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Empire E&P LLC  
Thompson #9  
NW-SE-SW-NE (2232' FNL & 1667 FEL)  
Section 6-9s-18w  
Rooks County, Kansas

Page 1

**5 1/2" Production Casing Set**

**Contractor:** Royal Drilling Co (rig #1)  
**Commenced:** April 18, 2017  
**Completed:** April 12, 2017  
**Elevation:** 2061' K.B., 2059' D.F., 2056' G.L.  
**Casing program:** Surface; 8 5/8" @ 228'  
Production, 3545'  
**Sample:** Samples saved and examined 2900' to the Rotary Total Depth.  
**Drilling time:** One (1) foot drilling time recorded and kept 2900' to the Rotary Total Depth.  
**Measurements:** All depths measured from the Kelly Bushing.  
**Drill Stem Tests:** None  
**Electric Log:** None

<u>Formation</u>	<u>Sample Depth</u>	<u>Sub-Sea Datum</u>
Topeka	2994	-933
Heebner	3201	-1140
Toronto	3223	-1162
Lansing	3240	-1179
Base Kansas City	3449	-1388
Conglomerate	3461	-1400
Arbuckle	3484	-1423
Rotary Total Depth	3546	-1485

(All tops and zones were made from a correlation of Drilling Time Logs and Sample Analysis)

**SAMPLE ANALYSIS, SHOWS OF OIL, TESTING DATA, ETC.**

**TOPEKA SECTION**

2994-3004'	Limestone, white, cream, finely crystalline, granular, fossiliferous in part; poor visible porosity, no shows.
3020-3031'	Limestone, gray, chalky; scattered pinpoint porosity; no shows.
3090-3100'	Limestone, white, tan, chalky, few cherty; dense.
3111-3120'	Limestone, gray, finely crystalline, fossiliferous, slightly chalky; no shows.

- 3158-3166' Limestone, white/gray, finely crystalline, oolitic in part; trace dark brown and black stain, no show of free oil and no odor in fresh samples.
- 3170-3188' Limestone, white, cream, chalky, plus white, cream; boney chert.

**TORONTO SECTION**

- 3223-3233' Limestone, white, gray, few fossiliferous, chalky in part, trace golden, brown stain, trace free oil and no odor in fresh samples.

**LANSING SECTION**

- 3240-3246' Limestone, white, tan, finely crystalline, fossiliferous in part, light brown/golden brown stain, trace of free oil and no odor in fresh samples
- 3260-3264' Limestone, white, fossiliferous, chalky, plus chert, gray/amber opaque.
- 3274-3284' Limestone, white, cream, finely crystalline, chalky, scattered fine pinpoint type porosity, brown and golden brown stain, no show of free oil and fair odor in fresh samples.
- 3296-3304' Limestone, white, cream and tan, finely crystalline, few fossiliferous, chalky, brown spotty stain, no show of free oil and faint to fair odor in fresh samples.
- 3324-3330' Limestone, tan, gray, slightly fossiliferous, few oolitic, trace poor stain, no free oil and no odor in fresh samples
- 3330-3342' Limestone, as above, plus white; boney chert.
- 3370-3378' Limestone, white, gray, finely crystalline, chalky, poorly developed porosity; no shows.
- 3392-3398' Limestone, gray, fossiliferous in part; chalky, few cherty; poor visible porosity, questionable brown edge discoloration, no free oil and no odor in fresh samples.
- 3411-3418' Limestone, white, gray, chalky, poor visible porosity, trace poor stain, no free oil and faint odor in fresh samples.
- 3436-3443' Limestone, as above, plus chert; white fossiliferous, opaque, no shows.

**MARMATON SECTION**

- 3455-3460' Limestone, white, fossiliferous, slightly cherty, trace brown and black stain, trace of free oil and no odor in fresh samples.

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Page 3

**ARBUCKLE SECTION**

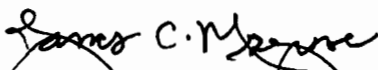
- 3484-3491' Dolomite, tan, finely crystalline, few medium crystalline, slightly cherty, poor to fair inter-crystalline and vuggy porosity, brown stain, show of free oil and faint odor in fresh samples.
- 3491-3501' Dolomite, white, gray, finely crystalline, slightly sandy (granular) fair vuggy type porosity, brown to dark brown stain and saturation, show of free oil and faint to good odor in fresh samples.
- 3501-3510' Dolomite, white, gray, medium to coarse crystalline, good vuggy type porosity, few sandy, good brown and dark brown stain and saturation, good show of free oil and good odor in fresh samples.
- 3510-3520' Dolomite, as above, good porosity, plus white oolitic chert.
- 3520-3530' Dolomite, as above, good vuggy type porosity, good stain and saturation, show of free oil and good odor in fresh samples.
- 3530-3546' Lost circulation/no samples.

**Rotary Total Depth            3546**

**Recommendations:**

5 ½' production casing was set and cemented on the Empire Energy E&P LLC, Thompson #9

Respectfully yours,

  
James C. Musgrove  
Petroleum Geologist

