study Primary Seal Integrity

Rapid diagnosis of seal performance enables rigless intervention with reduced carbon footprint



Location: Kuwait
Customer: Kuwait Oil Company
Field: Ahmadi
Well type: Dual string oil producer
Reference: SPE 187668-MS

Case benefits

- Enabled rigless diagnosis and remediation for reduced carbon footprint
- Provided primary seal diagnostics by identifying a tubing collar leak
- Guided remediation work for the well
- Restored production with minimal water cut
- Minimised water production and reduced the environmental impacts associated with disposal

Challenge

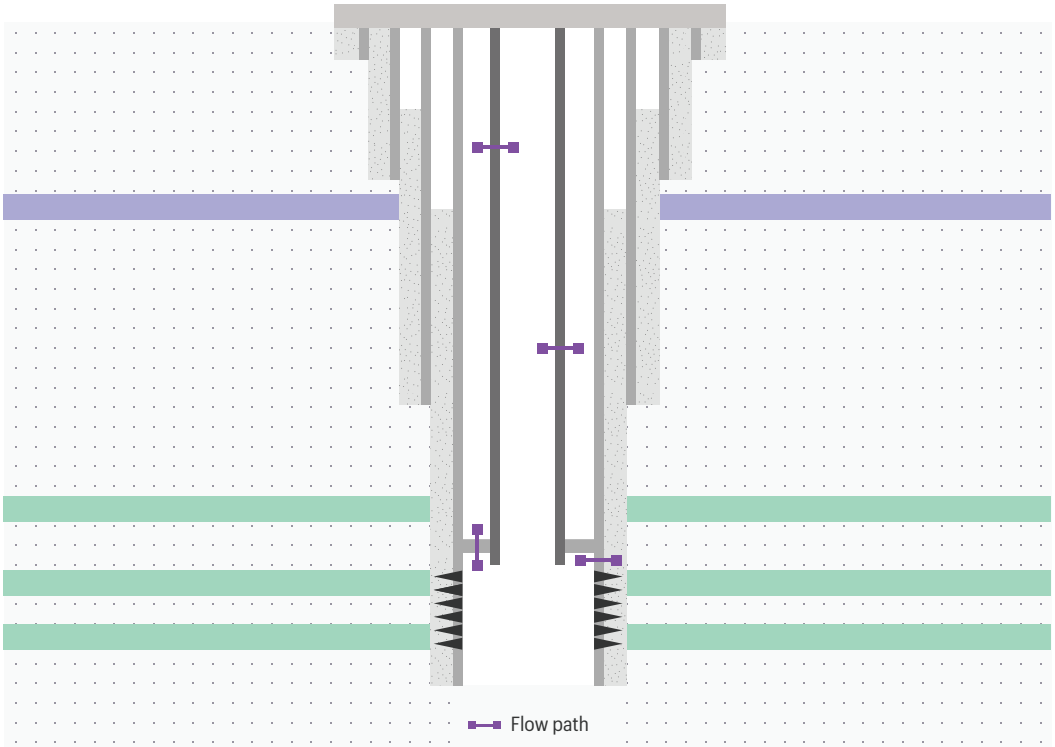
Primary barriers are key for protecting the integrity of a well system. When failures occur in these barriers, they must be diagnosed quickly to avoid unsafe operation, lost production and the risk of escalation. Leaks in wellbore tubulars can lead to unwanted fluid communication between reservoirs that can result in substantial production losses for oil and gas operators.

The subject well in this study is a naturally flowing oil producer that was producing from the top reservoir through the short string while the bottom reservoir, producing from the long string, had watered out and ceased to flow. A sudden increase in water cut at surface prompted the operator to investigate.

Solution

TGT's Primary Seal Integrity product locates leaks and evaluates seal performance without needing a workover rig. This rigless approach to seal diagnostics enables operators to optimise workover programmes and can deliver significant cost savings. This is particularly true if the diagnostics reveal that any remedial work can be conducted riglessly, thus avoiding the costs of workover rig mobilisation.

Delivered using TGT's True Integrity system with Chorus technology, Primary Seal Integrity identifies leaks and unwanted flow paths, guides corrective actions and can be used to validate the effectiveness of remedial work. Primary Seal Integrity combines temperature profile analysis and advanced acoustic analysis to diagnose



Primary Seal Intergrity example well sketch.

Primary Seal Integrity locates leaks and evaluates the seal performance of all primary barriers quickly and accurately, throughout the well system.

Delivered by our True Integrity system using the Chorus (acoustic) platform; Primary Seal Integrity provides a clear diagnosis of leaks and unwanted flowpaths so the right corrective action can be taken, and barriers can be validated to confirm integrity.

Primary Seal Integrity is used in a targeted fashion to pinpoint suspected integrity failures in the tubing or other primary barrier components, or proactively for regulatory validation.

problems. It is typically used in a targeted fashion to pinpoint a suspected breach in tubing or other primary barrier components within the well.

Result

The Primary Seal Integrity survey pinpointed the leaking element in the completion: a tubing collar of the blast joint in the long string (Figure 1). The leak was enabling water produced from the bottom reservoir to flow into the short string production of the upper reservoir, thereby causing the sudden increase in water cut at surface. A plug was set, riglessly, in the landing nipple of the long string to block the water route from the lower reservoir. After plug setting, a surface production test revealed a sharp drop in the water cut that indicated the success of the remedial operation. The TGT solution saved several days of rig resources and helped to reduce the carbon footprint of the remediation operation.

Both temperature and Chorus data indicate water inflow from the bottom reservoir and flow up through the casing and tubing to the leakage zone. This fluid then enters the annulus where it mixes with fluids from the upper reservoir and flows to surface.