

WELL HISTORY
ENSIGN OPERATING COMPANY
NO. 1-19 KOEHN
C N/2 SE SEC. 19, T30S, R30W
MEADE COUNTY, KANSAS

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STRIP LOG (WITH DRILL TIME, LITHOLOGY AND HOT WIRE MEASUREMENTS)	ATTACHED

SYNOPSIS

The Ensign Operating Co. No. 1-19 Koehn C N/2. SE Sec. 19, T30S, R30W, Meade County, Kansas was a 5900 foot well to evaluate the Lion Prospect. The main objective of the well was to evaluate the Pennsylvanian Morrow sandstones. Secondary objectives were the Chester sandstones, and the Mississippian Ste. Genevieve limestones. Another objective was to evaluate any significant oil and gas shows encountered while drilling the well to total depth.

The expected sandstones in the Morrow that produce oil and gas in this area were not present. Shows in the Pennsylvanian Swope limestones were drill-stem tested. This test recovered water with a show of oil in the sampler.

After an evaluation of the lithologic samples, drill-stem test data and bore hole geophysical logs, it was determined that the well was not capable of oil and gas production from the formations in the Pennsylvanian and Mississippian. The well was plugged and abandoned on March 31, 1995.

GENERAL WELL INFORMATION

Operator: Ensign Operating Co.

Well Name: No. 1-19 Koehn API No. 15-119-20 942

Prospect: Lion Prospect

Location: C N/2 SE Sec. 19, T30S, R30W, 1980' FSL, 1320' FEL

County: Meade

State: Kansas

Elevation: G.L. 2816' K.B. 2828'

Spudded: March 18, 1995 @ 1:45 P.M..

**Completed
Drilling:** March 29, 1995 @ 10:00 A.M.

Total Depth: Driller 5900' Logger 5898'

Status: Plug and Abandon

Drill-Stem Tests: Drill-Stem Test No. 1 4750'-4798', Pennsylvanian Swope.
30-60-60-120

I.O. Strong Blow, Bottom of Bucket In 1 Minute.
F.O. Strong Blow, Bottom of Bucket In 2 Minutes.

Recovery: 93' Oil & Gas Cut Muddy Water, 5% Gas, 2% Oil, 60% Water,
33% Mud.
2482' Gas Cut Saltwater

Sampler: 7.3 Cu Ft Gas, 50 Ml Oil, 450 Ml Mud, 3500 Ml Water
@ 810 psi. Rw 0.084 @ 70° F

Hydrostatic Pressures 2330-2167 psi
Flow Pressures 219-798:848-1277 psi
Shut-in Pressures 1482-1434 psi
Bottom Hole Temperature 120° F

Trilobite Testing Co., L.L.C., Tom Horacek, Tester

Logging Program: AIS/SP/GR 0' - 5897'
 CNS/PDS/GR/Cal 1682' - 5896'
 MLS/GR/Cal 1682' - 5871'
 BCA/GR/Cal 1682' - 5854'
 PSD/GR/Cal 2500' - 5898'

BPB Logging Co., Inc., Dan Tollefson, Engineer.

Sample Program: Ten foot samples from 2600' - 5900'. Samples were examined and described at the well site. Samples were caught on depth intervals by rig crews. Samples were lagged by geologist. All depths reported herein are lagged depths.

Mud Logging: Holmes Gas Detector Service, Unmanned Unit.

Mud Program: Cimmeron Mud Co., Jim Reed, Engineer.

Lost Circulation: None.

Contractor: Duke Drilling Co., Rig No. 6, Dusty Brinkley, Toolpusher.

Bit Record:	No.	Size	Make	Type	Depth Out	Feet	Hours
	1	12.25	STC	DTJR	1685'	1685'	27.00
	2	7.875	Ver	517C	5533'	3848'	120.25
	3	7.875	Ver	537C	5900'	367'	27.25

Total Rotating Hours 174.5, Average 33.81 Ft/Hr

Deviation Record: 1/4° @ 662'
 1° @ 999'
 1 1/2° @ 1501'
 11/2° @ 1685'
 1° @ 2214'
 3/4° @ 2712'
 3/4° @ 4674'
 1° @ 4798'
 1° @ 5533'
 1 1/4° @ 5900'

DAILY DRILLING REPORT

Ensign Operating Co.
No. 1-19 Koehn
C N/2 SE Sec. 19, T30S, R30W
Meade County, Kansas

7:00 A.M. Reports

1	Mar	18	0' (0') Rig up rotary tools. Spud @ 1:15 P.M..
2	Sun	19	662' (662')
3	Mon	20	1515' (853')
4	Tue	21	1770' (728') Set 8 5/8" @ 1682', Plug Down @ 4:00 P.M.
5	Wed	22	2760' (990') Drill Plug @ 4:00 A.M.
6	Thur	23	3540' (780')
7	Fri	24	4330' (790')
8	Sat	25	4798' (468')
9	Sun	26	4910' (112') DST No. 1 4750'-4798', Swope.
10	Mon	27	5310' (400')
11	Tue	28	5580' (270')
12	Wed	29	5887' (307')
13	Thur	30	5900' (13') Logging
14	Fri	31	5900' (0') Plug and Abandon.

FORMATION TOPS

Ensign Operating Co.
No. 1-19 Koehn
C N/2 SE Sec. 19, T30S, R30W
Meade County, Kansas

G.L. 2816' K.B. 2828'	Comparison Well NESE 26-30S-31W K.B. 2830'	Drill Time And Samples	Wire Line Logs
Tertiary	Surface +2819'	Surface +2816'	Surface +2816'
Cretaceous	NL	436' +2392'	436' +2392'
Permian			
Glaudalupian			
Taloga	NL	NP	NP
Day Creek	NL	NP	NP
Leonardian			
Nipewalla Gr.			
Blaine	NL	1055' +1773'	1059' +1769'
Cedar Hills	NL	1218' +1610'	1215' +1613'
Sumner Gr.			
Stone Corral	1644' +1186'	1692' +1136'	1688' +1140'
Ninnescah	1762' +1068'	1792' +1036'	1790' +1038'
Wellington	1962' +868'	1967' +861'	1964' +864'
Hutchinson	2186' +644'	2190' +638'	2190' +638'
Wolfcampian			
Chase Gr.			
Herington	2662' +168'	2686' +142'	2676' +152'
Krider	2718' +112'	2738' +90'	2732' +96'
Winfield	2760' +70'	2784' +44'	2778' +50'
Towanda	2810' +20'	2830' -2'	2828' -0'
Fort Riley	2858' -28'	2880' -52'	2878' -50'
Wreford	2956' -126'	2987' -159'	2980' -152'
Council Grove Gr.	3050' -220'	3081' -253'	3078' -250'
Pennsylvanian			
Virgilian			
Douglas Gr.			
Heebner	4224' -1394'	4242' -1414'	4236' -1408'
Toronto	4242' -1412'	4260' -1432'	4254' -1426'

G.L. 2816' K.B. 2828'	Comparison Well NESE 26-30S-30W K.B. 2830'	Drill Time And Samples	Wire Line Logs
Missourian			
Lansing Gr.	4330' -1500'	4348' -1520'	4344' - 1516'
Kansas City Gr.	4558' -1728'	4578' -1750'	4574' -1746'
Swope	4764' -1934'	4761' -1933'	4758' -1930'
Demoinesian			
Marmaton Gr.	4908' -2078'	4910' -2082'	4908' -2080'
Oswego	5010' -2180'	5219' -2187'	5012' -2184'
Cherokee Gr.	5058' -2228'	5060' -2232'	5057' -2229'
Atokaian .	5178' -2348'	5177' -2349'	5171' -2343'
Morrowian			
Chester	5346' -2516'	5332' -2504'	5329' -2501'
Terra Rossa	5438' -2608'	5373' -2545'	5370' -2542'
	5486' -2656'	5476' -2648'	5471' -2646'
Mississippian			
Meramecian			
Ste. Genevieve	5520' -2690'	5512' -2684'	5508' -2680'
Total Depth	5898' -3068'	5900' -3072'	5898' -3070'

LITHOLOGIC SAMPLE DESCRIPTIONS

Ensign Operating Co.
No. 1-19 Koehn
C N/2 SE Sec. 19, T30S, R30W
Meade County, Kansas

Sample examination commenced at 2600 feet and continued to total depth at 5900 feet. Samples were caught by crews on depth intervals and lagged by geologist. All depths reported herein are lagged depths. A 10 foot sample interval was used from 2600 feet to 5900 feet.

- 2580 - 2590 Anhydrite (90%), gray, white, fine crystalline. Shale (5%), gray, red. Dolomite (5%), gray, fine crystalline.
- 2590 - 2602 Anhydrite (95%), white, fine crystalline. Shale (5%), gray, red. Dolomite (trace), gray fine crystalline.
- 2602 - 2618 Anhydrite (90%), gray, white, fine crystalline. Shale (5%), gray, red. Dolomite (5%), tan, gray, fine crystalline.
- 2618 - 2624 Anhydrite (70%), gray, white, fine crystalline. Dolomite (25%), gray, fine crystalline. Shale (5%), gray, red.
- 2624 - 2634 Dolomite (65%), gray, tan, fine crystalline. Anhydrite (30%), gray, white, fine crystalline. Shale (5%), gray, red.
- 2634 - 2642 Dolomite (75%), light gray, some tan, fine crystalline. Anhydrite (25%), gray, white, fine crystalline. Shale (5%), gray, red.
- 2642 - 2654 Dolomite (50%), light gray, grayish tan, gray, fine crystalline. Anhydrite (45%), gray, white, fine crystalline. Shale (5%), gray, red.
- 2654 - 2663 Anhydrite (70%), gray, white, fine crystalline. Dolomite (25%), light gray, grayish tan, fine crystalline. Shale (5%), gray.
- 2663 - 2672 Anhydrite (85%), gray, white, fine crystalline. Dolomite (5%), light gray, fine crystalline. Shale (10%), gray.
- 2672 - 2684 Anhydrite (70%), gray, white, fine crystalline. Dolomite (25%), light gray, tan, fine crystalline. Shale (5%), gray.
- Chase Grp., Herington 2686' +142'**
- 2684 - 2694 Anhydrite (80%), white, gray, fine crystalline. Dolomite (15%), light gray, tan, fine crystalline.

- 2694 - 2704 Anhydrite (80%), white, gray, fine crystalline. Dolomite (15%), light gray, tan, fine crystalline. Shale (20%), gray.
- 2704 - 2718 Dolomite (50%), light gray, tan, fine crystalline. Anhydrite (45%), white, gray, fine crystalline. Shale (5%), gray. Chert (trace), light gray.
- 2718 - 2727 Dolomite (40%), light gray, tan, fine crystalline. Shale (40%), gray, red. Anhydrite (20%), gray, white, fine crystalline.
- 2727 - 2734 Dolomite (40%), light gray, tan, fine crystalline. Shale (40%), gray, red. Anhydrite (20%), gray, white, fine crystalline.

Krider 2738' +90'

- 2734 - 2744 Dolomite (65%), light gray, fine crystalline. Shale (20%), gray, red. Anhydrite (15%), gray, white, fine crystalline.
- 2744 - 2754 Dolomite (85%), light gray, fine crystalline, some vuggy porosity. Shale (10%), gray. Anhydrite (5%), gray, white, fine crystalline.
- 2754 - 2764 Dolomite (50%), light gray, tan, fine crystalline, some vuggy porosity. Shale (10%), gray. Anhydrite (40%), gray, white, fine crystalline.
- 2764 - 2776 Dolomite (45%), gray, fine crystalline. Shale (30%), gray, red. Anhydrite (25%), white, light gray.
- 2776 - 2779 Dolomite (40%), gray, fine crystalline. Shale (50%), gray, red, greenish gray. Anhydrite (10%), white, light gray, fine crystalline.

Winfield 2784' +44'

- 2779 - 2787 Shale (60%), gray, greenish gray, red. Dolomite (20%), gray, fine crystalline. Anhydrite (20%), white, light gray, fine crystalline.
- 2787 - 2796 Dolomite (70%), buff, tan, light gray, fine crystalline. Shale (25%), gray, green, red. Anhydrite (5%), white, light gray, fine crystalline.
- 2796 - 2810 Dolomite (75%), buff, tan, light gray, fine crystalline, trace vuggy porosity. Shale (20%), gray, green, red. Anhydrite (5%), white, light gray, fine crystalline.
- 2810 - 2822 Dolomite (60%), buff, tan, light gray, fine crystalline. Shale (30%), gray, green, red. Anhydrite (10%), white, light gray, fine crystalline.
- 2822 - 2830 Dolomite (50%), buff, tan, light gray, fine crystalline. Shale (30%), gray, green, red. Anhydrite (20%), white, light gray, fine crystalline.

Towanda 2830' -2'

- 2830 - 2836 Dolomite (40%), buff, tan, light gray, fine crystalline. Limestone (20%), white, packstone, wackestone. Shale (20%), gray, red, grayish green. Siltstone (20%), white, red. Chert (trace), gray.
- 2836 - 2842 Limestone (70%), white, packstone, wackestone. Dolomite (20%), gray, fine crystalline. Shale (5%), gray, red. Anhydrite (5%), white, gray, fine crystalline.
- 2842 - 2863 Limestone (90%), gray, grayish tan, white, packstone, wackestone, some oolitic packstone with oomoldic porosity, vuggy porosity. Dolomite (5%), gray, fine crystalline. Shale (5%), gray.
- 2863 - 2871 Limestone (100%), gray, grayish tan, packstone, wackestone, some oolitic packstone with oomoldic porosity, good vuggy porosity. Shale (trace), gray. Anhydrite (trace), gray, fine crystalline.
- 2871 - 2877 Limestone (90%), gray, grayish tan, packstone, wackestone, oolitic packstone with oomoldic porosity, vuggy porosity. Shale (trace), gray. Anhydrite (trace), gray, fine crystalline.

Fort Riley 2880' -52'

- 2877 - 2885 Limestone (90%), gray, grayish tan, packstone, wackestone, trace white oolitic packstone with oomoldic porosity, vuggy porosity. Dolomite (5%), gray, tan, crystalline, intercrystalline porosity. Shale (5%), gray.
- 2885 - 2898 Dolomite (80%), light gray, fine crystalline, crystalline, vuggy porosity. Limestone (20%), gray, grayish tan, wackestone, packstone. Shale (trace), gray.
- 2898 - 2914 Dolomite (90%), light gray, fine crystalline, crystalline, vuggy porosity. Limestone (10%), gray, grayish tan, wackestone, packstone. Shale (trace), gray.
- 2914 - 2927 Dolomite (90%), light gray, fine crystalline, crystalline, vuggy porosity. Limestone (10%), gray, grayish tan, wackestone, packstone. Shale (trace), gray.
- 2927 - 2934 Dolomite (85%), gray, tan, fine crystalline, crystalline, vuggy porosity. Shale (15%), gray. Limestone (trace), tan, wackestone, packstone.
- 2934 - 2945 Dolomite (50%), gray, tan, fine crystalline, crystalline, vuggy porosity. Limestone (45%), tan, light gray, packstone, wackestone, vuggy porosity. Shale (trace), gray, greenish gray.
- 2945 - 2954 Dolomite (50%), gray, tan, fine crystalline, crystalline, vuggy porosity. Limestone (40%), tan, light gray, packstone, wackestone, vuggy porosity. Shale (10%), gray, greenish gray.

- 2954 - 2967 Limestone (40%), tan, light gray, wackestone, some packstone. Dolomite (30%), gray, fine crystalline. Anhydrite (10%), white, fine crystalline. Shale (20%), gray, red.
- 2967 - 2972 Limestone (40%), tan, light gray, wackestone. Dolomite (35%), gray, fine crystalline. Anhydrite (10%), white, light gray, fine crystalline. Shale (15%), gray, red.
- 2972 - 2977 Limestone (40%), tan, light gray, wackestone. Dolomite (30%), gray, fine crystalline. Shale (30%), gray. Chert (trace), white, gray.
- 2977 - 2996 Limestone (75%), buff, white, tan, packstone, wackestone, some oolitic packstone with oomoldic porosity, some oolites filled with red shale - "red oolite marker". Shale (20%), gray, red. Anhydrite (trace), gray, white, fine crystalline. Dolomite (5%), gray, fine crystalline.

Wreford 2987' -159'

- 2996 - 3004 Limestone (60%), buff, tan, light gray, packstone, wackestone, trace oolitic packstone with oomoldic porosity, some red hematitic staining. Shale (25%), gray, red. Anhydrite (5%), white, fine crystalline, crystalline. Dolomite (10%), gray, fine crystalline.
- 3004 - 3014 Limestone (65%), buff, tan, light gray, packstone, wackestone. Shale (35%), gray, red. Anhydrite (trace), white, fine crystalline. Dolomite (5%), gray, fine crystalline.
- 3014 - 3024 Limestone (70%), buff, tan, light gray, packstone, wackestone. Shale (30%), gray, red. Anhydrite (trace), white, fine crystalline.
- 3024 - 3029 Limestone (75%), buff, tan, light gray, packstone, wackestone. Shale (20%), gray, red. Anhydrite (trace), white, fine crystalline. Dolomite (5%), gray, tan, fine crystalline.
- 3029 - 3040 Limestone (90%), buff, tan, light gray, packstone, wackestone, trace oolitic packstone with oomoldic porosity, vuggy porosity. Shale (10%), gray, red.
- 3040 - 3057 Limestone (100%), buff, tan, light gray, packstone, wackestone, vuggy porosity. Shale (trace), gray. Chert (trace), gray.
- 3057 - 3070 Limestone (95%), buff, tan, light gray, packstone, wackestone, vuggy porosity. Shale (5%), gray. Chert (trace), gray.
- 3070 - 3078 Limestone (95%), buff, tan, light gray, packstone, wackestone. Shale (5%), gray, red.

Council Grove 3081' -253'

- 3078 - 3089 Limestone (85%), buff, tan, light gray, packstone, wackestone. Shale (15%), gray, red.
- 3089 - 3100 Limestone (60%), buff, tan, light gray, wackestone, packstone. Dolomite (35%), white, fine crystalline, some with red hematitic staining. Anhydrite (5%), white, fine crystalline. Shale (trace), gray.
- 3100 - 3108 Limestone (80%), buff, tan, gray, packstone, wackestone with black pellets and fragments, trace oolitic packstone with oomoldic porosity. Dolomite (15%), tan, white, fine crystalline, vuggy porosity. Anhydrite (trace), white, fine crystalline. Shale (5%), gray.
- 3108 - 3120 Limestone (90%), white, buff, tan, packstone, wackestone, vuggy porosity. Dolomite (10%), tan, white, fine crystalline, vuggy porosity. Shale (trace), gray.
- 3120 - 3128 Limestone (95%), white, buff, tan, packstone, wackestone, vuggy porosity. Dolomite (5%), tan, white, fine crystalline. Shale (trace), gray.
- 3128 - 3133 Limestone (95%), white, buff, tan, packstone, wackestone, some vuggy porosity. Dolomite (trace), tan, white, fine crystalline. Shale (5%), gray, red.
- 3133 - 3138 Limestone (95%), white, buff, tan, packstone, wackestone, trace white oolitic packstone with oomoldic porosity, trace vuggy porosity. Shale (5%), gray, red. Anhydrite (trace), white, fine crystalline. Dolomite (trace), white, tan, fine crystalline.
- 3138 - 3158 Limestone (95%), white, buff, tan, packstone, wackestone, medium grained oolitic packstone with oomoldic porosity, some vuggy porosity. Shale (5%), gray, red.
- 3158 - 3163 Limestone (95%), white, buff, tan, packstone, wackestone, fine-medium grained oolitic packstone with oomoldic porosity, some vuggy porosity. Shale (5%), gray, red.
- 3163 - 3167 Limestone (95%), white, buff, tan, packstone, wackestone, some fine-medium grained oolitic packstone with oomoldic porosity. Shale (5%), gray.
- 3167 - 3188 Limestone (100%), white, buff, tan, coarse grained packstone, wackestone, vuggy porosity. Shale (trace), gray.
- 3188 - 3200 Limestone (50%), white, buff, tan, coarse grained packstone, wackestone, vuggy porosity. Dolomite (50%), tan, fine crystalline, vuggy porosity. Shale (trace), gray.
- 3200 - 3208 Limestone (75%), white, buff, tan, packstone, wackestone, some limestone with red hematitic staining. Dolomite (25%), tan, fine crystalline, vuggy porosity. Shale (trace), gray, red.

- 3208 - 3220 Limestone (95%), white, some tan mudstone, wackestone, some packstone, some limestone with red hematitic staining and red shale inclusions. Dolomite (5%), tan, fine crystalline. Shale (trace), red, gray.
- 3220 - 3226 Limestone (95%), white, some tan mudstone, wackestone, some packstone, some limestone with red hematitic staining and red shale inclusions, some red lime mudstone. Shale (5%), red, gray. Dolomite (trace), tan, fine crystalline, vuggy porosity.
- 3226 - 3230 Limestone (95%), white, mudstone, wackestone, some with red hematitic staining. Shale (5%), gray, red. Dolomite (trace), tan, fine crystalline.
- 3230 - 3232 Limestone (90%), white, mudstone, wackestone. Dolomite (10%), tan, white, fine crystalline. Shale (trace), gray.
- 3232 - 3240 Limestone (95%), white, wackestone, mudstone, packstone, some white medium grained oolitic packstone with oomoldic porosity. Shale (5%), gray, green, red. Dolomite (trace), white, fine crystalline.
- 3240 - 3254 Limestone (95%), white, wackestone, mudstone, packstone. Shale (5%), gray, green, red. Dolomite (trace), tan, fine crystalline.
- 3254 - 3270 Limestone (90%), white, tan, light gray, wackestone, packstone some white medium grained oolitic packstone with oomoldic porosity. Shale (10%), gray, red. Dolomite (trace), white, tan, fine crystalline.
- 3270 - 3283 Limestone (85%), white, tan, light gray, wackestone, packstone. Shale (15%), gray, red, green.
- 3283 - 3292 Limestone (90%), white, tan, light gray, wackestone, packstone. Shale (10%), gray, red, green.
- 3292 - 3296 Limestone (95%), white, tan, light gray, wackestone, packstone. Shale (5%), gray, green.
- 3296 - 3306 Limestone (90%), white, tan, light gray, wackestone, packstone. Shale (10%), gray, green.
- 3306 - 3324 Limestone (90%), white, tan, light gray, wackestone, packstone. Shale (10%), gray, green.
- 3324 - 3329 Limestone (95%), white, tan, light gray, wackestone, packstone. Shale (5%), gray, green.
- 3329 - 3336 Limestone (95%), white, tan, light gray, wackestone, packstone, trace oolitic packstone with oomoldic porosity. Shale (5%), gray, green.

- 3336 - 3355 Limestone (95%), white, tan, light gray, packstone, wackestone, vuggy porosity. Shale (5%), gray, green.
- 3355 - 3361 Limestone (95%), white, tan, light gray, packstone, wackestone, vuggy porosity. Shale (5%), gray, green.
- 3361 - 3372 Limestone (100%), buff, white, packstone, wackestone, vuggy porosity. Shale (trace), gray, bright green, green. Chert (trace), white.
- 3372 - 3382 Limestone (95%), buff, tan, light gray, packstone, wackestone some vuggy porosity. Shale (5%), gray, green. Chert (trace), white, gray.
- 3382 - 3392 Limestone (100%), buff, tan, light gray, packstone, wackestone, some vuggy porosity. Shale (trace), gray, green. Chert (trace), white, gray.
- 3392 - 3400 Limestone (100%), buff, tan, light gray, packstone, wackestone, trace oolitic packstone with oomoldic porosity. Shale (trace), gray, green. Chert (trace), white.
- 3400 - 3404 Limestone (100%), buff, tan, light gray, packstone, wackestone, trace vuggy porosity. Shale (trace), gray, green. Chert (trace), white, gray.
- 3404 - 3410 Limestone (100%), buff, tan, light gray, packstone, wackestone, vuggy porosity, trace oolitic packstone with oomoldic porosity. Shale (trace), gray, green. Chert (trace), gray, white.
- 3410 - 3420 Limestone (90%), buff, tan, light gray, packstone, wackestone, vuggy porosity, some oolitic packstone with oomoldic porosity. Shale (10%), gray, green. Chert (trace), gray, white.
- 3420 - 3423 Limestone (90%), buff, tan, light gray, packstone, wackestone, vuggy porosity, some oolitic packstone with oomoldic porosity. Shale (10%), gray, green. Chert (trace), gray, white.
- 3423 - 3440 No Sample.
- 3440 - 3465 Limestone (100%), buff, tan, light gray, oolitic packstone with oomoldic porosity, packstone, wackestone. Shale (trace), gray, green. Chert (trace), gray, white.
- 3465 - 3475 Limestone (90%), buff, tan, light gray oolitic packstone with oomoldic porosity, packstone, wackestone. Shale (trace), gray, green. Dolomite (10%), tan, fine crystalline, vuggy porosity.
- 3475 - 3482 Limestone (70%), buff, tan, light gray, packstone, wackestone, some oolitic packstone with oomoldic porosity. Dolomite (30%), tan, fine crystalline, vuggy porosity. Shale (trace), gray, green.

- 3482 - 3284 Dolomite (70%), buff, fine crystalline, vuggy porosity. Limestone (30%), buff, white, tan, packstone, oolitic packstone with oomoldic porosity, vuggy porosity. Shale (trace), gray.
- 3284 - 3492 Limestone (75%), buff, tan, white, packstone, oolitic packstone with oomoldic porosity, wackestone, vuggy porosity. Dolomite (25%), buff, fine crystalline, vuggy porosity. Shale (trace), gray.
- 3492 - 3510 Limestone (85%), buff, tan, white, packstone, oolitic packstone with oomoldic porosity, wackestone, vuggy porosity. Dolomite (15%), buff, fine crystalline, vuggy porosity. Shale (trace), gray.
- 3510 - 3528 Limestone (80%), buff, tan, white, packstone, wackestone, some oolitic packstone with oomoldic porosity, vuggy porosity. Dolomite (20%), buff, tan, fine crystalline. Shale (trace), gray.
- 3528 - 3533 Limestone (100%), buff, white, tan, packstone, wackestone, fusulinids, vuggy porosity. Shale (trace), gray, greenish gray.
- 3533 - 3539 Limestone (100%), buff, tan, light gray, packstone, wackestone, fusulinids, vuggy porosity. Shale (trace), gray, green.
- 3539 - 3547 Limestone (90%), buff, tan, light gray, packstone, wackestone, mudstone, some vuggy porosity, fusulinids. Shale (10%), gray, green.
- 3547 - 3555 Limestone (90%), buff, tan, light gray, packstone, wackestone, mudstone, fusulinids, some vuggy porosity. Shale (10%), gray, green.
- 3555 - 3574 Limestone (90%), buff, tan, white, packstone, wackestone, mudstone, some oolitic packstone with oomoldic porosity. Dolomite (trace), tan, fine crystalline. Shale (10%), gray, green.
- 3574 - 3581 Limestone (85%), buff, tan, light grayish tan, wackestone, mudstone, some packstone. Shale (15%), gray, green.
- 3581 - 3588 Limestone (85%), tan, buff, light grayish tan, wackestone, packstone, mudstone, fusulinids. Shale (15%), gray, green.
- 3588 - 3596 Limestone (80%), tan, buff, light grayish tan, wackestone, packstone, mudstone, fusulinids. Shale (20%), gray, green.
- 3596 - 3617 Limestone (90%), buff, tan, wackestone, packstone, mudstone, fusulinids. Shale (10%), green.
- 3617 - 3627 Limestone (95%), buff, tan, wackestone, packstone, mudstone, fusulinids. Shale (5%), green.

- 3627 - 3633 Limestone (80%), buff, tan, wackestone, packstone, mudstone. Shale (20%), green, gray.
- 3633 - 3638 Limestone (100%), buff, tan, wackestone, mudstone. Shale (trace), green, gray.
- 3638 - 3650 Limestone (100%), buff, tan, wackestone, mudstone, trace oolitic packstone with oomoldic porosity. Shale (trace), gray, green.
- 3650 - 3655 Limestone (100%), buff, tan, wackestone, mudstone. Shale (trace), green, gray.
- 3655 - 3665 Limestone (100%), buff, tan, wackestone, mudstone, packstone. Shale (trace), gray, green.
- 3665 - 3680 Limestone (100%), buff, tan, wackestone, mudstone, packstone. Shale (trace), green, gray.
- 3680 - 3693 Limestone (100%), buff, tan, wackestone, mudstone. Shale (trace), green, gray.
- 3693 - 3698 Limestone (100%), buff, tan, wackestone, packstone, mudstone, trace oolitic packstone with oomoldic porosity. Shale (trace), green, gray.
- 3698 - 3702 Limestone (100%), buff, tan, wackestone, packstone, mudstone, trace oolitic packstone with oomoldic porosity. Shale (trace), green, gray.
- 3702 - 3714 Limestone (100%), buff, tan, wackestone, packstone, mudstone, trace oolitic packstone with oomoldic porosity. Shale (trace), green, gray.
- 3714 - 3733 Limestone (100%), buff, tan, packstone, wackestone. Shale (trace), green, gray.
- 3733 - 3747 Limestone (90%), buff, tan, grayish tan, wackestone, packstone, mudstone. Shale (10%), gray, greenish gray.
- 3747 - 3758 Limestone (95%), tan, buff, light grayish tan, wackestone, mudstone. Shale (5%), gray, green.
- 3758 - 3768 Limestone (90%), tan, buff, light grayish tan, wackestone, mudstone, Shale (10%), gray, green.
- 3768 - 3773 Limestone (95%), tan, buff, light grayish tan, wackestone, mudstone. Shale (5%), gray, green.
- 3773 - 3780 Limestone (90%), tan, buff, light grayish tan, wackestone, mudstone. Shale (10%), gray, green.
- 3780 - 3787 Limestone (95%), tan, buff, light grayish tan, wackestone, mudstone. Shale (5%), gray, green.

- 3787 - 3800 Limestone (100%), tan, buff, light grayish tan, packstone, wackestone, trace fine grained oolitic packstone with oomoldic porosity, vuggy porosity. Shale (trace), gray, green.
- 3800 - 3818 Limestone (100%), tan, buff, light grayish tan, packstone, wackestone. Shale (trace), gray, green.
- 3818 - 3824 Limestone (100%), tan, buff, light grayish tan, packstone, wackestone. Shale (trace), gray, green.
- 3824 - 3828 Limestone (100%), tan, light grayish tan, packstone, wackestone. Shale (trace), gray, green.
- 3828 - 3844 Limestone (100%), tan, light grayish tan, packstone, wackestone, some vuggy porosity. Shale (trace), gray, green.
- 3844 - 3854 Limestone (100%), tan, light grayish tan, packstone, wackestone, some vuggy porosity. Shale (trace), gray, green.
- 3854 - 3862 Limestone (100%), tan, light grayish tan, packstone, wackestone, some vuggy porosity. Shale (trace), gray, green.
- 3862 - 3870 Limestone (100%), tan, light grayish tan, packstone, wackestone, some vuggy porosity. Shale (trace), gray, green.
- 3870 - 3874 Limestone (100%), tan, light grayish tan, packstone, wackestone, some vuggy porosity, fusulinids. Shale (trace), gray, green.
- 3874 - 3877 Limestone (100%), tan, light grayish tan, packstone, wackestone, some vuggy porosity, fusulinids. Shale (trace), gray, green.
- 3877 - 3885 Limestone (100%), tan, light grayish tan, packstone, wackestone, some vuggy porosity, fusulinids. Shale (trace), gray, green.
- 3885 - 3917 Limestone (100%), tan, light grayish tan, coarse grained packstone, vuggy, porosity, some bitumen stain. Shale (trace), gray, green.
- 3917 - 3924 Limestone (100%), tan, light grayish tan, coarse grained packstone, wackestone, vuggy porosity, fusulinids. Shale (trace), gray, green.
- 3924 - 3930 Limestone (100%), tan, light grayish tan, coarse grained packstone, wackestone, vuggy porosity, fusulinids. Shale (trace), gray, green.
- 3930 - 3940 Limestone (100%), tan, light grayish tan, coarse grained packstone, wackestone, vuggy porosity, fusulinids. Shale (trace), gray, green.

- 3940 - 3950 Limestone (100%), tan, light grayish tan, coarse grained packstone, wackestone, vuggy porosity. Shale (trace), green, gray, dark brown.
- 3950 - 3962 Limestone (100%), tan, light grayish tan, coarse grained packstone, wackestone, vuggy porosity. Shale (trace), green, gray, dark brown. Chert (trace), tan.
- 3962 - 3968 Limestone (100%), tan, light grayish tan, coarse grained packstone, wackestone, vuggy porosity. Shale (trace), green, gray, dark brown. Chert (trace), tan, brown, gray, white.
- 3968 - 3978 Limestone (100%), tan, light grayish tan, coarse grained packstone, wackestone, vuggy porosity. Shale (trace), gray, green, dark brown. Chert (trace), white, tan.
- 3978 - 3991 Limestone (100%), tan, light grayish tan, coarse grained packstone, wackestone, vuggy porosity, fusulinids. Dolomite (trace), tan, fine crystalline. Shale (trace), gray, green.
- 3991 - 4003 Limestone (100%), tan, light grayish tan, packstone, wackestone, vuggy porosity. Shale (trace), gray, green.
- 4003 - 4015 Limestone (90%), tan, light grayish tan, packstone, wackestone, vuggy porosity. Shale (10%), gray, green.
- 4015 - 4021 Limestone (95%), tan, light grayish tan, packstone, wackestone, vuggy porosity. Shale (5%), gray, green.
- 4021 - 4025 Limestone (90%), tan, light grayish tan, packstone, wackestone, vuggy porosity. Shale (10%), gray, green.
- 4025 - 4027 Limestone (100%), tan, light grayish tan, packstone, wackestone, vuggy porosity. Shale (trace), gray, green.
- 4027 - 4029 Limestone (90%), tan, light grayish tan, packstone, wackestone, vuggy porosity. Shale (10%), gray, green, dark brown.
- 4029 - 4040 Limestone (90%), tan, light grayish tan, packstone, wackestone, vuggy porosity. Shale (10%), gray, green, dark brown.
- 4040 - 4050 Limestone (100%), buff, tan, coarse grained packstone, vuggy porosity. Shale (trace), gray, green.
- 4050 - 4072 Limestone (100%), buff, tan, coarse grained packstone, vuggy porosity. Shale (trace), gray, green.
- 4072 - 4080 Limestone (100%), buff, tan, coarse grained packstone, vuggy porosity.
- 4080 - 4088 Limestone (100%), buff, tan, coarse grained packstone, vuggy porosity.

- 4088 - 4102 Limestone (100%), buff, tan, coarse grained packstone, vuggy porosity.
- 4102 - 4112 Limestone (80%), buff, tan, coarse grained packstone, vuggy porosity. Dolomite (20%), tan, fine crystalline.
- 4112 - 4122 Limestone (80%), buff, tan, coarse grained packstone, vuggy porosity. Dolomite, (20%), tan, fine crystalline.
- 4122 - 4132 Limestone (75%), buff, tan, coarse grained packstone, vuggy porosity. Dolomite (25%), tan, fine crystalline, vuggy porosity.
- 4132 - 4138 Limestone (50%), buff, tan, coarse grained packstone, vuggy porosity. Dolomite (50%), tan, fine crystalline, vuggy porosity.
- 4138 - 4144 Dolomite (80%), tan, fine crystalline, vuggy porosity. Limestone (20%), buff, tan, coarse grained packstone, vuggy porosity.
- 4144 - 4166 Dolomite (90%), tan, light gray, fine crystalline, vuggy porosity, anhydritic. Limestone (10%), buff, tan, coarse grained packstone, vuggy porosity. Shale (trace), gray, green, brown.
- 4166 - 4178 Dolomite (85%), tan, light gray, fine crystalline, vuggy porosity. Shale (10%), gray, green, brown. Limestone (5%), buff, tan, coarse grained packstone, vuggy porosity.
- 4178 - 4192 Dolomite (70%), tan, light gray, fine crystalline, vuggy porosity. Shale (trace), gray, green, brown. Limestone (30%), buff, tan, coarse grained packstone.
- 4192 - 4204 Dolomite (85%), tan, light gray, fine crystalline, vuggy porosity, anhydritic. Limestone (15%), buff, tan, coarse grained packstone. Shale (trace), gray, green.
- 4204 - 4212 Dolomite (60%), tan, light gray, fine crystalline, vuggy porosity, anhydritic. Limestone (40%), buff, tan, coarse grained packstone.
- 4212 - 4229 Limestone (70%), buff, tan, coarse grained packstone, vuggy porosity. Dolomite (30%), tan, light gray, fine crystalline.
- 4229 - 4235 Limestone (60%), buff, tan, coarse grained packstone, vuggy porosity. Dolomite (40%), tan, light gray, fine crystalline.
- 4235 - 4242 Limestone (60%), buff, tan, coarse grained packstone, vuggy porosity. Dolomite (20%), tan, fine crystalline, vuggy porosity. Shale (20%), black, gray, green.
Note: Sample caught late or lag is off badly.

Heebner 4242' -1414'

4242 - 4252 Limestone (70%), buff, tan, coarse grained packstone, vuggy porosity. Dolomite (10%), tan, fine crystalline, vuggy porosity, anhydritic. Shale (20%), black, gray, green.

4252 - 4257 Dolomite (50%), tan, fine crystalline, crystalline, vuggy porosity. Limestone (40%), tan, buff, grayish brown, coarse grained packstone, vuggy porosity. Shale (10%), black, gray, green.

Toronto 4260' -1432'

4257 - 4267 Limestone (65%), tan, grayish brown, packstone, wackestone, some vuggy porosity. Dolomite (10%), tan, fine crystalline. Shale (25%), black, gray, green.

4267 - 4285 Limestone (60%), tan, grayish tan, packstone, wackestone. Shale (30%), black, gray, green. Dolomite (10%), tan, fine crystalline, crystalline, vuggy porosity.

4285 - 4293 Limestone (90%), tan, grayish tan, packstone, wackestone, some vuggy porosity. Shale (10%), gray, greenish gray.

4293 - 4298 Limestone (90%), tan, grayish tan, wackestone, packstone, mudstone. Shale (10%), gray, green, black.

4298 - 4308 Limestone (90%), tan, grayish tan, wackestone, packstone, mudstone. Shale (10%), gray, green, black.

4308 - 4328 Limestone (100%), tan, grayish tan, wackestone, packstone. Shale (trace), gray, green, black. Sample does not fit drill time.

4328 - 4335 Limestone (100%), tan, grayish tan, wackestone, packstone. Shale (trace), green, gray, black.

4335 - 4340 Limestone (100%), tan, grayish tan, wackestone, packstone, mudstone. Shale (trace), green, gray.

Lansing 4348' -1520'

4340 - 4353 Limestone (100%), tan, grayish tan, wackestone, packstone, mudstone. Shale (trace), gray, green, black.

4353 - 4363 Limestone (100%), tan, buff, grayish tan, wackestone, packstone, mudstone. Shale (trace), gray, green, black. Chert (trace), white, tan.

4363 - 4379 Limestone (100%), tan, buff, grayish tan, wackestone, packstone, mudstone. Shale (trace), gray, green, black. Chert (trace), white, tan.

4379 - 4389 Limestone (100%), tan, buff, grayish tan, wackestone, packstone, mudstone. Shale (trace), gray, green, black. Chert (trace), white, tan.

- 4389 - 4392 Limestone (95%), tan, grayish tan, wackestone, mudstone, some packstone with vuggy porosity. Shale (5%), gray, green, black.
- 4392 - 4400 Limestone (100%), tan, buff, grayish tan, wackestone, mudstone, packstone, some vuggy porosity. Shale (trace), gray, green, black. Chert (trace), tan, white.
- 4400 - 4412 Limestone (100%), tan, buff, grayish tan, wackestone, packstone, mudstone, some vuggy porosity. Shale (trace), gray, green, black. Chert (trace), tan, white.
- 4412 - 4415 Limestone (100%), tan, buff, grayish tan, wackestone, packstone, mudstone, some vuggy porosity. Shale (trace), gray, green, black.
- 4415 - 4422 Limestone (100%), tan, grayish tan, wackestone, mudstone, packstone, vuggy porosity. Shale (trace), gray, green, black.
- 4422 - 4435 Limestone (90%), tan, grayish tan, wackestone, mudstone, some gray packstone with black, dark gray pellets and fragments. Shale (10%), black, gray. Chert (trace), tan.
- 4435 - 4454 Limestone (85%), tan, grayish tan, wackestone, mudstone, packstone. Shale (15%), black, gray, green. Chert (trace), tan, brown.
- 4454 - 4461 Limestone (90%), tan, buff, wackestone, mudstone, some packstone. Shale (10%), black, gray. Chert (trace), tan, white.
- 4461 - 4468 Limestone (100%), tan, buff, wackestone, mudstone, packstone, vuggy porosity, trace lime mudstone with red hematitic staining. Shale (trace), gray, green, black.
- 4468 - 4472 Limestone (90%), tan, buff, wackestone, mudstone, packstone, some packstone with black, dark gray pellets and fragments. Shale (10%), black, gray, green. Chert (trace), tan.
- 4472 - 4486 Limestone (100%), buff, tan, packstone, wackestone, vuggy porosity. Shale (trace), gray, black.
- 4486 - 4505 Limestone (100%), buff, tan, packstone, wackestone, vuggy porosity. Shale (trace), gray, black. Chert (trace), tan, white, gray.
- 4505 - 4508 Limestone (100%), buff, tan, packstone, wackestone, vuggy porosity. Shale (trace), gray, black. Chert (trace), tan, white, gray.
- 4508 - 4510 Limestone (85%), buff, tan, grayish tan, packstone, wackestone, mudstone. Shale (15%), gray, black. Chert (trace), tan, white, gray.
- 4510 - 4514 Limestone (90%), tan, grayish tan, light brown, wackestone, packstone, mudstone. Shale (10%), gray, black, green.

- 4514 - 4518 Limestone (95%), tan, grayish tan, wackestone, packstone, mudstone, some oolitic packstone with oomoldic porosity. Shale (5%), gray, green, black.
- 4518 - 4534 Limestone (100%), tan, grayish tan, wackestone, packstone, oolitic packstone with oomoldic porosity. Shale (trace), gray, green, black.
- 4534 - 4552 Limestone (100%), tan, grayish tan, wackestone, packstone, oolitic packstone with oomoldic porosity. Shale (trace), gray, green, black.
- 4552 - 4577 Limestone (100%), tan, grayish tan, wackestone, packstone, oolitic packstone with oomoldic porosity, vuggy porosity.

Kansas City 4578' -1750'

- 4577 - 4586 Limestone (100%), tan, grayish tan, packstone, oolitic packstone with oomoldic porosity, vuggy porosity. Shale (trace), black, gray.
- 4586 - 4592 Limestone (90%), tan, grayish tan, packstone, oolitic packstone with oomoldic porosity, vuggy porosity. Shale (10%), black, gray.
- 4592 - 4600 Limestone (55%), tan, grayish tan, wackestone, packstone, trace oolitic packstone with oomoldic porosity. Shale (45%), gray, black, green.
- 4600 - 4614 Limestone (95%), grayish tan, tan, mudstone, wackestone, some packstone, oolitic packstone with oomoldic porosity. Shale (5%), gray, black. Mud Gas 9 Units 4604'-4608'
- 4614 - 4625 Limestone (90%), grayish tan, tan, mudstone, wackestone, some packstone. Shale (10%), gray, green, black.
- 4625 - 4639 Limestone (100%), buff, tan, wackestone, mudstone, packstone, some tan oolitic packstone with oomoldic porosity. Shale (trace), gray, black. Chert (trace), gray.
- 4639 - 4647 Limestone (90%), grayish tan, tan, wackestone, packstone, mudstone. Shale (10%), gray, black. Chert (trace), gray, tan.
- 4647 - 4655 Limestone (95%), tan, grayish tan, wackestone, mudstone, packstone. Shale (5%), black, gray. Chert (trace), tan, white.

- 4655 - 4662 Limestone (100%), tan, grayish tan, wackestone, mudstone, packstone. Shale (trace), gray, black. Chert (trace), gray.
- 4662 - 4672 Limestone (95%), tan, grayish tan, wackestone, mudstone, packstone. Shale (5%), black, gray. Chert (trace), gray, white.
- 4672 - 4683 Limestone (95%), tan, grayish tan, wackestone, mudstone, packstone. Shale (5%), black, gray. Chert (trace), tan, gray.
- 4683 - 4696 Limestone (100%), buff, tan, wackestone, mudstone, some packstone. Shale (trace), black, gray. Chert (trace), gray.
- 4696 - 4706 Limestone (100%), buff, tan, wackestone, mudstone, some packstone. Shale (trace), gray. Chert (trace), gray.
- 4706 - 4718 Limestone (95%), grayish tan, tan, light brown, mudstone, wackestone. Shale (5%), gray. Chert (trace), gray.
- 4718 - 4729 Limestone (100%), grayish tan, light brown, mudstone, wackestone. Shale (trace), gray, black. Chert (trace), gray.
- 4729 - 4739 Limestone (100%), grayish tan, gray, mudstone, some wackestone. Shale (trace), gray, black. Chert (trace), gray.
- 4739 - 4747 Limestone (100%), grayish tan, gray, brown, mudstone, some wackestone. Shale (trace), gray, black. Chert (trace), gray.
- 4747 - 4753 Limestone (100%), grayish tan, gray, brown, mudstone, some wackestone. Shale (trace), gray, black. Chert (trace), gray.
- 4753 - 4755 Limestone (100%), grayish tan, gray, brown, mudstone. Shale (trace), black, gray. Chert (trace), gray.
- 4755 - 4758 Shale (85%), black, gray. Limestone (15%), grayish tan, gray, brown, mudstone. Chert (trace), gray.
- Swope 4761' -1933'**
- 4758 - 4763 Shale (55%), black, gray. Limestone (45%), grayish tan, gray, brown, mudstone. Chert (trace), gray.
- 4763 - 4786 Limestone (35%), grayish tan, gray, brown, mudstone. Limestone (45%), tan, medium grained oolitic packstone with oomoldic porosity, some limestone with

brown oil stain, yellow fluorescence, good cut, good residual ring. Mud Gas 15 Units 4767-4780. Shale (20%), black, gray.

4786 - 4798 Limestone (85%), tan, medium grained oolitic packstone with oomoldic porosity, some limestone with brown oil stain, yellow fluorescence, good cut, good residual ring. Shale (15%), black, gray.

4798 - 4798 Limestone (100%), tan, medium grained oolitic packstone with oomoldic porosity, some limestone with brown oil stain, yellow fluorescence, good cut, good residual ring. Shale (trace), black.

Drill-Stem Test No. 1 4750'-4798', Pennsylvanian Swope. Open Hole Test.

30-60-60-120

I.O. Strong Blow, Bottom of Bucket In 1 Minute.

F.O. Strong Blow, Bottom of Bucket In 2 Minutes.

Recovery: 93' Oil & Gas Cut Muddy Water, 5% Gas, 2% Oil, 60% Water, 33% Mud.

2482' Gas Cut Saltwater

Sampler: 7.3 Cu Ft Gas, 50 MI Oil, 450 MI Mud, 3500 MI Water @ 810 psi.

Rw 0.084 @ 70° F

Hydrostatic Pressures 2330-2167 psi

Flow Pressures 219-798:848-1277 psi

Shut-in Pressures 1482-1434 psi

Bottom Hole Temperature 120° F

Trilobite Testing Co., L.L.C., Tom Horacek, Tester

4798 - 4806 Limestone (90%), tan, light grayish tan, wackestone, packstone, mudstone, some oolitic packstone with oomoldic porosity. Shale (10%), black, gray.

4806 - 4818 Limestone (95%), grayish brown, grayish tan, mudstone. Shale (5%), black, gray.

4818 - 4828 Limestone (95%), grayish brown, grayish tan, mudstone. Shale (5%), black, gray.

4828 - 4838 Limestone (75%), grayish brown, grayish tan, mudstone, fine grained chloritic packstone. Shale (25%), black, gray. Chert (trace), gray. Circulated Sample.

4838 - 4848 Limestone (80%), grayish brown, grayish tan, brown, tan, mudstone, packstone, wackestone. Shale (20%), black, gray.

- 4848 - 4859 Limestone (80%), grayish brown, grayish tan, brown, tan, mudstone, wackestone. Shale (20%), black, gray.
- 4859 - 4872 Shale (55%), gray, black. Limestone (45%), tan, grayish tan, brown, wackestone, mudstone.
- 4872 - 4887 Shale (50%), gray, black. Limestone (50%), tan, grayish tan, brown, wackestone, mudstone.
- 4887 - 4889 Shale (65%), gray, black. Limestone (35%), tan, grayish tan, tan, grayish brown, wackestone, mudstone.
- 4889 - 4899 Limestone (80%), tan, grayish tan, wackestone, mudstone. Shale (20%), gray, black.
- 4899 - 4908 Limestone (85%), grayish brown, grayish tan, wackestone, mudstone. Shale (15%), gray, black.
- Marmaton 4910' -2082'**
- 4908 - 4913 Limestone (75%), grayish brown, grayish tan, mudstone, wackestone. Shale (25%), gray, black.
- 4913 - 4922 Limestone (85%), buff, tan, coarse grained packstone, vuggy porosity. Shale (15%), gray, black, green.
- 4922 - 4936 Limestone (80%), buff, tan, coarse grained fossiliferous packstone, vuggy porosity. Shale (20%), black, gray, green.
- 4936 - 4945 Limestone (85%), tan, grayish tan, wackestone, packstone, trace oolitic packstone with oomoldic porosity. Shale (15%), green, gray, black.
- 4945 - 4954 Limestone (90%), tan, grayish tan, wackstone, packstone. Shale (10%), green, gray, black.
- 4954 - 4959 Limestone (75%), tan, grayish tan, wackestone, packstone. Shale (25%), green, gray, black.
- 4959 - 4975 Limestone (80%), tan, grayish tan, wackestone packstone, some vuggy porosity. Shale (20%), green, gray, black.
- 4975 - 4984 Limestone (90%), buff, tan, grayish tan, wackestone, packstone. Shale (10%), green, gray, black.
- 4984 - 4994 Limestone (90%), grayish tan, tan, wackestone, packstone. Shale (10%), green, gray, black.

4994 - 5000 Limestone (95%), tan, grayish tan, wackestone, packstone. Shale (5%), green, gray, black.

5000 - 5010 Limestone (75%), tan, grayish tan, wackestone, packstone, mudstone. Shale (25%), green, gray, black.

Oswego 5015' -2187'

5010 - 5018 Limestone (80%), tan, grayish tan, wackestone, packstone, mudstone. Shale (20%), green, gray, black.

5018 - 5030 Limestone (100%), tan, light grayish tan, wackestone, mudstone. Shale (trace), green, gray.

5030 - 5046 Limestone 100%), buff, tan, wackestone, mudstone. Shale (trace), green, gray.

5046 - 5055 Limestone (100%), tan, light grayish tan, mudstone, wackestone, some packstone. Shale (trace), gray, green.

Cherokee 5060' -2232'

5055 - 5070 Limestone (100%), tan, buff, grayish tan, wackestone, packstone, mudstone. Shale (trace), gray, green.

5070 - 5080 Limestone (90%), tan, buff, grayish tan, wackestone, packstone, mudstone. Shale (10%), black, gray, green. Chert (trace), gray, tan. Mud Gas 7 Units 5074'-5076'

5080 - 5090 Limestone (80%), grayish tan, tan, wackestone, packstone, mudstone. Shale (20%), black, gray, green.

5090 - 5099 Limestone (70%), grayish tan, tan, wackestone, mudstone. Shale (30%), black, gray, green.

5099 - 5110 Limestone (75%), grayish tan, tan, brown, wackestone, mudstone, packstone. Shale (25%), black, gray.

5110 - 5119 Limestone (75%), tan, grayish tan, brown, wackestone, packstone, mudstone. Shale (25%), black, gray. Chert (trace), dark brown. Mud Gas 10 Units 5110'-5115'.

5119 - 5128 Limestone (80%), tan, grayish tan, brown, wackestone, mudstone. Shale (20%), black, gray.

5128 - 5139 Limestone (85%), brown, grayish brown, wackestone, mudstone, packstone. Shale (15%), black, gray.

- 5139 - 5148 Limestone (80%), brown, grayish brown, wackestone, mudstone, packstone. Shale (15%), black, gray. Dolomite (5%), brown, tan, fine crystalline.
- 5148 - 5157 Limestone (60%), brown, grayish brown, wackestone, mudstone, packstone. Dolomite (30%), brown, tan, fine crystalline. Shale (10%), gray, black.
- 5157 - 5166 Limestone (60%), brown, grayish brown, tan, wackestone, mudstone, packstone. Dolomite (20%), tan, brown, fine crystalline. Shale (20%), gray, black.
- 5166 - 5176 Limestone (85%), tan, grayish brown, brown, wackestone, mudstone, some packstone. Dolomite (10%), tan, fine crystalline. Shale (5%), black, gray.

Atoka 5177' -2349'

- 5176 - 5186 Limestone (95%), tan, grayish brown, wackestone, mudstone, some packstone. Shale (5%), black, gray. Dolomite (trace), tan, brown, fine crystalline.
- 5186 - 5193 Limestone (90%), tan, brown, wackestone, packstone, mudstone. Shale (10%), black, gray.
- 5193 - 5206 Limestone (80%), tan, brown, grayish brown, wackestone, packstone, mudstone. Shale (10%), black, gray. Dolomite (10%), brown (oil stain), fine crystalline, limy, brown oil stain, bright yellow fluorescence, good cut, good residual ring. Mud Gas 50 Units 5196'-5201'.
- 5206 - 5217 Limestone (90%), tan, brown, grayish brown, wackestone, packstone, mudstone. Shale (5%), gray, black. Dolomite (5%), brown (oil stain), fine crystalline, trace dolomite with brown oil stain, bright yellow fluorescence, good cut, good residual ring. Mud Gas 10 Units 5214'-5216'.
- 5217-5226 Limestone (95%), tan, brown, grayish brown, wackestone, packstone, mudstone. Shale (5%), gray, black. Dolomite (trace), brown (oil stain), fine crystalline, brown oil stain, bright yellow fluorescence, good cut, good residual ring.
- 5226 - 5232 Limestone (85%), tan, brown, grayish brown, wackestone, packstone, mudstone. Dolomite (5%), brown (oil stain), fine crystalline, brown oil stain, bright yellow fluorescence, good cut, good residual ring. Shale (10%), black, gray.
- 5232 - 5242 Limestone (95%), tan, brown, grayish brown, wackestone, packstone, mudstone. Shale (5%), black, gray. Dolomite (trace), tan, fine crystalline.
- 5242 - 5256 Limestone (95%), tan, brown, grayish brown, wackestone, packstone, mudstone. Shale (5%), black, gray. Dolomite (trace), tan, fine crystalline.
- 5256 - 5265 Limestone (95%), tan, brown, grayish brown, wackestone, packstone, mudstone, fossiliferous. Shale (5%), black, gray. Dolomite (trace), tan, fine crystalline.

- 5265 - 5274 Limestone (85%), tan, brown, grayish brown, wackestone, packstone, mudstone, fossiliferous. Shale (10%), black, gray. Dolomite (5%), tan, fine crystalline.
- 5274 - 5286 Limestone (85%), tan, brown, grayish brown, wackestone, packstone, mudstone. Shale (15%), black, gray. Mud Gas 8 Units 5276'-5280'.
- 5286 - 5298 Limestone (90%), dark brown, grayish brown, tan, mudstone, wackestone. Shale (10%), black, gray. Chert (trace), dark brown with fossil ghosts.
- 5298 - 5306 Limestone (85%), grayish tan, tan, grayish brown, dark brown, mudstone, wackestone. Shale (5%), black, gray. Dolomite (10%), dark brown (oil stain), fine crystalline, dark brown oil stain, dull yellow fluorescence, very good cut, good residual ring. Mud Gas 35 Units 5292'-5295'. Chert (trace), dark brown, gray.
- 5306 - 5317 Limestone (75%), dark brown, brown, tan, mudstone, wackestone. Shale (20%), black, gray. Dolomite (5%), dark brown (oil stain), fine crystalline, dark brown oil stain, dull yellow fluorescence, very good cut, good residual ring.
- 5317 - 5322 Limestone (95%), dark brown, brown, grayish brown, some tan, mudstone, wackestone. Shale (5%), black, gray.
- 5322 - 5326 Limestone (95%), dark brown, brown, grayish brown, mudstone, wackestone. Shale (5%), black, gray.
- 5326 - 5331 Limestone (90%), dark brown, brown, grayish brown, mudstone, wackestone. Shale (10%), black, gray.
- Morrow 5332' -2504'**
- 5331 - 5346 Shale (70%), black, gray. Limestone (30%), dark brown, brown, grayish brown, mudstone, wackestone, fossiliferous.
- 5346 - 5360 Shale (90%), black, gray, light gray, light brown, some light gray shale has coaly fragments. Limestone (10%), dark brown, brown, grayish brown, tan, mudstone, wackestone, packstone.
- 5360 - 5372 Shale (50%), gray, light gray, black, pyritic, trace coaly. Limestone (50%), tan, brown, wackestone, packstone.
- 5272 - 5380 Limestone (85%), tan, coarse grained fossiliferous packstone. Shale (15%), gray, light gray, black.
- 5380 - 5387 Limestone (80%), tan, coarse grained fossiliferous packstone. Shale (20%), gray, light gray, black, grayish green, pyritic.

- 5387 - 5400 Limestone (85%), tan, coarse grained fossiliferous packstone. Shale (15%), black, gray, light gray, green, brown, pyritic. Chert (trace), brown, gray.
- 5400 - 5412 Limestone (75%), tan, coarse grained, fossiliferous packstone. Shale (25%), gray, black, light gray, green, brown.
- 5412 - 5424 Limestone (95%), tan, coarse grained fossiliferous packstone. Shale (5%), gray, green, black.
- 5424 - 5434 Limestone (95%), tan, buff, coarse grained fossiliferous packstone. Shale (5%), gray, green, black.
- 5434 - 5444 Limestone (90%), tan, buff, coarse grained fossiliferous packstone. Shale (10%), gray, green, black.
- 5444 - 5454 Limestone (90%), tan, buff, coarse grained fossiliferous packstone. Shale (10%), gray, greenish gray.
- 5454 - 5466 Limestone (95%), tan, buff, coarse grained fossiliferous packstone. Shale (5%), gray, greenish gray.
- 5466 - 5472 Limestone (85%), tan, grayish tan, coarse grained fossiliferous packstone. Shale (15%), gray, black.

Terra Rossa 5476' -2648'

- 5472 - 5485 Limestone grayish brown, tan, coarse grained fossiliferous packstone. Shale (5%), gray, green, black, red, dark red.
- 5485 - 5499 Limestone (90%), grayish brown, tan, coarse grained fossiliferous packstone, trace limestone with red hematitic staining. Shale (10%), gray, green, black, red, dark red.
- 5499 - 5510 Limestone (90%), tan, buff, wackestone, coarse grained fossiliferous packstone, mudstone, trace limestone with red hematitic staining. Shale (10%), gray, green, dark red, black.

Ste. Genevieve 5512' -2684'

- 5510 - 5520 Limestone (80%), tan, buff, grayish tan, wackestone, mudstone, packstone. Shale (20%), gray, red, green, black. Few pieces of Ste. Genevieve type lithology limestone.
- 5520 - 5524 Limestone (95%), buff, fine grained silty packstone, some limestone with bitumen staining. Shale (5%), gray, red, green, black. Chert (trace), gray, red, orange.

- 5524 - 5533 Limestone (70%), buff, fine grained silty packstone, some limestone with bitumen staining. Shale (30%), gray, green, red. Chert (trace), gray, red, orange.
- 5533 - 5540 Limestone (70%), buff, fine grained silty packstone. Shale (30%), black, gray, green, red. Note: Shale is cavings.
- 5540 - 5551 Limestone (50%), buff, fine grained silty packstone. Shale (50%), black, gray, green, red. Note: Shale is cavings.
- 5551 - 5561 Limestone (75%), buff, fine grained silty packstone. Shale (25%), black, gray, green, red. Note: Shale is cavings.
- 5561 - 5571 Limestone (75%), buff, fine grained silty packstone. Shale (25%), black, gray, green, red. Note: Shale is cavings.
- 5571 - 5582 Limestone (70%), buff, fine grained silty packstone. Shale (30%), black, gray, green, red. Note: Shale is cavings.
- 5582 - 5590 Limestone (15%), buff, fine grained silty packstone. Shale (85%), black, gray, green, red. Note: Shale is cavings.
- 5590 - 5600 Limestone (50%), buff, fine grained silty packstone. Shale (50%), black, gray, green, red. Note: Shale is cavings.
- 5600 - 5611 Limestone (45%), buff, wackestone, packstone, fine grained silty packstone. Shale (55%), red, gray, green, black. Note: Shale is cavings.
- 5611 - 5620 Limestone (50%), buff, wackestone, packstone, fine grained silty packstone. Shale (50%), red, gray, green, black. Note: Shale is cavings.
- 5620 - 5630 Limestone (65%), buff, medium grained packstone, wackestone. Shale (35%), red, gray, green, black. Note: Shale is cavings.
- 5630 - 5640 Limestone (75%), tan, medium grained packstone. Shale (25%), gray, green, red (Shale is cavings). Chert (trace), white, gray.
- 5640 - 5650 Limestone (70%), tan, medium grained packstone, wackestone. Shale (30%), red, green, gray, black (Shale is cavings).
- 5650 - 5660 Limestone (75%), tan, coarse grained packstone. Shale (25%), red, gray, green, gray, black (Shale is cavings).
- 5660 - 5666 Limestone (90%), tan, buff, coarse grained packstone, wackestone. Shale (10%), red, gray, green, black (Shale is cavings). Chert (trace), white.

- 5524 - 5533 Limestone (70%), buff, fine grained silty packstone, some limestone with bitumen staining. Shale (30%), gray, green, red. Chert (trace), gray, red, orange.
- 5533 - 5540 Limestone (70%), buff, fine grained silty packstone. Shale (30%), black, gray, green, red. Note: Shale is cavings.
- 5540 - 5551 Limestone (50%), buff, fine grained silty packstone. Shale (50%), black, gray, green, red. Note: Shale is cavings.
- 5551 - 5561 Limestone (75%), buff, fine grained silty packstone. Shale (25%), black, gray, green, red. Note: Shale is cavings.
- 5561 - 5571 Limestone (75%), buff, fine grained silty packstone. Shale (25%), black, gray, green, red. Note: Shale is cavings.
- 5571 - 5582 Limestone (70%), buff, fine grained silty packstone. Shale (30%), black, gray, green, red. Note: Shale is cavings.
- 5582 - 5590 Limestone (15%), buff, fine grained silty packstone. Shale (85%), black, gray, green, red. Note: Shale is cavings.
- 5590 - 5600 Limestone (50%), buff, fine grained silty packstone. Shale (50%), black, gray, green, red. Note: Shale is cavings.
- 5600 - 5611 Limestone (45%), buff, wackestone, packstone, fine grained silty packstone. Shale (55%), red, gray, green, black. Note: Shale is cavings.
- 5611 - 5620 Limestone (50%), buff, wackestone, packstone, fine grained silty packstone. Shale (50%), red, gray, green, black. Note: Shale is cavings.
- 5620 - 5630 Limestone (65%), buff, medium grained packstone, wackestone. Shale (35%), red, gray, green, black. Note: Shale is cavings.
- 5630 - 5640 Limestone (75%), tan, medium grained packstone. Shale (25%), gray, green, red (Shale is cavings). Chert (trace), white, gray.
- 5640 - 5650 Limestone (70%), tan, medium grained packstone, wackestone. Shale (30%), red, green, gray, black (Shale is cavings).
- 5650 - 5660 Limestone (75%), tan, coarse grained packstone. Shale (25%), red, gray, green, gray, black (Shale is cavings).
- 5660 - 5666 Limestone (90%), tan, buff, coarse grained packstone, wackestone. Shale (10%), red, gray, green, black (Shale is cavings). Chert (trace), white.

- 5666 - 5676 Limestone (90%), tan, buff, coarse grained packstone, wackestone. Shale (10%), red, gray, green, black (Shale is cavings). Chert (trace), white. Mud Gas 12 Units 5672'-5676'.
- 5676 - 5680 Limestone (90%), tan, buff, coarse grained packstone, wackestone. Shale (10%), red, gray, green, black (Shale is cavings). Chert (trace), white.
- 5680 - 5689 Limestone (85%), tan, buff, coarse grained packstone, wackestone. Shale (15%), red, gray, green, black (Shale is cavings). Chert (trace), white. Mud Gas 5 Units 5686'-5688'.
- 5689 - 5700 Limestone (90%), tan, buff, coarse grained packstone, wackestone. Shale (10%), red, gray, green, black (Shale is cavings). Chert (trace), white.
- 5700 - 5709 Limestone (80%), tan, buff, coarse grained packstone, wackestone. Shale (20%), red, gray, green, black (Shale is cavings).
- 5709 - 5720 Limestone (75%), tan, buff, coarse grained packstone, wackestone. Shale (25%), red, gray, green, black (Shale is cavings). Chert (trace), white, gray.
- 5720 - 5730 Limestone (70%), tan, buff, coarse grained packstone, wackestone. Shale (30%), red, gray, green, black (Shale is cavings).
- 5730 - 5742 Limestone (50%), tan, buff, coarse grained packstone, wackestone. Shale (50%), red, gray, green, black (Shale is cavings).
- 5742 - 5750 Limestone (30%), tan, buff, coarse grained packstone, wackestone. Shale (70%), red, gray, green, black (Shale is cavings).
- 5750 - 5758 Limestone (30%), tan, buff, coarse grained packstone, wackestone. Shale (70%), red, gray, green, black (Shale is cavings).
- 5758 - 5770 Limestone (25%), tan, buff, coarse grained packstone, wackestone. Shale (75%), red, gray, green, black (Shale is cavings).
- 5770 - 5782 Limestone (50%), tan, buff, coarse grained packstone, wackestone. Shale (50%), red, gray, green, black (Shale is cavings).
- 5782 - 5788 Limestone (70%), tan, buff, coarse grained packstone, wackestone. Shale (30%), red, gray, green, black (Shale is cavings).
- 5788 - 5800 Limestone (80%), tan, light grayish tan, packstone, wackestone. Shale (20%), red, gray, green, black (Shale is cavings). Chert (trace), gray.
- 5800 - 5810 Limestone (90%), tan, light grayish tan, packstone, wackestone. Shale (10%), red, gray, green, black (Shale is cavings). Chert (trace), gray.

- 5810 - 5820 Limestone (90%), buff, tan, medium-coarse grained packstone, wackstone. Shale (10%), black, gray, green, red (Shale is cavings). Chert (trace), gray.
- 5820 - 5830 Limestone (90%), buff, tan, medium-coarse grained packstone, wackstone. Shale (10%), black, gray, green, red (Shale is cavings).
- 5830 - 5840 Limestone (90%), buff, tan, medium-coarse grained packstone, wackstone. Shale (10%), black, gray, green, red (Shale is cavings).
- 5840 - 5848 Limestone (75%), buff, tan, medium-coarse grained packstone, wackstone. Shale (25%), black, gray, green, red (Shale is cavings).
- 5848 - 5860 Limestone (85%), buff, tan, medium-coarse grained packstone, wackstone. Shale (15%), black, gray, green, red (Shale is cavings).
- 5860 - 5870 Limestone (70%), tan, light grayish tan, medium-coarse grained packstone. Shale (30%), black, gray, green, red (Shale is cavings).
- 5870 - 5882 Limestone (65%), tan, light grayish tan, medium-coarse grained packstone. Shale (35%), black, gray, green, red (Shale is cavings).
- 5882 - 5889 Limestone (50%), tan, light grayish tan, medium-coarse grained packstone. Shale (50%), black, gray, green, red (Shale is cavings).
- 5889 - 5896 Limestone (40%), tan, grayish tan, medium-coarse grained packstone. Shale (60%), black, gray, green, red (Shale is cavings).
- 5896 - 5900 Limestone (35%), tan, grayish tan, light brown, wackestone, mudstone, some packstone. Shale (65%), green, gray, red, black (Shale is cavings).

Total Depth Driller 5900' -3072'

Total Depth Logger 5898' -3070'

SUMMARY

The Ensign Operating Co. No. 1-19 Koehn C N/2. SE Sec. 19, T30S, R30W, Meade County, Kansas was a 5900 foot well to evaluate the Lion Prospect. The main objective of the well was to evaluate the Pennsylvanian Morrow Sandstones. Secondary objectives were the Chester sandstones, and the Mississippian Ste. Genevieve limestones. Another objective was to evaluate any significant oil and gas shows encountered while drilling the well to total depth.

The expected sandstones in the Morrow that produce oil and gas in this area were not present. Shows in the Pennsylvanian Swope limestones were drill-stem tested. This test recovered water with a show of oil in the sampler.

After an evaluation of the lithologic samples, drill-stem test data and bore hole geophysical logs, it was determined that the well was not capable of oil and gas production from the formations in the Pennsylvanian and Mississippian. The well was plugged and abandoned on March 31, 1995.