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Scale 1:240 (5"=100') Imperial
Measured Depth Log

Well Name:	Waugh B #4
Location:	SE-NE-NW-SW Ellis County
License Number:	API #15-051-26511-00-00
Region:	Kansas
Spud Date:	7/12/2016
Drilling Completed:	7/19/2016
Surface Coordinates:	Section 15, Township 15 South, Range 13 East
	2,310' FSL & 2,310' FWL
Bottom Hole Coordinates:	Vertical well w/ minimal deviation, same as above
Ground Elevation (ft):	1,992
K.B. Elevation (ft):	1,998
Logged Interval (ft):	1,200 To: 3170
Total Depth (ft):	3,180
Formation:	Arbuckle Simple Play
Type of Drilling Fluid:	Chemical (Andy's Mud)

Provided by STRIP LOG from Wellington Systems 1-405-407-1334 www.WellingtonLogs.com

OPERATOR

Company: John O. Farmer, Inc.
Address: 370 W. Wichita Ave.
Russell, KS 67665

Comments

The Waugh B #4 well was drilled by Discovery Drilling Rig #2 (Ted Pushin / Terry Wickham).

The 5.500" 17.00# Waugh B #4 was discovered in AB interim. Rock samples were washed and evaluated from 3,000' to 3,180' (TD). Based on the results of the DST #1 (3,150' - 3,180') and especially the Mississippian top was picked 17' low to the comparison well, Waugh B #2 (John O. Farmer Inc.). Structural relationship with the previous wells was maintained and the Mississippian was picked 17' low to the comparison well. The Kinderhook section thickened and the Hunton was encountered 2' low. The primary pay zone (Simpson Sand) was picked 1' low to the comparison well. A drill stem test was conducted over the top of the Simpson Sand and it produced 1,000' of gas in 45 minutes on a 20/64" choke. Based on the DST results, the electric logs, it was decided that 5.1/2" production casing be set to utilize the Waugh B #4 as a SWDW.

ROCK TYPES

Anhy	Chert	Gas	Lime	Marl	Shale	Stringer	
Bentonite	Coal	Gypsum	Marble	Salt	Sand	Tuff	
Dolomite	Conglomerate	Igneous	Metamorphic	Sandstone	Siltstone	Unknown	
Dst	Cgl	Ls	Mnsnd	Shcol	Shscol	Tn	

OTHER SYMBOLS

POROSITY		VUGGY	ROUNDING		OIL	FRACTURE
Vuggy			Spotted		Spotted	
Fracture			Trace		Trace	
Pinpoint			Submod		Dead	
Intergran			Subrnd			
Inter			Rnd			
Chalky			Angular			
Organic						
Pinpoint						

STAIN		ODOR		FLUORESCENCE		INTERVAL	
Spotted		Petro		Yellow		Core	
Trace		Sulfur		Orange		Sidewall	
Dead		Gas		Dull			

Curve Track 1	
ROP (min/ft)	
Gamma (API)	
Resistivity (Ω)	

Depth	Lithology	Geological Descriptions	DST/Mud/Survey
1,200		**The open-hole logging was performed by Mr. Gerry Petersen of Petrologs. The following logs were run: KCL Logs Included: Compensated Neutron Density, Dual Induction, and Microresistivity.**	**Mud Engineer:** Dennis Mullins
		Formation tops and datums from the open-hole logs include the following:	**Tester:** Carl Tatum

Formation	Depth	Datum
Anhydrite	1027	971
Topeka	2710	-712
Heebner	2931	-933
Toronto	2951	-953
Lansing	2971	-973
Stone Corral	3055	-1057
Base Kansas City	3123	-1125
Arbuckle	3170	-1172

Depth	Lithology	Geological Descriptions	DST/Mud/Survey
2,000			
2,500			
3,000		**Mississippian 3350' (-970)**	
		Dsm: off wht gry, fnsub cry, mostly SW.	
		Dsm: brwn gry, fn cry, SW.	
		Dsm: brwn gry, fn cry, poor vuggy porosity, spotted.	
		Dsm: cry.	
		Dsm: off wht brwn gry, fnsub cry, mostly SW, spotted.	DR 5.0 TG 10
		Dsm: off wht, cry, fn cry, mostly SW, sub clark.	
		Dsm: cry, sub chert.	
		Ss: wh gry clr.	
		Dsm: off wh brwn gry, fn cry, sub tr vis porosity, spotted.	
		Dsm: off wh brwn gry, fn cry, mostly SW, tarnish.	
		Dsm: off wh gry.	
		Chert: cry.	
		Dsm: off wh gry, fnscy fn cry, mostly SW, tarnish, chert off wh.	
		Dsm: cry.	
		Kinderhook 3500' (-1216)	
		Ss: mdk gry, sub soft.	
		Ss: cry.	
		Ss: mdk gry, soft.	
		Ss: wh gry clr.	
		Ss: wh gry clr.	
		Ss: cry.	DR 5.0 TG 10
		Hunton 3750' (-1466)	
		Chert: lt gry off wh, fair-good int flow porosity, tarnish, chert off wh, mdpk.	
		Chert: off wh gry, fair-good int flow porosity, sub dull off wh, mdpk, tarnish.	
		Chert: off wh, fair-good int flow, sub dull wh porosity, tarnish.	
		Dsm: lgy, fn cry, mostly SW, tarnish.	
		Dsm: cry.	
		Maquoketa 3840' (-1550)	
		Ss: lt gry.	
		Ss: mdk gry.	
		Viola 3872' (-1582)	
		Dsm: off wht gry, fnsub cry, pseudo-int tr vis porosity, SW/Oilsmy, tar odor.	
		Dsm: off wh, fnsub cry, fair-good int vis porosity, SW/Oilsmy, tar odor.	
		Dsm: off wh gry, fnsub cry, poor-fair int vis porosity, tarnish.	
		Dsm: cry.	
		Dsm: lt gy brn, fnsub cry, mostly SW, tarnish.	
		Dsm: cry.	DR 5.0 TG 10
		Simpson Dolo 3980' (-1670)	
		Dsm: off wh, fnsub cry, poor-fair int vis porosity, tarnish, tr oil, 1-2% tr vis gas, odor.	
		Simpson Sand 3990' (-1680)	
		Ss: wh, off wh, cry to fnsb gry, fair-int gas porosity, tr oil, tr vis gas, 1-2% tr vis gas, odor, 1-2% tr gas bubbles from tr vis water, 100% cut, fair-good flow.	
		Ss: wh, off wh gry, cry, fnsb gry, fair-good int gas porosity, tr oil, tr vis gas, 1-2% tr vis gas, odor, 100% cut, fair-int vis gas, 100% tr vis water.	
		Ss: wh, off wh, fnsub gry, poor-int gas porosity, tr vis water, tarnish, sub dull, sub dull, tr oil, 1-2% tr vis gas, odor.	
		Ss: off wh gry.	
		Arbuckle 3040' (-1750)	
		Dsm: sucrosic, tn cry, fair-good int vis porosity, tarnish.	
		Dsm: tarnish, fnsub cry, mostly SW, sub dull, tarnish.	
		Dsm: off wh cry, fnsub cry, fair int vis porosity, tarnish.	
		Dsm: lmsub cry, fnsub cry, mostly SW, tarnish, sub dull, sub dull.	
		Dsm: cry.	

DST #1: 3,150'-3,180' (Simpson Sand)

IF: Strong blow BOB in 30 seconds, no bottom hole flow.
ISI: Dead.
FF: Strong blow BOB in 30 seconds, no bottom hole flow, 45" MCF/D, 20/64" choke, 200 psi.
FSI: Dead.
Recovered: 1,000' of gas in the drill pipe, 60' of gas in the drill collars, 20' of slightly gas cut mud (5% gas, 95% mud).
Pressures: IHP 1,651-1,651, IFP 200-200, ISIP 1,000-1,000, FFP 200-200, FSIP 1,000-1,000.
Temperature: 100°F.