Robert D. Hendrix
Petroleum Geologist

GEOLOGIST'S REPORT
DRILLING TIME AND SAMPLE LOG

LEASE	Brown #13-36
COMPANY	Murfin Drilling Co., Inc.
LOCATION	330'FSL & 1500'FWL
SEC. 36	TWSP. 13 S	RGE. 19W
COUNTY	Ness	STATE	Kansas
CONTRACTOR	Murfin Drilling Rig #5
SPUD	5/30/2011	COMP. 6/3/2011
MUD UP	3710'	TYPE MUD	Chemical
CASING	SURFACE 8 5/8" @ 226'
	PRODUCTION 4 1/2" @ 4197'
ELEVATIONS	KB 2691'
	DF	GL 2686'
	From: Kelly Bushing
	Measurements are from KB

SAMPLE SAVED FROM	2650' TO 4197'
DRILLING TIME KEPT FROM	2650' TO 4197'
SAMPLE EXAMINED FROM	3300' TO 4197'
GEOLOGICAL SUPERVISION FROM	3300' TO 4197'
GEOLOGIST ON WELL	Robert D. Hendrix

ELECTRICAL SURVEYS	
RUN	Log Tech
DUAL INDUCTION	
DUAL COMPENSATED POROSITY	
MICRO	

FORMATION TOPS	ELECTRIC LOG	SAMPLE
Anhydrite	1176' (+815)	1178' (+813)
Base Anhydrite	1196' (+795)	1200' (+791)
Topeka	2960' (-969)	2962' (-971)
Heebner	3232' (-1241)	3234' (-1243)
Toronto	3252' (-1261)	3254' (-1263)
Lansing	3277' (-1286)	3279' (-1288)
Stark Shale	3471' (-1480)	3473' (-1482)
Reagan Sand	3592' (-1591)	3594' (-1593)
Arbuckle	3562' (-1571)	3564' (-1573)
RTD	4197'	4197'
LTD		4196'

REMARKS:

With the positive results of DST's #2, #3, and #4, it is recommended that production casing be set on this test to further explore it's potential.

LEGEND

Anhydrite, Sandstone, Limestone, Shale, Cherty Ls, Chalky Ls, Chert, Oolomite

DRILLING TIME IN MINUTES PER FOOT
Rate of Penetration Decreases
5 10 15

DEPTH | LITHOLOGY | Drilling Time | Oil Shows | Ex. Th | SAMPLE DESCRIPTION | REMARKS

1150 — **Anhydrite 1176 (+815)**

1200 — **Base Anhydrite 1196 (+795)**

2850

Shale: gray, green

Limestone: tan to brown, fxln, dense, fossiliferous, no vis por

Shale: gray, silty

Limestone: tan to brown, fxln, dense, fossiliferous, no vis por

2900

Shale: gray, red

Limestone: tan, fxln, soft, fossiliferous, no vis por

Shale: gray, black, silty

Limestone: brown, fxln, fossiliferous, no vis por

Shale: gray, red

50

Shale: gray, black, silty

Limestone: tan to white, f-mstn, fossiliferous, no vis por

Shale: gray, soft, silty

Topeka 2960 (-969)

Limestone: brown to tan, f-mstn, fossiliferous, no vis por

3000

Limestone: white to tan, mstn, n-fossiliferous, fr intercryst, no vis por

Shale: gray, green, dark red, soft, silty

Limestone: tan to gray, f-mstn, sl chalky, sl fossiliferous, no vis por

Shale: gray, green, red

50

Shale: gray, brown, silty

Limestone: tan to gray, f-mstn, oolitic in part, fossiliferous, no vis por

Limestone: tan to gray, f-mstn, oolitic in part, fossiliferous, no vis por

Limestone: white to tan, fxln, chalky, fossiliferous, no vis por

Geologist on location @ 2:00 pm, 1/8/2013

3100

Limestone: white to tan, s-chalky, pelletoidal, no vis por

Limestone: white to brown, fxln, s-chalky, soft, granular, fossiliferous, pelletoidal, no vis por

Shale: gray, green, soft, silty

wt. 6.9, vis. 60, lcm 2.5
Morgan Mud: Cade Lines

Shale: gray, green, soft, silty

Limestone: tan to white, fxln, chalky, soft, with very dense layer found throughout sample, no vis por

Limestone: tan to white, fxln, chalky, granular, no vis por

50

Shale: black carbonaceous, & gray

Limestone: tan to brown, fxln, chalky, fossiliferous, no vis por

3200

Shale: black, gray

Limestone: tan to white, fxln, s-chalky, granular, no vis por

50

Limestone: tan to white, fxln, s-chalky, granular, sl fossiliferous, no vis por

Limestone: tan to white, fxln, s-chalky, granular, no vis por

Shale: black, gray

Limestone: tan to brown, fxln, chalky, fossiliferous, no vis por

Shale: black, gray

Limestone: tan to brown, fxln, chalky, sl fossiliferous, no vis por

Limestone: tan to white, fxln, s-chalky, dense, hard in part, wt in oil on several pieces, no vis por, no odor

DST #1
3200-3233
30-60-60-90
1st open: blow built to 7"
2nd open: blow built to 8 1/2"
Rec: 5' mud with surface return
Rec:
90' viscos 5/55
IFP: 30-30/30-30/60
hydro: 1614-1570 psi
IF 23-62 psi
FF 31-71 psi
ip: 1313-1355 psi
ISIP 977
fp: 1304-1337 psi
FSIP 977
chlorides: 42,000 ppm
api ne G 11 @ 55°F

CFS — 50 — Limestone: tan to brown, f-mstn, sl chalky, dense, hard in part, no vis por, no odor

Shale: black carbonaceous

Shale: black, gray, green, red

Shale: gray, green, soft

Heebner 3232 (-1241)

CFS — 3250 — Limestone: tan to brown, f-mstn, sl chalky, dense, no vis por, no odor

Limestone: tan to brown, f-mstn, sl chalky, with black shale plates, odds on break, no odor

Shale: gray, red

Toronto 3252 (-1261)

CFS — 3300 — Limestone: tan, f-mstn, fossiliferous, sl intercryst por, 2 pieces black surface stain, nfs, no odor

Limestone: tan to white, sl chalky, fossiliferous, no vis por

Shale: gray, red

Limestone: tan to brown, fxln, sl chalky, sl fossiliferous, no vis por

Limestone: tan to white, sl chalky, oolitic in part, fossiliferous, pr oolicastic por, pr if to dark spotty stain, nfs, faint odor

Lansing 3277 (-1286)

Shale: gray, red

Limestone: tan, f-mstn, sl chalky, oolitic in part, fossiliferous, 5 % sample, pr oolicastic por, dark spotty stain dead and flakey, faint odor

CFS — 50 — Limestone: white to tan, f-mstn, s-chalky, oolitic, 1% sample, sl oolicastic por, dark spotty stain dead and flakey, faint odor

CFS — 3350 — Limestone: white to tan, f-mstn, chalky, sl chalky, no vis por

Limestone: white to tan, fxln, chalky, cherty, no vis por

Shale: gray, red, black

8:00 am, 1/5/2013
wt. 9.2, vis. 52, lcm 3.0
Morgan Mud: Cade Lines

CFS — 3400 — Limestone: white, f-mstn, sl chalky, oolitic in part, fossiliferous, 1 % sample, pr intercryst por, dark spotty stain, nfs, no odor

Limestone: white to tan, f-mstn, sl chalky, oolitic in part, fossiliferous, 2 % sample, pr oolicastic por, pr intercryst por, pr if to dark spotty stain, nfs, faint odor

Shale: gray, red

Limestone: tan, f-mstn, sl chalky, oolitic in part, fossiliferous, 5 % sample, pr oolicastic por, dark spotty stain dead and flakey, faint odor

Limestone: white to tan, f-mstn, s-chalky, oolitic, 1% sample, sl oolicastic por, dark spotty stain dead and flakey, faint odor

Limestone: white to tan, f-mstn, chalky, sl chalky, no vis por

Limestone: white to tan, fxln, chalky, cherty, no vis por

Shale: gray, red, black

DST #2
3399-3440
30-60-60-90
1st open: Blob 1 1/2 min
1st close: Blob 2 1/2 min
2nd open: Blob 2 min
2nd close: Blob 2 min & gts
Rec:
62' gsp
300' gcm
30' mcw 40/60
315 gscm 30/30/40
125 gsmco 20/10/55
IFP: 31-62 psi
hydro: 1714-1708 psi
IF 106-337 psi
FF 169-337 psi
ip: 869-952 psi
ISIP: 1081 P
gravity: 34°

CFS — 3450 — Limestone: white to tan, f-mstn, sl chalky, mostly dense, sl chalky, oolitic in part, with 1 piece black shale, 1 piece tan shale, 1 piece dark tan shale, s-mstn on break, no odor

Shale: gray, black, red

8:00 am, 1/10/2013
wt. 9.4, vis. 49, lcm 3.2
Morgan Mud: Cade Lines

Limestone: tan to white, fxln, sl chalky, sl fossiliferous, pr pin por, no

Limestone: tan to white, fxln, sl chalky, sl chalky, dense, no vis por

Stark Shale 3471 (-1480)

Shale: gray, red, black

Limestone: tan, fxln, sl chalky, mostly dense, sl chalky, oolitic in part, with 1 piece black shale, 1 piece dark tan shale, s-mstn on break, no odor

CFS — 3500 — Limestone: tan to white, fxln, sl chalky, sl fossiliferous, pr pin por, no

Shale: gray, red

Limestone: tan to white, fxln, sl chalky, sl chalky, dense, no vis por

DST #3
3559-3592
30-60-60-90
1st open: blow built to 3"
2nd open: blow built to 2 1/2"
no return 1
Rec:
62' scm 20/80
180' gcm 30/50
372' mcw
IFP: 1013-1815 psi
F 21-46 psi
IF 53-103 psi
hp: 1174-1166 psi
ISIP 1079

8:00 am, 1/12/2013
wt. 9.5, vis. 79, lcm 7.0
Morgan Mud: Cade Lines

CFS — 3550 — Shale: gray, red

Shale: gray, red

Limestone: tan to white, fxln, sl chalky, sl fossiliferous, pr pin por, no

Limestone: tan, fxln, sl chalky, granular, pr intercryst por, fr if sat stain, gd nfs, good odor

Limestone: tan, fxln, sl chalky, granular, fr intercryst por, fr if sat stain, gd nfs, good odor

Dolomite: tan, mstn, granular, cherty, fr intercryst por, fr if sat stain, gd nfs, good odor

Arbuckle 3562 (-1571)

8:00 am, 1/13/2013
wt. 9.2, vis. 51, lcm 6.0
Morgan Mud: Cade Lines

CFS — 3600 — Shale: gray, red

Sandstone: clear, vf, red grained, sub ang, most sorted, semi-friable, fr intercryst por, fr if sat stain in matrix, fr nfs, good odor

Sandstone: clear, vf, red grained, sub ang, most sorted, semi-friable, fr intercryst por, fr if sat stain in matrix, fr nfs, good odor

Sandstone: clear to tan, mod-lg grained, sub ang, most sorted, semi-friable, fr intergranular por, dark stain in matrix, sl nfs, good odor

Reagan Sand 3592 (-1591)

DST #4
3597-3620
30-60-60-90
1st open: bob 17min
1st close: surface return
2nd open: bob 17 min
2nd close: surface return
Rec:
62' gc 10/90
62' mcw 20/80
62' wcm 20/80
124 gsp
IFP: 1000-1819 psi
F 29-89 psi
IF 100-164 psi
hp: 1142-1727 psi
ISIP 1087

Sandstone: clear to tan, mod grained, sub ang, most sorted, semi-friable, fr intergranular por, dark stain in matrix, sl nfs, good odor

CFS — 3650 — Sandstone: clear, vf, red grained, sub ang, most sorted, semi-friable, fr intercryst por, fr if sat stain in matrix, fr nfs, good odor

Sandstone: clear, vf, red grained, sub ang, most sorted, semi-friable, fr intercryst por, fr if sat stain in matrix, fr nfs, good odor, with a minor amount of dolomite in samples

Sandstone: clear to tan, mod grained, sub ang, most sorted, semi-friable, fr intergranular por, fr if sat stain in matrix, pr nfs, good odor

DST #5
3660-3690
15-30-15-60
1st open: bob instantly
1st close: surface return
2nd open: bob instantly
2nd close: no return
Rec:
22M' water
hydro: 1880-1819 psi
F 518-681 psi
IF 30-105 psi
hp: 1880-1390 psi
ISIP: 1121P
chlorides: 43,000
rw: .22 @65°F

Sandstone: clear to tan, mod-lg grained, sub ang, most sorted, semi-friable, fr intergranular por, dark stain in matrix, sl nfs, good odor

Geologist off site at 6:30 am, 1/13/2013

Dolomite: tan, mstn, granular, cherty, fr intercryst por, fr if sat stain, gd nfs, good odor

CFS — 3700 — Dolomite: tan, mstn, granular, cherty, fr intercryst por, fr if sat stain, gd nfs, good odor

CFS — 3750 — Dolomite: tan, mstn, granular, cherty, fr intercryst por, fr if sat stain, gd nfs, good odor

CFS — 3800 — Dolomite: tan, mstn, granular, cherty, fr intercryst por, fr if sat stain, gd nfs, good odor

CFS — 3850 — Dolomite: tan, mstn, granular, cherty, fr intercryst por, fr if sat stain, gd nfs, good odor

CFS — 3900 — Dolomite: tan, mstn, granular, cherty, fr intercryst por, fr if sat stain, gd nfs, good odor

CFS — 3950 — Dolomite: tan, mstn, granular, cherty, fr intercryst por, fr if sat stain, gd nfs, good odor

CFS — 4000 — Dolomite: tan, mstn, granular, cherty, fr intercryst por, fr if sat stain, gd nfs, good odor

CFS — 4050 — Dolomite: tan, mstn, granular, cherty, fr intercryst por, fr if sat stain, gd nfs, good odor

CFS — 4100 — Dolomite: tan, mstn, granular, cherty, fr intercryst por, fr if sat stain, gd nfs, good odor

CFS — 4150 — Dolomite: tan, mstn, granular, cherty, fr intercryst por, fr if sat stain, gd nfs, good odor

CFS — 4200 — Dolomite: tan, mstn, granular, cherty, fr intercryst por, fr if sat stain, gd nfs, good odor