SWEPI LP Well: HW-8105

Executive Summary

Purpose: Evaluate the cement bond in the well HW-8105.

Solution Methodology: Survey the casing with Isolation Scanner and CBL-VDL Tools

<u>General</u>: The well HW-8105 is a heater well and has a 7-5/8", 26.4# casing from surface to 2128ft. CBL-VDL and Isolation Scanner Logs were run from 2128ft to surface. A combined CBL-VDL and Isolation Scanner presentation is in this report.

During the drilling stages, no cement plug was needed in the well to prevent loss circulation to ensure a quality cement job for the 7-5/8" casing.

The Schlumberger's Isolation Scanner cement evaluation service provides more certainty for light weight cements by combining the pulse-echo technique with a new ultrasonic technique that induces a flexural wave in the casing with a transmitter and measures the resulting signal at two receivers. The attenuation calculated between the two receivers provides an independent response that is paired with the pulse echo measurement and compared with a laboratory – measured database to produce an image of the material behind the casing. By measuring radially beyond traditional cement evaluation boundaries, Isolation Scanner service confirms zonal isolation.

This well has been cemented using light lead slurry of 9.5ppg followed with tail slurry of 15.5ppg in order to mitigate possible lost circulation during cementing operations. Both the conventional CBL-VDL and ultra sonic pulse-echo techniques rely on a significant contrast in acoustic impedance between the cement and the displaced drilling mud to determine whether or not: a) there is cement behind the casing rather than drilling mud and b) the cement is bonded to the casing and the formation. Due to the use of light weight cement in this well which results in lower contrast, the conventional CBL-VDL and ultra sonic pulse-echo techniques have to be supported with the Schlumberger's Isolation Scanner tool.

<u>Summary of Findings</u>: The Isolation Scanner Log from the raw curve measurements and all the images indicate Top of Cement (TOC) at 237ft.

Three different zones of cement bond log quality can be seen from the analysis as follows:

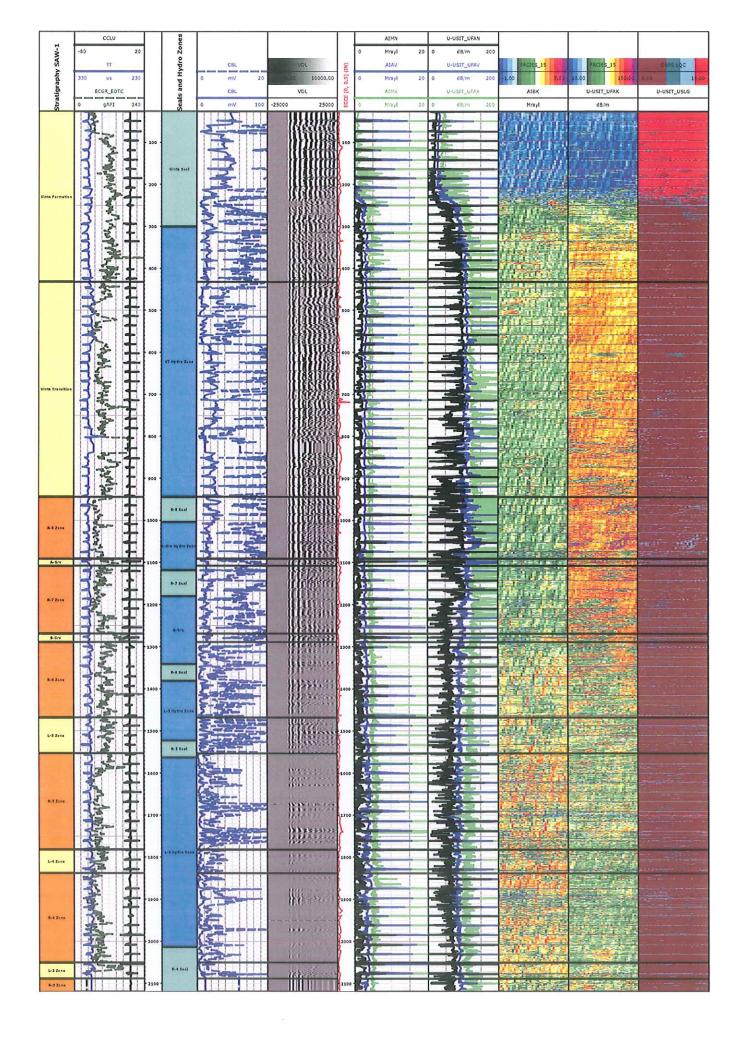
Zone 1 - 1550ft – 2128ft: The flexural image map indicates cement is present in the annulus behind the casing and that casing is bonded. Adequate isolation exists. This is the tail cement at 15.5ppg. Top of tail cement is also supported by the VDL formation signal.

Zone 2 - : 237ft - 1550ft: The flexural image map indicates that adequate cement for isolation exists. There are some local channels with microdebonding cement in certain intervals as seen on the image map. Overall the cement condition is fair to good bonding.

Zone 3 - : Surface — 237ft: The flexural image indicates the Top of Cement (TOC) at 237ft and presence of air in the annulus preventing quantitative cement analysis. Spotty cement is visible on the image map. These indicate presence of cement fall-back during the curing process.

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<u>Conclusions</u>: The Isolation Scanner Cement Bond Analysis indicates that cement bond is present in the annulus behind the casing. Adequate bonding exists to isolate the production zone and the saline water interval from the overlying water bearing intervals. The Top of Cement (TOC) is at 237ft.



Depth, ft.	Stratigraphy R/L Zones	Seals and Hydro Zones	Gamma 0 api 240	Well 8105 Borehole (BH) Cement Plugs	BH Plug Seal*	8105 Drill Losses	Comments
300	Uinta Formation	Uinta Seal 300, estimated	Phone of the last	Placed Tagged Note: No BH cement plugs were placed in well 8105			*: Good interval for BH cement plug base Casing Installation: Cement to surface Circulated w/air and gel mud (~8-9 ppg w/ ~0-15 ppb LCM);
700	Uinta Transition	UT Hydro Zone					~1010ft MD: ~450 gpm
900		944 1004R-8 Seal	£ 5				15 min ECD test: ~15 bph loss
1100 -	R-7 Zone 1269 1289 1351, HD	A-Grv Hydro Zone 1118 1189R-7 Seal B-Grv Hydro Zone 1341 1331R-6 Seal L-5 Hydro Zone	The state of the s				~1252ft MD: ~450 gpm 15 min ECD test: ~15 bph loss
1500	1553 R-5 Zone	1523 1563R-5 Seal L-4 Hydro Zone 1833.0, TOSN		Circulated mud after casing installation, before cementing.			~1552ft MD: ~450 gpm 15 min ECD test: ~7 bph loss ~1753ft MD: 410 gpm ECD test: 32 bph loss ~1993ft MD: ~ 409 gpm 15 min ECD test: ~30 (60?) bph loss (reduced loss with increased LCM,
2200 -	R-3 Zone 2238 L-2 Zone	R-4 Seal 2185.2 - 2193.3, Greeno Red 2257.1 - 2264.1, TI Bed	ICP	Pressure responses observed in B well at 138 pad during drilling; and slight response in 138 L5 during casing cementing			to ~15ppb) ~2060ft MD: ECD test: ~12 bph loss ~2285ft MD: ~360 gpm 15 min ECD test: ~ 5 bph loss;