

## Case study Multi Seal Integrity

# Source of sustained annular pressure identified, enabling remediation planning in a horizontal oil producer



**Location:** Russia  
**Well type:** Horizontal oil producer  
**Reference:** SPE-198385

### Case benefits

- Identified the source of sustained annular pressure in a horizontal oil producer with high gas-oil ratio
- Diagnosed production casing collar leak using spectral acoustics and temperature surveys
- Enabled targeted remediation to restore well to safe and productive operation.

### Challenge

Sustained Annulus Pressure (SAP) can occur at any point in a well's life cycle and cause potential hazards such as casing failure or well collapse. These issues can have a substantial detrimental effect on a field's production capacity. Effective methods for SAP monitoring and identification help operators to diagnose the issue at an early stage and maintain safe operations throughout the field development process.

Two years after a horizontal oil producer was drilled and completed, it began recording surface pressures of 7.2 MPa in the 7-9 $\frac{5}{8}$ -in. annulus. This is a common issue in high Gas-Oil-Ratio (GOR) wells where the target reservoir has a gas cap. In this case, the field operator wanted to determine the source of SAP.

### Solution

The operator selected TGT's Multi Seal Integrity product to reveal the location of the possible casing leak and look for the presence of channeling.

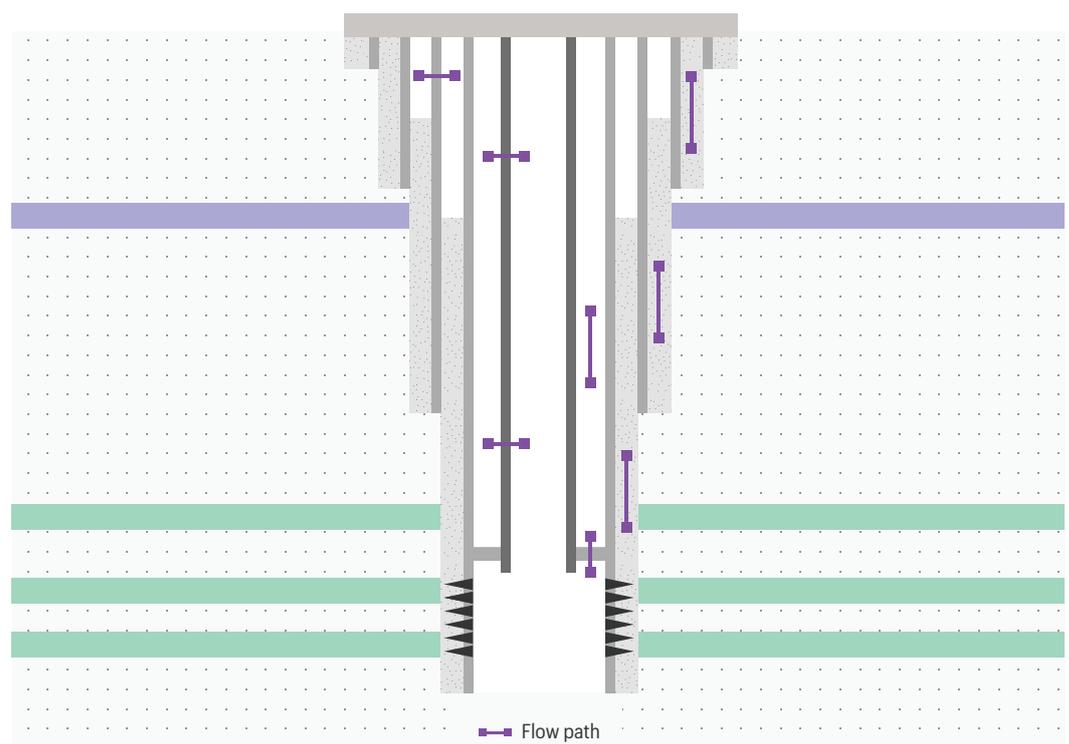
Delivered by TGT's True Integrity diagnostic system using the Chorus acoustic platform, Multi Seal Integrity provides a clear diagnosis of leaks and unwanted flow paths so that corrective actions can be taken.

Additionally, the client chose to proactively validate the condition of tubular barriers by using the Pulse electromagnetic platform. Multi Seal Integrity evaluates the seal performance of multiple barriers and thus locates leaks and flow paths throughout a well system, from the wellbore to the outer annuli.

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 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.



Chorus (acoustic) platform and Cascade's high-precision temperature data was acquired under limited bleed-off and full choke bleed-off conditions to identify the source of the sustained annulus pressure. This information was combined with Pulse electromagnetic defectoscopy to evaluate casing thicknesses, locate collar positions and identify intervals affected by corrosion.

### Result

Under both limited and full choke bleed-off conditions, Chorus showed a high-frequency acoustic signal across the depth depicted by line A (see Figure 1). The temperature profile showed a narrow cooling anomaly at the same depth, which is due to gas flow through the leaking collar.

Hence, the source of SAP in the 7-9 $\frac{1}{8}$ -in. annulus was a leak in the well completion elements at the depth depicted by Line A. Temperature data alone was not very demonstrative, so the conclusion was based mainly on Chorus data. The correlation of Chorus data with Pulse data (see metal thickness column) confirmed the 7-in. casing collar was leaking.

The success of this survey shows the effectiveness of TGT's True Integrity system as an accurate diagnostic approach to determine the integrity of wellbore and downhole equipment. The ability to assess well integrity without pulling out downhole equipment is a particularly valuable feature.

Figure 1. The main survey results for the horizontal oil producer indicate the source of SAP to be a leaking production casing collar at the depth depicted by Line A.

