

WELL HISTORY
ENSIGN OPERATING COMPANY
NO. 1-18 EMBERTON
SE NW SEC. 18, T35S, R42W
MORTON COUNTY, KANSAS

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

SYNOPSIS

The Ensign Operating Company, No. 1-18 Emberton, SE NW Sec. 18, T35S, R42W, Morton County, Kansas, was a 4870-foot wildcat well to test the Pennsylvanian Morrow formation on the West Elkhart Prospect. The primary exploratory objective of the well was the Pennsylvanian Morrow formation 'B' sandstone. This sandstone member of the Morrow formation is productive in the Interstate Field, northwest of the test well location, and in the Northwest Flats Field, south of the test well location. Secondary objectives include the 'G' sandstone and the Keyes members of the Morrow formation. Shallower Pennsylvanian and Permian aged potentially productive intervals were contractually excluded in this initial exploratory well on the prospect.

A mud gas detector was used from 930 feet to total depth. Lithologic samples were collected and examined from 930 feet to total depth. No significant gas shows were logged by the mud gas detector. The sensitivity of the mud gas detector did not meet accepted industry standards. The sensitivity of the gas detection equipment was sufficient to detect any large commercially producible accumulations of gas. None was detected. A poor show of oil was detected by fluorescence and cut in the Morrow 'B' sandstone. The sandstone that hosted the oil show had very poor visual porosity, being clay filled and silica cemented. No gas readings were recorded on the gas detector through the oil show interval. Another very poor oil show was noted by fluorescence and cut in the Morrow 'G' sandstone. No mud gas detector readings were associated with this oil show.

Analyses of wire line geophysical logs showed no intervals in the well with an indicated capability to produce oil or gas in commercial quantities. The intervals with the two recorded oil shows in the lithologic samples had indicated low porosities with high water saturations. No cores or drill stem tests were taken during the drilling of this well.

The contractor experienced difficulty with severe lost circulation before the surface casing was set. Several hundred feet were dry drilled from the Permian Day Creek formation to the base of the Blaine formation. The surface casing program was modified to help overcome these lost circulation difficulties.

The Morrow 'B' sandstone, the main exploratory of the test well was not developed at this location. The structural positions of the formations were as forecast on the well prognosis.

After a review and examination of the lithologic samples, mud gas detector readings and geophysical logs, it was concluded that this well would not be commercially productive of oil or gas. The well was plugged and abandoned on July 21, 1988.

GENERAL WELL INFORMATION

Operator: Ensign Operating Company

Well Name: No. 1-18 Emberton

Location: SE NW Sec. 18, T35S, R42W, 3300' FEL, 3300' FSL

County: Morton

State: Kansas

Field: Wildcat

Elevation: G.L. 3598' K.B. 3611'

Date Spudded: July 11, 1988 @ 3:30 P.M.

Date Drilling Completed: July 19, 1988 @ 8:52 A.M.

Total Depth: Driller 4870' Logger 4859'

Status: Plugged and abandoned.

Drill Stem Tests: None

Cores: None

Logging Program:

DIL-SP-GR	900' - 4858'
BCD-BCN-GR/Cal	900' - 4826'
BCN-GR	40' - 950'
ML-GR/Cal	950' - 4837'

Great Guns Logging - Dale Legleiter, Engineer

Sample Program: 30' Samples 930' - 2710'
10' Samples 2710' - 4870'
Samples examined at well site. Samples were caught on depth intervals. Samples were not lagged.

Mud Logging: Payne Logging Incorporated. Unmanned Unit.

Mud Program: Mud furnished by drilling contractor.

Lost Circulation: 430' Several hundreds of barrels.
432' Several thousands of barrels. Dry drilled to 930'
1123' Sixty barrels.

Contractor: H-30 Incorporated
Rig No. 3
Dodge Wilson - Tool Pusher

FORMATION TOPS

	G.L. 3598'	K.B. 3611'	Drill Time and Samples	Wire Line Geophysical Logs	Comparison Well Graham Michaelis No. 1 Shrauner SE SE 18-35S-42W
Tertiary			Surface + 3598'	Surface + 3598'	
Permian					
Guadalupian					
Taloga			254' +3357'	268' +3343'	
Day Creek			425' +3186'	424' +3187'	
Whitehorse			458' +3153'	458' +3153'	
Leonardian					
Nippewalla Gr.					
Blaine			806' +2805'	794' +2817'	
Cedar Hill			987' +2624'	992' +2619'	
Saltplain			1146' +2465'	1146' +2465'	
Sumner Gr.					
Stone Corral			1399' +2212'	1392' +2219'	
Ninnescah			1416' +2195'	1412' +2199'	1430' +2196'
Wolfcampian					
Chase Gr.			1921' +1690'	1912' +1699'	1940' +1686'
Council Grove Gr.			2317' +1294'	2311' +1300'	2340' +1286'
Pennsylvanian					
Virgilian					
Wabaunsee Gr.			2724' +887'	2717' +894'	2710' +916'
Shawnee Gr.					
Topeka			2929' +682'	2920' +691'	2940' +686'
Greenwood			3159' +452'	3150' +461'	3179' +447'
Douglas Gr.					
Heebner			3232' +379'	3228' +383'	3256' +370'
Missourian					
Lansing-Kansas City Gr.			3307' +304'	3303' +308'	3332' +294'
Pleasanton			3813' -202'	3804' -193'	3824' -198'
Desmoinesian					
Marmaton Gr.			3834' -223'	3822' -211'	3842' -216'
Cherokee Gr.			3977' -366'	3970' -359'	3998' -372'
Atokian			4085' -474'	4070' -459'	4106' -480'
Morrowian			4292' -681'	4281' -670'	4312' -686'
B Sandstone			4437' -826'	4424' -813'	4666' -840'
G Sandstone			4665' -1054'	4658' -1047'	4696' -1070'
Keyes			4715' -1104'	4704' -1093'	4746' -1120'
Mississippian			4803' -1192'	4796' -1185'	4836' -1210'
Total Depth			4870' -1259'	4858' -1247'	4891' -1265'

DAILY DRILLING REPORT

7:00 A.M. Reports

July 11, 1988	40' (0') MIRT
12	430' (390') Spud @ 3:30 P.M. July 11, 1988.
13	430' (0') 13 3/8" @ 283'. Plug down @ 6:00 P.M. Drill plug @ 4:30 A.M.
14	1123' (693') 8 5/8" @ 930'. Plug down @ 6:45 P.M. Drill plug @ 4:30 A.M.
15	2480' (1357')
16	3300' (820')
17	3910' (610')
18	4340' (430')
19	4850' (510')
20	4870' (20') Logging, plug and abandond.

Ensign Operating Company
No. 1-18 Emberton
SE NW Sec. 18, T35S, R42W
Morton County, Kansas

Sample interval is every 30 feet from 930 feet to 2710 feet, and every 10 feet from 2710 feet to 4870 feet. Samples were collected on depth intervals. Samples were not lagged. Sample descriptions are corrected for lag by using drill time charts.

930 - 953 Anhydrite (100%), white, fine crystalline, amorphous.

953 - 974 Anhydrite (100%), white, fine crystalline, amorphous.

974 - 992 Dolomite (85%), tan, fine crystalline. Shale (10%), red, silty. Anhydrite (5%), white, fine crystalline.

CEDAR HILLS 987' +2624'

992 - 1018 Shale (50%), red, silty, anhydritic. Anhydrite (15%), white, fine crystalline. Dolomite (15%), tan, fine crystalline. Sandstone (20%), white, reddish orange, very fine grained, unconsolidated. Sandstone content may be higher because of loss of sandstone in sample processing.

1018 - 1049 Sandstone (80%), white, reddish orange, very fine grained, unconsolidated. Anhydrite (5%), white, fine crystalline. Dolomite (5%), tan, fine crystalline. Shale (10%), red, silty, anhydritic.

1049 - 1239 Sandstone (90%), white, reddish orange, very fine grained, unconsolidated. Shale (10%), red, sandy.

SALTPLAIN 1146' +2465'

1239 - 1370 Siltstone (70%), red, sandy. Shale (30%), red, sandy.

STONE CORRAL 1399' +2212'

1370 - 1404 Anhydrite (90%), light gray, fine crystalline. Shale (10%), red, sandy.

NINNESCAH 1416' +2195'

1404 - 1427 Anhydrite (60%), light gray, fine crystalline. Dolomite (35%), light gray, fine crystalline, anhydritic. Shale (5%), red, sandy.

RED CAVE 1437' +2174'

1427 - 1457	Shale (30%), red. Siltstone (40%), red. Anhydrite (30%), white, fine crystalline. Dolomite (trace), gray, fine crystalline.
1457 - 1488	Shale (30%), red. Siltstone (35%), red. Anhydrite (30%), white, fine crystalline.
1488 - 1518	Shale (45%), red, Siltstone (20%), red. Anhydrite (35%), white, light gray, fine crystalline.
1518 - 1548	Shale (40%), red. Siltstone (20%), red. Anhydrite (40%), white, light gray, fine crystalline. Dolomite (trace), gray, fine crystalline.
1548 - 1571	Shale (35%), red. Shale (5%), light green. Siltstone (20%), red, dandy. Anhydrite (40%), white to light gray, fine crystalline.
1571 - 1603	Shale (45%), red. Shale (5%), light green. Siltstone (15%), red, sandy. Anhydrite (35%), white, light gray, fine crystalline.
1603 - 1660	Shale (65%), red. Shale (5%), light green. Siltstone (10%), red, sandy. Anhydrite (20%), light gray, white, fine crystalline.
1660 - 1688	Shale (45%), red. Shale (5%), light green. Anhydrite (50%), white, light gray, fine crystalline.
1688 - 1721	Shale (40%), red. Siltstone (20%), red, sandy. Anhydrite (40%), light gray, white, fine crystalline.
1721 - 1754	Shale (65%), red. Siltstone (10%), red. Anhydrite (25%), white, light gray, fine crystalline.
1754 - 1781	Shale (50%), red. Siltstone (15%), red, white, sandy. Anhydrite (35%), light gray, white, fine crystalline.
1781 - 1810	Shale (35%), red. Siltstone (40%), red, white, sandy. Anhydrite (25%), gray, white, fine crystalline.
1810 - 1872	Shale (35%), red. Siltstone (10%), red, white, sandy. Anhydrite (35%), white, light gray, fine crystalline. Dolomite (30%), buff, white, sucrosic.
1872 - 1898	Shale (30%), red, Shale (5%), bright green. Siltstone (10%), red. Anhydrite (30%), white, light gray, fine crystalline. Dolomite (20%), buff, white, sucrosic, fine crystalline.

CHASE 1921' +1690'

- 1898 - 1986 Shale (50%), red. Shale (5%), light green, Anhydrite (30%), white, light gray, fine crystalline. Dolomite (15%), buff, white, fine crystalline, sucrosic.
- 1986 - 2017 Shale (60%), red. Shale (5%), light green. Anhydrite (25%), white, light gray, fine crystalline. Dolomite (10%), buff, white, fine crystalline.
- 2017 - 2087 Shale (65%), red. Shale (5%), light green. Anhydrite (15%), white, light gray, fine crystalline. Dolomite (15%), buff, white, fine crystalline.
- 2087 - 2140 Shale (70%), red. Anhydrite (15%), white, light gray, fine crystalline. Dolomite (10%), buff, light gray, fine crystalline. Siltstone (5%), red.
- 2140 - 2175 Shale (40%), red. Anhydrite (10%), white, fine crystalline. Dolomite (35%), buff, light gray, fine crystalline. Shale (5%), light green. Siltstone (5%), red.
- 2175 - 2194 Shale (65%), red. Siltstone (10%), red, sandy. Anhydrite (10%), white, light gray, fine crystalline. Dolomite (15%), buff, white, sucrosic, fine crystalline.
- 2194 - 2224 Shale (30%), red. Siltstone (50%), red, sandy. Shale (5%), light green, light purple. Anhydrite (10%), white, light gray, fine crystalline. Dolomite (5%), buff, tan, sucrosic, fine crystalline.
- 2224 - 2265 Shale (50%), red. Shale (5%), light green. Dolomite (30%), tan, sucrosic. Limestone (5%), red, mudstone. Anhydrite (5%), white, fine crystalline.
- 2265 - 2311 Dolomite (80%), buff, tan, sucrosic, fine crystalline, calcareous. Limestone (5%), buff, wackestone with dark gray pellets. Shale (15%), red.

COUNCIL GROVE 2311' +1300'

- 2311 - 2373 Dolomite (80%), buff, tan, sucrosic, crystalline. Limestone (10%), light gray, wackestone with dark gray pellets. Shale (10%), red.
- 2373 - 2416 Dolomite (55%), buff, tan, sucrosic, crystalline. Limestone (35%), gray, wackestone with dark gray pellets. Shale (10%), red.
- 2416 - 2446 Limestone (70%), gray, wackestone with gray pellets and fragments. Dolomite (20%), tan, gray, sucrosic, crystalline. Shale (10%), red. Red shale is probably cavings.

- 2446 - 2475 Limestone (30%), gray, wackestone with some packstone. Dolomite (30%), buff, gray, fine crystalline, sucrosic. Shale (40%), red (cavings).
- 2475 - 2517 Limestone (40%), gray, wackestone. Dolomite (10%), buff, light gray, fine crystalline, sucrosic. Shale (50%), red (cavings).
- 2517 - 2546 Limestone (40%), gray, wackestone. Shale (60%), red (cavings).
- 2546 - 2572 Limestone (70%), gray, wackestone with dark gray pellets and fragments. Shale (30%), red (cavings).
- 2572 - 2616 Limestone (100%), buff, light gray, wackestone.
- 2616 - 2647 Limestone (100%), buff, light gray, wackestone.
- 2647 - 2674 Limestone (40%), gray, mudstone, wackestone. Shale (20%), gray. Shale (40%), red (cavings).
- 2674 - 2692 Limestone (70%), gray, wackestone with dark gray pellets and fragments. Shale (20%), gray. Shale (10%), red (cavings).
- 2692 - 2709 Limestone (80%), gray, wackestone with dark gray pellets and fragments, abundant fusilinids. Shale (10%), gray. Shale (10%), red (cavings). Chert (trace), gray, white.
- 2709 - 2713 Limestone (90%), gray, tan, wackestone with dark gray pellets and fragments, abundant fusilinids. Shale (10%), gray.
- WABAUNSEE 2717' +894'**
- 2713 - 2725 Limestone (70%), gray, wackestone. Shale (30%), gray, calcareous.
- 2725 - 2737 Limestone (60%), gray, wackestone. Shale (40%), gray, calcareous. Chert (trace), gray.
- 2737 - 2747 Limestone (65%), buff, wackestone. Limestone (10%), gray, wackestone. Shale (25%), gray, calcareous.
- 2747 - 2755 Limestone (85%), gray, wackestone. Shale (15%), gray, calcareous. Chert (trace), dark brown, white.
- 2755 - 2766 Limestone (90%), buff, gray, wackestone, fossiliferous. Shale (10%), gray, calcareous. Pyrite (trace).
- 2766 - 2773 Limestone (80%), buff, gray, wackestone. Shale (20%), gray.
- 2773 - 2785 Limestone (90%), buff, gray, wackestone. Shale (10%), gray.

- 2785 - 2796 Limestone (80%), buff, wackestone. Limestone (10%), gray, wackestone with dark gray pellets. Shale (10%), gray.
- 2796 - 2800 Limestone (90%), buff, wackestone. shale (10%), gray. Sample is 30% red shale cavings.
- 2800 - 2805 Limestone (90%), buff, gray, wackestone, fossiliferous, fusilinids. Shale (10%), gray. Sample is 50% red shale cavings.
- 2805 - 2818 Limestone (90%), buff, gray, wackestone, fossiliferous, fusilinids. Shale (10%), gray. Sample is 40% red shale cavings.
- 2818 - 2835 Limestone (95%), buff, wackestone to mudstone. Shale (5%), gray. Sample is 30% red shale cavings.
- 2835 - 2844 Limestone (95%), buff, wackestone. Shale (5%), gray.
- 2844 - 2856 Limestone (90%), tan, buff, gray, wackestone with some packstone. Shale (10%), gray.
- 2856 - 2865 Limestone (90%), tan, light gray, wackestone some with dark gray pellets and fragments. Shale (10%), gray. Pyrite (trace).
- 2865 - 2872 Limestone (100%), buff, wackestone to packstone. Shale (trace), gray.
- 2872 - 2889 Limestone (95%), buff, wackestone to packstone. Shale (5%), gray.
- 2889 - 2904 Limestone (100%), buff, light gray, wackestone. Shale (trace), gray.
- TOPEKA 2920' +691'**
- 2904 - 2925 Limestone (100%), buff, tan, wackestone, fusilinids. Shale (trace) gray.
- 2925 - 2939 Limestone (100%), buff, wackestone to mudstone. Shale (trace), gray.
- 2939 - 2959 Limestone (100%), buff, light gray, wackestone to mudstone. Shale (trace), gray.
- 2959 - 2964 Limestone (100%), buff, tan, wackestone to mudstone. Shale (trace), gray.
- 2964 - 2973 Limestone (90%), tan, light gray, wackestone to mudstone. Shale (10%), gray. Sample is 25% red shale cavings.
- 2973 - 2989 Limestone (90%), tan, light gray, wackestone to mudstone. Shale (10%), gray. Sample is 35% red shale cavings.

- 2989 - 2997 Limestone (80%), buff, light gray, wackestone to mudstone. Limestone (10%), reddish brown, mudstone. Shale (10%), black, gray. Sample is 30% red shale cavings.
- 2997 - 3008 Limestone (60%), buff, light gray, wackestone to mudstone. Limestone (30%), reddish brown, mudstone. Shale (10%), gray. Sample is 35% red shale cavings.
- 3008 - 3020 Limestone (85%), buff, wackestone, fossiliferous. Limestone (15%), reddish brown, mudstone, dolomitic. Sample is 50% red shale cavings.
- 3020 - 3026 Limestone (95%), buff, white, wackestone with some packstone. Shale (5%), gray. Good sample.
- 3026 - 3038 Limestone (100%), buff, white, wackestone with some packstone, fossiliferous. Shale (trace), gray.
- 3038 - 3049 Limestone (100%), buff, light gray, wackestone to packstone. Chert (heavy trace), buff, white, light orange. Pyrite (trace).
- 3049 - 3060 Limestone (90%), buff, wackestone to packstone. Chert (trace), white. Dolomite (10%), buff, sucrosic.
- 3060 - 3067 Limestone (80%), buff, white, wackestone. Dolomite (15%), buff, sucrosic. Shale (5%), black, gray. Chert (trace), white.
- 3067 - 3077 Limestone (50%), buff, white, wackestone. Dolomite (50%), buff, sucrosic. Shale (trace), gray. Chert (trace), tan, white. Sample is 70% red shale cavings. Major change in sample quality.
- 3077 - 3087 Limestone (80%), buff, light gray, wackestone. Dolomite (10%), buff, tan, sucrosic. Shale (10%), gray, black. Sample is 50% red shale cavings. Cuttings are very small in size.
- 3087 - 3105 Limestone (90%), buff, tan, wackestone. Shale (10%), gray. Sample is 80% red shale cavings.
- 3105 - 3117 Limestone (80%), buff, tan, wackestone. Shale (20%), gray. Sample is 80% red shale cavings.
- 3117 - 3129 Limestone (90%), buff, tan, wackestone. Shale (10%), gray. Sample is 50% red shale cavings.
- 3129 - 3150 Limestone (90%), buff, wackestone. Shale (10%), gray. Sample is 85% red shale cavings.
- GREENWOOD 3159' +452'**
- 3150 - 3173 Limestone (95%), tan, light gray, wackestone. Shale (5%), gray. Sample is 30% red shale cavings.

- 3173 - 3178 Limestone (95%), tan, light gray, wackestone to mudstone. Shale (5%), gray. Sample is 30% red shale cavings.
- 3178 - 3206 Limestone (90%), tan, buff, light gray, wackestone to mudstone. Shale (10%), gray. Chert (trace), white. Samples are 35% red shale cavings. Cuttings are very small in size.
- 3206 - 3215 Limestone (95%), tan, wackestone. Shale (5%), gray. Sample is 80% red shale cavings.
- HEEBNER 3232' +379'**
- 3215 - 3240 Limestone (100%), tan, wackestone. Shale (trace), gray. Chert (trace), tan, brown. Sample is 85% red shale cavings.
- 3240 - 3266 Limestone (90%), tan, light gray, wackestone. Shale (10%), gray. Chert (trace), gray. Samples are 75% red shale cavings.
- 3266 - 3286 Limestone (90%), tan, light gray, wackestone. Shale (10%), gray. Chert (trace), gray, white. Pyrite (trace). Samples are 70% red shale cavings.
- 3286 - 3303 Limestone (85%), tan, light gray, wackestone with some packstone. Shale (15%), gray. Samples are 35% red shale cavings.
- LANSING 3307' +304'**
- 3303 - 3316 Limestone (80%), tan, light gray, wackestone. Shale (20%), gray, black. Sample is 85% red shale cavings.
- 3316 - 3331 Limestone (70%), tan, light gray, wackestone. Shale (30%), gray, black. Sample is 80% red shale cavings.
- 3331 - 3338 Limestone (70%), gray, wackestone. Shale (20%), gray. Sandstone (10%), gray, very fine grained, calcareous. Sample is 25% red shale cavings.
- 3338 - 3346 Limestone (80%), buff, light gray, wackestone. Shale (10%), gray. Sandstone (10%), gray, very fine grained, calcareous. Sample is 20% red shale cavings.
- 3346 - 3352 Limestone (80%), tan, light gray, wackestone. Shale (20%), gray, black. Sample is 75% red shale cavings.
- 3352 - 3387 Limestone (100%), buff, white, wackestone with some packstone. Shale (trace), gray, black. Good sample.
- 3387 - 3392 Limestone (100%), buff, white, wackestone. Shale (trace), gray, black. Sample is 90% red shale cavings.

- 3402 Limestone (50%), buff, tan, light gray, wackestone. Sandstone (30%), light gray, very fine grained, calcareous. Shale (20%), black, gray. Sample is 70% red shale cavings.
- 3402 - 3411 Limestone (70%), tan, light gray, wackestone. Shale (30%), black, gray. Sample is 80% red shale cavings.
- 3411 - 3437 Limestone (60%), light gray, tan, wackestone. Shale (25%), black, gray. Sandstone (15%), gray, very fine grained, calcareous. Sample is 85% red shale cavings.
- 3437 - 3456 Limestone (100%), gray, packstone with dark gray pellets. Pellets are fine grained in size, fossiliferous. Shale (trace), gray, black. Good sample with 15% red shale cavings.
- 3456 - 3473 Limestone (100%), buff, tan, wackestone with some packstone, fossiliferous, fusulinids. Shale (trace), gray, black.
- 3473 - 3484 Limestone (80%), tan, light gray, wackestone. Shale (20%), gray, black. Sample is 90% red shale cavings.
- 3484 - 3493 Limestone (50%), tan, light gray, wackestone. Shale (20%), gray, black. Sandstone (30%), light gray, fine grained, calcareous. Sample is 70% red shale cavings.
- 3493 - 3508 Limestone (50%), dark brown, mudstone. Shale (50%), gray, very dark brown to black. Sample is 50% red shale cavings.
- 3508 - 3525 Limestone (80%), light gray, tan, wackestone to mudstone. Limestone (5%), dark brown, mudstone. Shale (15%), gray, black. Sample is 60% red shale cavings.
- 3525 - 3535 Limestone (90%), tan, light gray, mudstone to wackestone. Shale (10%), gray, black. Sample is 75% red shale cavings.
- 3535 - 3547 Limestone (90%), tan, light gray, mudstone to wackestone. Shale (10%), gray, black. Samples are 80% red shale cavings. Cuttings are very small in size.
- 3547 - 3557 Limestone (85%), tan, light gray, wackestone. Shale (15%), gray, black. Sample is 90% red shale cavings.
- 3557 - 3586 Limestone (80%), tan, light gray, wackestone. Shale (20%), gray, black. Sample is 95% red shale cavings.
- 3586 - 3605 Sandstone (70%), brown, very fine grained, calcareous. Shale (25%), gray, black. Limestone (5%), tan, light gray, wackestone. Samples are 85% red shale cavings.

- 3605 - 3611 Sandstone (40%), brown, very fine grained, calcareous. Shale (20%) gray, black. Limestone (40%), tan, wackestone. Sample is 80% red shale cavings.
- 3611 - 3640 Limestone (100%), white, wackestone to packstone, oolitic. Shale (trace), gray, black. Chert (trace), white. Good samples.
- 3640 - 3646 Limestone (85%), white, wackestone with some mudstone. Some oolitic packstone with oomoldic porosity. Shale (15%), gray, black. Sample is 20% red shale cavings.
- 3646 - 3681 Limestone (95%), white, wackestone to mudstone with trace of oolitic packstone with oomoldic porosity. Shale (5%), gray. Chert (trace), white. Samples are 20% red shale cavings.
- 3681 - 3691 Limestone (90%), buff, white, wackestone to mudstone with some oolitic packstone. Shale (10%), gray. Chert (trace), white. Sample is 35% red shale cavings.
- 3691 - 3697 Limestone (70%), buff, white, wackestone to mudstone with some oolitic packstone with oomoldic porosity. Shale (15%), gray. Sandstone (15%), gray, very fine grained, calcareous. Chert (trace), white. Sample is 50% red shale cavings.
- 3697 - 3721 Limestone (90%), white, buff, packstone to wackestone, oolitic with oomoldic porosity. Shale (10%), gray. Sample is 40% red shale cavings.
- 3721 - 3739 Limestone (95%), white, buff, wackestone. Shale (5%), gray. Sample is 50% red shale cavings.
- 3739 - 3751 Limestone (85%), white, buff, wackestone with trace of oolitic packstone. Shale (15%), gray. Chert (trace), white. Sample is 40% red shale cavings.
- 3751 - 3772 Limestone (80%), white, buff, wackestone. Shale (10%), gray. Sandstone (10%), light gray, very fine grained, micaceous. Samples are 30% red shale cavings.
- 3772 - 3787 Limestone (80%), white, buff, wackestone to mudstone. Shale (20%), gray, dark gray. Samples are 35% red shale cavings.
- PLEASANTON 3813' -202'**
- 3787 - 3819 Limestone (90%), white, buff, wackestone. Shale (10%), gray. Sandstone (trace), white, fine grained. Sample are 30% red shale cavings.

3819 - 3832 Limestone (80%), white, buff, wackestone. Shale (15%), gray.
Sandstone (5%), white, very fine grained. Samples are 25% red
shale cavings.

MARMATON 3834' -223'

3832 - 3847 Limestone (70%), white, buff, wackestone. Shale (10%), gray.
Sandstone (20%), white very fine grained, calcareous. Sample is
30% red shale cavings.

3847 - 3863 Limestone (80%), white, buff, wackestone. Shale (15%), gray.
Sandstone (5%), white, gray, very fine grained, calcareous.
Samples are 25% red shale cavings.

3863 - 3886 Limestone (85%), buff, white, wackestone. Shale (10%), gray.
Sandstone (5%), white, gray, very fine grained, calcareous.
Samples are 40% red shale cavings.

3886 - 3899 Limestone (90%), buff, white, wackestone. Shale (10%), gray.
Sandstone (trace), white, fine grained, calcareous. Sample is 30%
red shale cavings.

3899 - 3907 Shale (30%), gray. Sandstone (40%), gray, brown, very fine
grained, calcareous, micaceous. Limestone (30%), buff, tan,
wackestone. Sample is 70% red shale cavings.

3907 - 3913 Shale (30%), gray. Sandstone (50%), gray, brown, very fine grained
calcareous, micaceous. Limestone (20%), tan, buff, wackestone.

3913 - 3930 Shale (70%), dark brown. Shale (30%), gray. Limestone (trace),
buff, tan, wackestone. Sample is 60% red shale cavings.

3930 - 3940 Limestone (90%), white, light gray, wackestone, argillaceous.
Shale (10%), gray.

CHEROKEE 3977' -366'

3940 - 3980 Shale (100%), gray, silty, calcareous.

3980 - 3991 Limestone (65%), buff, tan, wackestone. Shale (35%), gray, silty,
calcareous. Sample is 60% red shale cavings.

3991 - 4010 Shale (80%), gray, silty, calcareous, sandy. Limestone (20%), tan,
wackestone. Samples are 60% red shale cavings.

4010 - 4027 Shale (95%), gray, silty, calcareous with some sandy shale.
Limestone (95%), tan, buff, wackestone.

4027 - 4037 Shale (90%), very dark brown to black. Limestone (10%), brown,
mudstone to wackestone.

- 4037 - 4044 Limestone (70%), gray, tan, mudstone to wackestone. Shale (30%), gray, very dark brown to black.
- 4044 - 4057 Limestone (80%), gray, tan, mudstone to wackestone. Shale (20%), gray, very dark brown to black. Sample is 85% red shale cavings.
- 4057 - 4071 Shale (50%), gray, very dark brown to black. Limestone (50%), buff, white, wackestone. Sample is 40% red shale cavings.
- 4071 - 4079 Shale (70%), gray, very dark brown to black. Limestone (30%), buff, tan, wackestone to mudstone. Sample is 90% red shale cavings

ATOKA 4085' -474'

- 4079 - 4088 Shale (60%), gray, black. Limestone (40%), buff, tan, wackestone to mudstone. Sample is 90% red shale cavings.
- 4088 - 4097 Limestone (80%), buff, tan, wackestone. Shale (20%), gray, green, black. Chert (trace), white. Sample is 40% red shale cavings.
- 4097 - 4106 Limestone (90%), tan, buff, wackestone. Shale (10%), gray, green, black. Pyrite (trace). Sample is 30% red shale cavings.
- 4106 - 4117 Limestone (95%), buff, tan, wackestone. Shale (5%), gray, green. Chert (trace), tan. Sample is 20% red shale cavings.
- 4117 - 4131 Sandstone (60%), light gray, very fine grained. Limestone (20%), buff, tan, wackestone. Shale (20%), gray, green. Chert (trace), tan, gray, white. Sample is 40% red shale cavings.
- 4131 - 4139 Limestone (60%), tan, buff, wackestone. Sandstone (25%), light gray, fine grained, calcareous. Shale (15%), gray, black. Chert (trace), tan, light gray. Sample is 35% red shale cavings.
- 4139 - 4155 Limestone (100%), buff, wackestone. Shale (trace), gray. Good sample.
- 4155 - 4180 Shale (70%), gray, siliceous. Limestone (20%), buff, wackestone, fossiliferous. Shale (10%), gray.
- 4180 - 4188 Shale (85%), gray, siliceous. Limestone (5%), buff, wackestone. Shale (10%), gray, black.
- 4188 - 4198 Limestone (75%), buff, tan, mudstone to wackestone. Shale (10%), gray, siliceous. Shale (15%), gray, black.
- 4198 - 4207 Limestone (60%), buff, tan, mudstone to wackestone. Shale (5%), gray, siliceous. Shale (35%), gray, black. Chert (trace), dark brown, gray.

- 4207 - 4216 Limestone (60%), tan, light gray, wackestone to mudstone. Shale (40%), gray, black.
- 4216 - 4235 Limestone (70%), tan, light gray, wackestone to mudstone. Shale (30%), gray, black.
- 4235 - 4243 Limestone (40%), tan, light gray, wackestone. Limestone (30%), dark brown, mudstone. Shale (30%), gray, black. Chert (heavy trace), dark brown, black.
- 4243 - 4255 Limestone (50%), dark brown, mudstone. Limestone (10%), tan, light brown, wackestone to mudstone. Shale (40%), gray, black. Chert (trace), black, dark brown.
- 4255 - 4266 Limestone (40%), dark brown, mudstone. Limestone (30%), tan, light brown, wackestone to mudstone. Shale (20%), gray, black. Chert (trace), black, dark brown.
- 4266 - 4280 Shale (60%), gray, black. Limestone (40%), dark brown, mudstone. Limestone (10%), tan, light brown, wackestone. Chert (trace), black, dark brown.
- MORROW 4292' -681'**
- 4280 - 4326 Limestone (50%), dark brown, gray, mudstone. Shale (50%), gray, black. Limestone (trace), tan, brown, wackestone. Chert (trace). black, brown.
- 4326 - 4337 Shale (70%), black, gray. Limestone (30%), dark brown, gray, mudstone with trace of chlorite. Chert (trace), gray, black. Pyrite, (trace).
- 4337 - 4343 Shale (50%), black, gray. Limestone (50%), gray, dark brown, wackestone to mudstone, fossiliferous. Pyrite (trace). Trace loose coarse to granule sized rounded sand grains.
- 4343 - 4359 Shale (60%), gray, black. Limestone (40%), gray, wackestone to packstone. Pyrite (heavy trace).
- 4359 - 4371 Shale (70%), gray, black. Limestone (30%), gray, wackestone. Pyrite (trace).
- 4371 - 4375 Shale (80%), gray, light gray, black, fossiliferous. Limestone (20%), gray, brown, wackestone. Red shale cavings increasing, now 25% of samples.
- 4375 - 4385 Shale (90%), black, gray. Limestone (10%), gray, wackestone. Pyrite (trace).

- 4385 - 4395 Shale (95%), black, gray. Limestone (5%), gray, wackestone. Pyrite (trace).
- 4395 - 4401 Shale (80%), black, gray. Limestone (15%), brown, gray, wackestone. Sandstone (5%), white, fine grained with some coarse grained to granule sized sandstone. Pyrite (trace).
- 4401 - 4407 Shale (90%), gray, black. Sandstone (10%), white, gray, fine grained with some coarse grained to granule sized sandstone. Limestone (trace), brown, gray, wackestone. Pyrite (trace).
- 4407 - 4414 Shale (95%), gray, black, fossiliferous. Sandstone (5%), white, gray, fine grained with some coarse grained to granule sized sandstone. Limestone (trace), brown, gray, wackestone. Pyrite (trace).
- 4414 - 4429 Shale (100%), black gray. Sandstone (trace), white, gray, fine grained with some coarse grained and granule sized sandstone.
- MORROW B SANDSTONE 4437' -826'**
- 4429 - 4441 Sandstone (90%), gray, course grained, granule, siliceous, calcareous. Very poor visible porosity, white clay matrix between most grains. Spotted yellow fluorescence with poor to fair cut. Shale (10%), black, gray, fossiliferous.
- 4441 - 4455 Sandstone (85%), gray, course grained, granule, siliceous, calcareous. Very poor visible porosity. Spotted yellow fluorescence with poor to fair cut. Sandstone has white clay matrix between most grains. Shale (15%), black, gray, fossiliferous.
- 4455 - 4468 Shale (60%), black, gray, fossiliferous. Sandstone (40%), gray, course grained, granule, siliceous. Some spotted yellow fluorescence with poor to fair cut. Sandstone has white clay matrix between most grains. Pyrite (trace). Samples were circulated at 4468'.
- 4468 - 4475 Shale (100%), black, gray, fossiliferous, bryozoans, brachiopods, gastropods, crinoids. Sandstone (trace), gray, course grained, granules, unconsolidated.
- 4475 - 4527 Shale (100%), black, gray, fossiliferous. Sandstone (trace), gray, white, fine grained.
- 4527 - 4574 Shale (100%), black, gray, fossiliferous, calcareous. Pyrite (trace).
- 4574 - 4637 Shale (100%), black, gray, fossiliferous, calcareous. Pyrite (trace).

- 4637 - 4646 Shale (100%), black, gray, fossiliferous, calcareous. Pyrite (trace).
- 4646 - 4652 Shale (60%), black, gray, fossiliferous, calcareous. Sandstone (40%), gray, white, fine grained, glauconitic, calcareous. Some intergranular porosity. Some yellow fluorescence with poor cut. Pyrite (trace).
- 4652 - 4657 Shale (50%), black, gray, fossiliferous. Sandstone (50%), gray, white, fine grained, glauconitic, calcareous. Some intergranular porosity. Some yellow fluorescence with poor cut.
- 4657 - 4664 Sandstone (90%), gray, white, fine grained, glauconitic, calcareous. Trace intergranular porosity. Some sandstone has coarse grained to granule floating grains in fine grained matrix. Limestone (20%), gray, white, mudstone. Shale (20%), gray, black.

MORROW G SANDSTONE 4665' -1054'

- 4664 - 4680 Sandstone (80%), gray, white, fine grained with some very coarse to granule sized floating grains, glauconitic, calcareous. Very poor visible porosity. No show of oil or gas. Shale (20%), gray, black, fossiliferous, calcareous.
- 4680 - 4696 Sandstone (70%), gray, white, fine grained with some very coarse grained and granules, glauconitic, calcareous. Shale (30%), gray, black, fossiliferous, calcareous.
- 4696 - 4702 Shale (80%), gray, black. Sandstone (5%), gray, white, fine grained, glauconitic, calcareous.
- 4702 - 4708 Shale (95%), gray, black. Sandstone (5%), gray, white, fine grained.
- 4708 - 4714 Shale (60%), gray, black. Sandstone (40%), white, with some multi-colored, granule to coarse grained, unconsolidated. No show of oil or gas. Sample was caught late.

KEYES 4715' -1104'

- 4714 - 4724 Sandstone (100%), white, with some multi-colored grains, granule to coarse grained, unconsolidated. No show of oil or gas. Shale (trace), black, gray.
- 4724 - 4745 Sandstone (95%), white, granule to coarse grained, unconsolidated. Shale (5%), black, gray.
- 4745 - 4764 Sandstone (60%), white, granule to coarse grained, unconsolidated. Shale (40%), black, gray.

4764 - 4775	Shale (85%), black, gray, Sandstone (15%), white, granule to course grained. Sandstone (trace), white, fine grained, glauconitic.
4775 - 4784	Shale (85%), black gray, Sandstone (5%), white, course grained, granule, unconsolidated. Sandstone (5%), white fine grained, glauconitic. Shale (5%), red, mauve. First indication of Mississippian Unconformity.
4784 - 4794	Sandstone (80%), white, medium grained, granule, unconsolidated. Shale (20%), black, gray. Pyrite (heavy trace).
MISSISSIPPIAN 4803' -1192'	
4794 - 4818	Shale (45%), red, green, mauve, light green, tan. Shale (35%), black, gray. Limestone (5%), light brown, mudstone. Sandstone (15%), white, medium grained, course grained. Siltstone (trace), red, white, calcareous. Top of Mississippian is a wire line geophysical log equivalent point.
4818 - 4829	Shale (45%), red, green, mauve, light green, tan. Siltstone (30%), red, white, calcareous. Shale (20%), black, gray. Sandstone (5%), white, medium grained with some fine grained.
4829 - 4839	Siltstone (80%), red, white, very calcareous. Shale (10%), mauve, red, light green, tan. Shale (10%), black, gray.
4839 - 4846	Siltstone (50%), red, white, very calcareous. Shale (30%), tan, gray, mauve, light green, tan. Shale (20%), black, gray. Limestone (trace), white, mudstone, wackestone.
4846 - 4859	Siltstone (50%), red, white, very calcareous. Shale (30%), tan, gray, light green. Shale (20%), black, gray.
4859 - 4870	Siltstone (60%), red, white, very calcareous. Shale (35%), tan, gray, light green, tan. Shale (5%), black, gray.

Total Depth Driller 4870 Feet.
Total Depth Logger 4859 Feet.

SUMMARY

The Ensign Operating Company, No 1-18 Emberton, SE NW Sec. 18, T35S, R42W, Morton County, Kansas, was a wildcat well to test the West Elkhart Prospect. The 'B', 'G' and Keyes sandstone members of the Pennsylvanian Morrow formation were the main exploratory objectives of this wildcat well. These Morrow formation sandstones produce oil and gas from wells in nearby fields.

Poor oil shows were noted in the Morrow 'B' and 'G' sandstones. No cores or drill stem tests were taken during the drilling of the well. Analyses of wire line geophysical logs showed no intervals in the well capable of commercial oil or gas production.

An evaluation of well and other data indicated the well was not capable of commercial oil or gas production. The well was plugged and abandoned on July 21, 1988.