



Interpretation Summary

Radial Cement Bond Log

Company:	Energy Works Management.
Well:	Strategic Et al Cameron 1-73 60 10N, 117 15W
UWI:	3001736010117150
Licence:	1937
Log Date:	March 04, 2020
Interpreted By:	M. Langille

Summary

The cement bond integrity was evaluated using an Applied Radial Incremented Bond Tool with 16 sector receivers from 1365.7 mKB (First Reading) to surface under static conditions. The maximum calibrated amplitude in 177.8 mm casing is 61 mV.

Correlated to: Kelly Bushing



Well Configuration

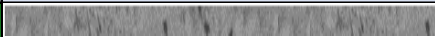




Orientation: Vertical

Table 1 – Cement & Tubular Information

Tubular & Cement Information	
Surface Casing	244.5 mm, 53.57 kg/m, Surface - 426.0 mKB CEMENTED WITH 38.5 TONNES + 2% CaCl ₂ . 4.0 CEMENT RETURNS TO SURFACE.
Production Casing	177.8 mm, 34.23 kg/m, Surface - 1635.0 mKB. CEMENTED WITH 18.7 TONNES FILL LITE 2-125 +3% A-9 + .7% R-6N AND 8.3 t "G"CEMENT + .2% R-6N +.4% FL-77. NO RETURNS TO SURFACE.

Interpretation Summary

Cement Bond Interpretation Methodology		
Evaluation	Description	Method
Bond Index	Bond index is a calculation based on the CBL 3' Amplitude signal in mV that provides a quantitative interpretation of the cement bond to pipe. A bond index value > 0.8 provides reasonable assurance that hydraulic isolation is possible.	Calculation BP Method
		3' Amplitude
Formation Bond	Cement bond to formation is a qualitative estimation derived from the Variable Density Waveform Log (VDL). When "Formation signal" is apparent in the VDL it is assumed that there is sufficient coupling to pipe and formation to support hydraulic isolation.	Analyst Input
		VDL
Micro Annulus	Micro-separation of pipe from cement that reduces the cements ability to support the pipe in shear and thus allows for some pipe ring. A static pass and a pressure pass are required. Characterized by the difference between the static 3' amplitude vs the pressured up 3' amplitude.	Calculation Static vs Pressure
		Log Flag 
Channelling	A cement channel is a potential conduit for formation fluids/gasses to communicate with one another. Expressed as "inconsistent circumferential cement coverage". In order to identify a cement channel, a CBL with Radial receivers is required in order to map the 360 degree circumference of the casing.	Calculation Radial Receivers
		Log Flag 
Fast Formation	Fast Formation occurs when the first acoustic signal arrives at the receiver through the formation rather than through the casing, and hence its amplitude is unrelated to the cement bond. Representative of Good bond to pipe and formation. Characterized by comparing the TT3 relative to the expected pipe arrival time.	Analyst Input
		Travel Time

Cement Bond Interpretation Legend		
Cement Bond Class	Calculated Bond Index Range	Processed Log - Cement Class Pattern
Good Cement Bond	1.00 - 0.80	
Fair Cement Bond	0.80 - 0.65	
Partial Cement Bond	0.65 - 0.50	
Poor Cement Bond	0.50 - 0.20	
Free Pipe	0.20 - 0.00	

Analyst Parameters						
Zone	Pipe Time	Max. 3' Amp.	Min. 3' Amp.	Channel Cut	Well Geometry:	Vertical
1365.7 - 0.0 mKB	285 usec	61 mV	3 mV	15 mV	Fluid Type:	Water
-	-	-	-	-	Fluid Level:	15.0 mKB
-	-	-	-	-	Pressure Pass:	No
-	-	-	-	-	Min. Zone Size:	3 m

Analyst Comments
<p>The cement bond condition from 1365.7 to 267.9 mKB is mainly good with few areas of fair bond. From 267.9 to 8.0 mKB the bond condition deteriorates from partial to poor. Fluid level was found at 8.0 mKB</p> <p>M. Langille</p>

Table 2 – Radial Cement Bond Log Interpretation Summary

Cement Bond Interpretation Summary					
Top (m)	Bottom (m)	Interval Length (m)	Cement Bond Class	Bond Index	Analyst Comments
0.0	8.0	8.0	Invalid Data	FALSE	Fluid Level
8.0	249.6	241.6	Poor Cement Bond	0.50 - 0.20	High 3' Amplitude Pipe arrival travel time Pipe signal & chevrons over casing collars in VDL
249.6	267.9	18.3	Partial Cement Bond	0.65 - 0.50	High 3' Amplitude Consistent 3' pipe arrival travel time Strong pipe signal in VDL
267.9	288.6	20.7	Fair Cement Bond	0.80 - 0.65	Slightly elevated 3' Amplitude Consistent 3' pipe arrival travel time Weak pipe signal in VDL Inconsistent Radial coverage
288.6	756.9	468.3	Good Cement Bond	1.00 - 0.80	Low 3' Amplitude Late & inconsistent travel time Weak pipe signal in VDL Isolated areas of increased amplitude
756.9	762.2	5.3	Fair Cement Bond	0.80 - 0.65	Slightly elevated 3' Amplitude Consistent 3' pipe arrival travel time Weak pipe signal in VDL Inconsistent Radial coverage
762.2	1365.7	603.5	Good Cement Bond	1.00 - 0.80	Low 3' Amplitude Late & inconsistent travel time Weak pipe signal in VDL Isolated areas of increased amplitude

Processed Radial Cement Bond Log

Well UWI: 3001736010117150

Log Date: March 04, 2020

Log Interval: 1365.7 - 0.0 mKB

DEPT m	CCL 40 95	3' Amp. 0MPA 0 mV 100	Rad. Amp. 1-8 0 mV 100	Radial Map(MV) 45 0 0 0	3' Travel Time 100 μS 1100	(Bond idx) 100 0	(← Cement Channel Flag) 1 0
	Gamma Ray 0 gAPI 120			10 5 VDL(mV) 0 0 0 0		0.8 Bond idx 1 0	Cement Bond Class (Good-Fair-Partial-Poor-Free) 100 0

Depth (m) Intvl = -5.8304 - 1365.7772 (MD) DSR = 1/1200

