Case study Multi Seal Integrity

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Diagnostics locate casing leak and help operator avoid costly workover to restore well

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Location: Egypt, Western Desert **Well type:** Gas producer

Case benefits

- Accurately identified the leak point in A-annulus
- Avoided unnecessary and costly workover
- Restored production

Challenge

The completion string of a gas producer was upsized from $3\frac{1}{2}$ " x $4\frac{1}{2}$ " to $4\frac{1}{2}$ " x $5\frac{1}{2}$ " with 13% chrome tubing to enhance production. Prior to starting the workover, the A-annulus was successfully pressure tested to 1,500psi. The old completion string was cut above the AHC packer, retrieved and replaced with the new '13CR95' tubing together with a new packer. An A-annulus leak was then observed after setting the packer, but with no TCA communication.

Before continuing, the operator needed to understand the integrity dynamics at play and ensure that the new packer was sealing. Conventional diagnostics could have meant another costly workover, lost production, and the risk of damage to the expensive 13CR95 tubing joints. All of which were clearly undesirable.

Solution

To identify the integrity breach, TGT designed a diagnostic programme utilising the 'True Integrity' system with Chorus (acoustic) and Indigo technology. Slickline conveyance was used for efficient and low cost rigless operation, and minimal footprint.

Two survey passes were deployed, one with the well shut-in and another with continuous water injection into the A-annulus. During shut-in conditions, the baseline temperature and acoustic responses confirmed that there was no cross flow or lateral flow anywhere in the well system.



Multi Seal Integrity example well sketch.

Multi Seal Integrity validates sealing performance of multiple barriers.

Multi Seal Integrity gives you the calrity and insight needed to manage well system performance more effectively.

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packer.

Injection was then started in A-annulus and

the acoustic and temperature surveys were

repeated. This time, the temperature profile

exhibited a cooling effect caused by water

being forced into A-annulus, but there was no temperature difference across the upper

Notably, clear acoustic responses were

evident at two intervals under injection

was observed at X175 ft. Also, a lower

conditions. A high amplitude wide frequency

band acoustic signature, typical of 'leak flow'

amplitude, lower frequency signal was observed around X650 ft. No acoustic signal was observed across the upper packer confirming it was sealing properly.

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Result

The analyst confirmed the leak point in the 9-5/8" casing at X175 ft. The operator was able to assess the integrity of the well and decided not to remediate the casing leak, deciding instead to operate the well with the proper monitoring and risk mitigation plans in place.

Multi Seal Integrity answer product showing comparison between measurements acquired during shut-in and injection conditions. The primary leak point is clearly visible at X175 ft, and a minor leak interval is evident around X650 ft.

		TEMP	DELTA-T	CHORUS SHUT-IN	CHORUS INJECTION	ACOUSTIC POWER	SND INJECTION	ACOUSTIC POWER
DEPTH	WELL	TEMP_RIH_SHPT	DT	75 📕 📕 120 dB SPL	75 120 dB SPL	SNLP	65 📕 📕 120 dB SPL	SNDP
ft	SKETCH	50 °F 300	-0.55 0.25	0.1 kHz 58.6	0.1 kHz 58.6	65 dB 140	0.1 kHz 58,6	60 dB 110
		TEMP_I3U1						
		50 °F 300						
		TEMP_RIH_IHPT						
		50 °F 300			7 .			7
L _	4 ¹ / ₂ "					<u> </u>		
X100	13 ³ / ₈ "				16			
L _			2		1. john shere the sories	- E		
X200	9 ³ / ₈ "		-		No John water bridge and and			
<u> </u>			<u> </u>					
X300			<u> </u>		Typical acoustic signa	ture of		
L _			Ş.		leak flow with 'acousti	¢ power'		
X400		Temperature anomaly	<u>}</u>		maximum at X175 ft	1		
L _		under injection conditions						
X500		correlates with leak point.	<u></u>			<u>}</u>		
L			<u> </u>					
X600			_			 		
<u> </u>			{			5		}
X700						1		
<u> </u>		Temperature difference			Low amplitude acoust	ic signal		
X800		between baseline and			related to minor leak f	low		
L		main injection surveys						
×900		indicate water movement	[
⊢ −		through A-annulus up to	}				5 P	
X000					No acoustic or tempe	rature		
	- Contraction of the second		\$		anomalies evident at	packer		
x100	C L L L L L L L L L L L L L L L L L L L							
						1		3