

GEOLOGICAL DEPARTMENT  
SOUTHWESTERN GAS COMPANY

13-16-12E

INDEPENDENCE, KANSAS

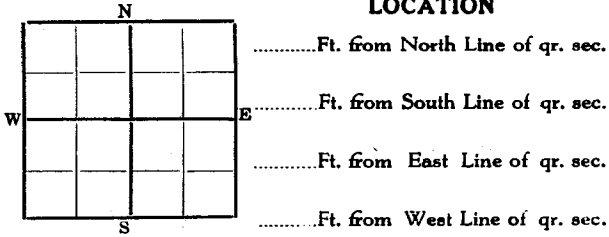
LOG OF WELL

Company Sentinel Oil & Gas Co. Farm Miller Well No. #1  
 State Kansas County Lyon S. 13 T. 16 R. 12  
 Commenced Drilling 9/1/16 Completed \_\_\_\_\_ Elev. \_\_\_\_\_  
 Shot \_\_\_\_\_ Qts. from \_\_\_\_\_ to \_\_\_\_\_ I. P. \_\_\_\_\_ R. P. \_\_\_\_\_  
 Casing: \_\_\_\_\_ Casing: \_\_\_\_\_ Casing: \_\_\_\_\_  
 Casing: \_\_\_\_\_ Casing: \_\_\_\_\_ Casing: \_\_\_\_\_  
 Tubing \_\_\_\_\_ Caged at \_\_\_\_\_ Packer at \_\_\_\_\_  
 Contractor \_\_\_\_\_

Soil	2	Shale shell	613
Boulders	17	Shale	653
Blk shale	37	Lime	642
Quick sand	52	Slate	657
Limestone	69	Limestone	667
Shale	79	Shale & shell	707
Lime	89	Lime	712
Lime	104	Slate	751
Shale	134	Slate	761
Lime	136	Lime	781
Shale	156	Shale	870
Lime	162	Sand water	870
Shale	186	Shale	1000
Lime	191	Sand	1010-water
Shale	206	Shale	1033
Lime	218	Shale	1083
Shale	221	Lime	1113
Lime	261	Lime	1138
Cave	267	Shale	1158
Shale	282	Lime	1163
Lime	296	Sand	1218
Shale	316	Shale	1233
Lime	324	Lime	1245
Shale	349	Shale	1260
Shale	374	Shell lime	1262
Slate	392	Lime	1327
Blk Shell	402	Rock rod	1372
Limestone	427	Lime	1435
Slate	472	Blk shell	1440
Shale	502	Lime	1460
Shells	520	Shale	1550
Lime	535	Lime	1582
Shale	545	Shale	1635
Lime	550	Lime	1645
Sand	558-water	Shale	1700
Lime	563	Lime	1715
Shale	582	Shale	1750
Lime	583		

(over)

LOCATION



TEST

Through	Pitot Tube Test of ..... 192...			..... 192..... Open Gauge Test Shows
	Used	Mercury	Water	
..... In. Tubing	Reading			
..... In Casing	Vol. Cu. Ft.			..... Lbs.

13-16-12E

Lime	1768
Shale blk	1770
Sand	1785
Blk Shale	1830
Lime	1838
shale	1840
Lime	1855
Lime blk	1860
Shale	1875
Lime	1885
Shale	1890
Shell blk	1910
Lime	1915
Shale blk	1923
Broken shale & lime	1949
Lime	1995
Break	2005
Sandy Lime	2010
Top of Miss. Lime	1924

Well Log.

Drilled by the Kansas Natural Gas Co. Section 13, Twp 16, Range 12E  
Miller Ranch, Osage Co, Kansas.  
Located in SW SW.

Started September 1, 1917.  
Completed January 31, 1917.

37990

1243, 4.5

Soil	2	-	2	Lime	10	-1645
Boulders	15	-	17	Shale	55	-1700
White shale	20	-	37	Lime	15	-1715
Quick sand	15	-	52	Shale	35	-1750
Shale	5	-	57	Lime	15	-1765
Grey Lime	12	-	69	Black Shale	5	-1770
Blue Shale	10	-	79	Grey Sand	15	-1785
Lime	10	-	89	Black Shale	45	-1830
Grey Lime	15	-	104	Lime	5	-1835
Shale	30	-	134	Shale	5	-1840
Lime	2	-	136	Lime	15	-1855
Shale	20	-	156	Black Lime	5	-1860
White Lime	12	-	168	Shale	15	-1875
Shale	18	-	186	Lime	10	-1885
Lime	15	-	201	Shale	15	-1900
Blue Shale	5	-	206	Black Shell	10	-1910
Lime	12	-	208	Lime	5	-1915
Shale	3	-	221	Black Shale	8	-1923
Lime	40	-	261	Black Fine Sand	6	-1929
YellowCave	6	-	267	Broken Shale And Lime	20	-1949
Shale	25	-	292	Lime	46	-1995
Lime	4	-	296	Break	10	-2005
Shale	20	-	316	Sandy Lime	5	-2010
Lime	8	-	324			
Brown Shale	25	-	349			
Blue Shale	25	-	374			
White Slate	18	-	392			
Black Lime	10	-	402			
Lime	25	-	427			
Blue Shale	45	-	472			
Shale	30	-	502			
Shells	18	-	520			
Lime	15	-	535			
Shale	10	-	545			
Lime	5	-	550			
Sand & Water)	8	-	558			
Lime	5	-	563			
Shale	25	-	588			
Lime	15	-	603			
Shale & Shells	20	-	623			
Shale	20	-	643			
Lime	15	-	658			
White Slate	9	-	667			
Lime	10	-	677			
Shale & Shells	40	-	717			
Lime	5	-	722			
Slate	49	-	771			
Lime	75	-	846			
Shale	34	-	880			
Shale	90	-	970			
Water Sand	10	-	980			
Shale	30	-	1010			
Water Sand	10	-	1020			
Water Sand	78	-	1098			
Lime	25	-	1123			
Lime	35	-	1158			
Shale	5	-	1163			
Lime	55	-	1218			
Sand	10	-	1228			
Lime	5	-	1233			
Shale	29	-	1262			
Lime	105	-	1367			
Red Rock	5	-	1372			
Lime	63	-	1435			
Black Shell	5	-	1440			
Lime	70	-	1510			
Shale	40	-	1550			
	12	-	1562			

Total Depth.

Casing Record

12 1/2	-	57'
10	-	324'
8	-	957'
6 1/4	-	1060

Note; The TOP of Mississippi Lime Stone was found at 1929 feet.