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October 18, 1983

GEOLOGIC REPORT

Jennings Drilling Company
#4 Heintzelman-Miller
SE NE NE 23-8S-21E
Leavenworth County, Kansas

23-8-21E

Daily Progress:

10-10 Move on, rig up, drill surface hole
10-11 162', 8 5/8" set @ 159', plug down @ 3:15 a.m.
shut down due to rain @ 2:50 p.m.
10-12 250', service rig, test for deviation @ 757' (1/2 degree off)
10-13 1217', core #1, drilling
10-14 1407', drilling, RTD 1570', run E-Logs
10-15 1570', 4 1/2" set @ 1335'

Service Companies:

Contractor: Teton Drilling Company
E-Logs: Great Guns; CDL, IEL
Core Analysis: Core Laboratories, Inc.

Formation Tops:

<u>Formations</u>	Relation to previous wells:		
	#4 Heintzelman-Miller SE NE NE 23-8S-21E GL 932	#2 Heintzelman-Miller NE SE NE 23-8S-21E	#1 Heintzelman SE SE NE 23-8S-21E
Lansing	224 (+708)	-3	+5
B. Kansas City	544 (+387)	-7	+4
Cherokee	788 (+144)	-7	+5
Coal Marker	1158 (-226)	-17	+2
U. McLouth Ss	1256 (-324)	-15	+1
Miss. St. Louis	1298 (-364)	+40	+24
Spergen	1342 (-410)	-	+15
Warsaw	1372 (-440)	-	+13
Osage Ø	1522 (-590)	-	-
LTD	1572 (-640)	-	-

Shows:E-Log Depths

- 1242-1252 Upper McLouth Interval
Sandstone, shaley, fine grained, quartz, with gray shale laminae, some is tightly cemented, some with fair porosity, good show free oil
- 1256-1262 Upper McLouth Sandstone
Sandstone, fine grained, quartz, subrounded, well sorted, good porosity, brown stain, oil saturated with slight show of gas, oil appears relatively heavy (15-17 degrees API)
- 1395-1401 Mississippi Warsaw
Limestone, tan, medium crystalline, medium grained fossil grains, cherty (white), very slight show oil, slight flourescence, very slight cut.
- 1521-1526 Mississippi Osage $\emptyset$
Dolomite, light tan, sucrosic, with abundant chert (white), fine crystalline, fair porosity, very slight show oil, no free oil.

Log Analysis:

<u>Depth</u>	<u>$\emptyset_D$</u>	<u>$\emptyset_N$</u>	<u>$\emptyset_{XP}$</u>	<u>R_T</u>	<u>S_W</u>	<u>Remarks</u>
U. McLouth Ss.						
1456-58	19	23	21	16	45	
1458-60	19.5	24	22	24	36	
1460-62	19.5	24	22	16	44	21.9% $\emptyset$ from core analysis

$$R_W = 0.20 \text{ and } M = 1.8$$

Core Analysis:

1260-60.8	porosity	21.9%
(1261-62, E-Log)	permeability	282.0 Md
	oil saturation	50.8%
	water saturation	25.4%
	oil in place	1172 bbl/acre foot

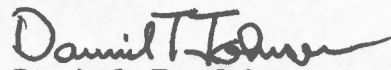
Recommendation and Summary:

It was recommended that the Upper McLouth Sandstone be tested through casing. Recommended perforations are 1256 to 1262. The stimulation used should be the same as was used in the McLouth Sandstones in the #1 Heintzelman and the #2 Heintzelman-Miller wells.

The presence of Upper McLouth Sand with good reservoir quality in the #4 Heintzelman-Miller well was somewhat of a surprise. The porous and permeable sand in this well is separated from that in the #1 well, which is producing, by an Upper McLouth Interval comprised of sandy shale and very shaley sandstone found in the #2 well. Either the #4 well penetrated a different sand in the Upper McLouth Interval, or the sands in the #1 and #4 well are connected in a sinuous manner. Production statistics and oil analysis may shed light on this problem.

The absence of Lower McLouth Sandstone as well as the Burgess Sandstone in the #4 well was the result of the Mississippi St. Louis being quite high structurally in relation to both previous producers. The Mississippi Top in the #4 well is 40 feet higher than in the #2 Heintzelman-Miller and 24 feet higher than in the #1 Heintzelman. Due to the anomalous structural conditions, the well was deepened to test the Mississippi Osage. A slight show of oil was detected in the Osage $\emptyset$ at 1521, however the show was noncommercial.

Respectfully submitted,


Daniel T. Johnson

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