Robert D. Hendrix
Petroleum Geologist

GEOLOGIST'S REPORT
DRILLING TIME AND SAMPLE LOG

COMPANY Murfin Drilling Company Inc.
LEASE Jean 'A' #1-7
FIELD Wildcat
LOCATION 1320'fsl & 330'fel
SEC 7 TWSP 1s RGE 37w
COUNTY Cheyenne STATE Kansas
CONTRACTOR Murfin Drilling Co. Inc. Rig #3
SPUD 4/26/2019 COMP 5/6/2019
RTD 4700 LTD 4700
MUD UP 3306 TYPE MUD Chemical
SAMPLES SAVED FROM 3470 TO TD
DRILLING TIME KEPT FROM 3470 TO TD
SAMPLES EXAMINED FROM 3470 TO TD
GEOLOGICAL SUPERVISION FROM 3400
GEOLOGIST ON WELL Robert D. Hendrix

ELEVATIONS
KB 3168
DF
GL 3163
Measurements Are All From Kelly Bushing

CASING
CONDUCTOR
SURFACE 8-5/8" at 330'
PRODUCTION 5 1/2"

ELECTRICAL SURVEYS
Compensated Porosity, Dual Induction, Microlog, Sonic, Pioneer Wireline

FORMATION TOPS	ELECTRIC LOG	SAMPLE
Anhydrite	3120 (+48)	3118 (+50)
Neva	3562 (-394)	3565 (-397)
Topeka	3893 (-725)	3897 (-729)
Lansing	4108 (-940)	4106 (-938)
Stark Shale	4326 (-1158)	4330 (-1162)
BKC	4382 (-1214)	4385 (-1217)
Ft. Scott	4503 (-1335)	4502 (-1334)
Oakley	4588 (-1420)	4589 (-1421)

API# 15-023-21509

REMARKS:

LEGEND: Anhydrite, Sandstone, Limestone, Shale, Carb Sh, Cherty LS, Chert, Dolomite

DRILLING TIME IN MINUTES PER FOOT (Rate of Penetration Decreases) | DEPTH | LITHOLOGY | GAS UNIT | SAMPLE DESCRIPTION | REMARKS

Anhydrite 3118 (+50)

Base Anhydrite 3155 (+15)

Geologist on location 3400' at 2:09 pm 4/29/2017
Bit Trip at 3400' to change from PDC to button.
Strap out of hole was 0.87' long to board.

Shale: red, silty, sandy

Sandstone: white, f/t, sl. glauconitic, friable, fn-gr, subrnd, well sorted, pr interxln por, ns fr amt of flaky dead oil, no fo, no odor

Shale: red, sandy

Shale: red, silty, sandy

Shale: gray, green, red, soft silty

Neva 3565 (-397)

Limestone: tan to white, f-mxln, sl chalky, granular, oolitic, fossiliferous, no vis por

Limestone: gray to tan, dense, sl pyritic, sl fossiliferous, vo vis por

Shale: red, gray, black, silty

Shale: red, silty, sandy

Shale: red, silty, v-sandy

Red Eagle 3631 (-463)

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

Limestone: tan to white, fxln, chalky, cherty, granular in part, fossiliferous, no vis por

Shale: gray, soft, muddy

Shale: gray, silty, sl sandy

Foraker 3678 (-510)

Limestone: tan to gray, f-mxln, sl chalky, oolitic in part, fossiliferous, 5% sample sl pp por, dark spotty stain, flaky dead oil, nfo, no odor odor.

Shale: gray, silty, sandy

Limestone: gray, f-mxln, fossiliferous, 5% sample no vis por, dark spotty stain, nfo, no odor.

Shale: gray, black, brown, silty

Limestone: tan, fxln, mostly dense, fossiliferous, 1 piece sl pp por, dark spotty stain, v-slsfo, no odor.

Limestone: tan, fxln, chalky, fossiliferous, granular, 3% sample sl pp por, dark spotty stain, gilsonite, nfo, no odor.

Shale: gray, brown, blocky, abd mineral streaks

8:00am, 4/30/2019
wt 8.9, vis. 84, lcm 4#
Mud-Co, Cade Lines

Shale: gray, red, silty, dark gray, blocky

Limestone: tan to white, fxln, chalky, granular, sl oolitic in part, no vis por

Shale: gray, red, silty, dark gray, blocky

Shale: gray, red, silty

Shale: gray, red, black, blocky

Shale: red, gray, silty

Limestone: lt gray to tan, fxln, chalky, oolitic, fossiliferous, no vis por, ns

Limestone: lt. gray/green to tan, fxln, oolitic in part, pyritic, fossiliferous, no vis por, ns

Shale: gray, red, silty

Limestone: lt. gray to tan, fxln, sl chalky, pyritic, fossiliferous, no vis por, ns

Shale: gray, red, silty

Stotler 3826 (-658)

Limestone: tan, f-mxln, sl chalky, fossiliferous, 25 % sample fr pp por, gd black tarry stain, gilsonite, nfo, no odor

Limestone: tan to white, fxln, fossiliferous, 10 % sample fr pp por, gd dark spotty stain, black gilsonite, nfo, no odor

Shale: gray, green, red, silty

Limestone: tan to white, f-mxln, fossiliferous, 10 % sample fr pp to fossiliferous por, gd dark spotty to sat stain, slsfo dark, no odor

Shale: gray, dark gray, red, silty

Limestone: tan to white, mxln, fossiliferous, pyritic, 20% sample fr pp to fossiliferous por, gd black spotty to sat stain, prsfo black heavy, faint odor

Shale: red, gray, silty, soft

DST #1
3802-3903
30-60-30-60
1st open: built to 1 1/2"
1st shut in: no blow
2nd open: no blow
2nd shut in: no blow
Rec:
5' mud
hydro: 1890-1866 psi
If: 18-20 psi
ff: 22-23 psi
sip: 359-278 psi
bht: 125° F

Topeka 3897 (-729)

Limestone: white to lt gray, f-mxln, sl pyritic, oolitic in part, fossiliferous, calcite replacement, pr interxln por, 4 pieces dark spotty tarry stain, nfo, no odor

Shale: gray, green, red, silty

Limestone: lt gray to white, fxln, sub chalky, fossiliferous, 1% sample sl pp por, spotty black stain, nfo, no odor

Shale: gray, green, red, silty

8:00am, 5/1/2019
wt 9.0, vis. 66, lcm 4#
Mud-Co, Dave Lines

Limestone: tan, fxln, sl chalky, dense, fossiliferous, no vis por

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

Shale: red, gray, black

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

Shale: red, gray, silty

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

Limestone: tan to white, fxln, oolitic in part, fossiliferous, fr oolicastic por, ns

Shale: red, gray, dark gray, silty

Shale: gray, green, red, soft silty, black, blocky

DST #2
3988-4041
30-60-30-60
1st open: weak blow built to 1/2" died back to surface
2nd open: no blow
no returns
Rec:
5' mud
hydro: 2004-1970 psi
If: 15-16 psi
ff: 15-16 psi
sip: 23-17 psi
bht: 129° F

Oread 4030 (-862)

Limestone: white, fxln, chalky, non competent, oolitic in part, fossiliferous, sl interxln por, black spotty to sat stain, v-slsfo, faint odor

Limestone: white, fxln, chalky, non competent, oolitic in part, fossiliferous, 10% sample no vis por, black spotty to sat stain, nfo, no odor

Limestone: white to tan, fxln, sl chalky, mostly dense, sl fossiliferous, no vis por, 2 pieces of show from above

wt 9.1, vis. 65, lcm 4#
Morgan Mud, Dave Lines
8:00am, 5/2/2019

Shale: red, gray, silty

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

Shale: red, gray, silty

Lansing 4106 (-938)

Limestone: tan to white, fxln, sl chalky, sl fossiliferous, 1% sample v-sl scattered pp por, pr scattered black spotty stain, nfo, no odor

Limestone: tan, v-fxln, dense, sl fossiliferous, no vis por

Limestone: tan to white, f-mxln, fossiliferous, 5% sample fr pp to vug por, gd dark sat stain, fr-sfo, no odor

Sandstone: brown stained, friable, vfn-gr, rnd, well sorted, fr intergrn por, gd dark sat stain, fr-sfo bleeding on several pieces, good odor

Shale: red, gray, green, biotitic, silty

DST #3
4068-4181
30-60-30-60
1st open: blow built to 1 1/2"
2nd open: no blow
no returns
Rec:
20' mud-w-oil spots in tool
hydro: 2073-2061 psi
If: 18-26 psi
ff: 29-34 psi
sip: 1128-1086 psi
bht: 131° F

Shale: red, silty, black, gray

Limestone: tan to white, fxln, sl chalky, pyritic, fossiliferous, 10% sample pr interxln por, dark spotty to sat stain, pr-sfo bleeding, fr odor

Shale: red, gray, green

Limestone: tan, fxln, sl chalky, dense, sl pyritic, fossiliferous, 1% sample no vis por, scattered dark spotty stain, nfo, no odor

8:00am, 5/3/2019
wt 9.3, vis. 63, lcm 4#
Mud-Co, Dave Lines

Shale: red, gray, green, silty

Limestone: white, fxln, sl chalky, oolitic in part, fossiliferous, sl pyritic, 10% sample pr pp to vug por, pr-sfo some bleeding, gd dark spotty to sat stain, good odor

Limestone: white to tan, v-fxln, dense, sl fossiliferous, no vis por

DST #4
4178-4235
30-60-60-90
1st open: bob 11 min
1st shut in: surface return died 40 min
2nd open: bob 15 min
2nd shut in: bob 32 min
Rec:
65 go 5/95
126' go 40/60
189' gmco 15/20/65
63' gmwco 15/20/20/45
303' omcw 10/15/75
hydro: 2150-2127 psi
If: 32-188 psi
ff: 190-332 psi
sip: 1370-1323 psi
bht: 141° F
gravity: 27°
chl: 58,000 ppm

Shale: gray, green, red, blocky

Limestone: white to tan, fxln, sl chalky, sl fossiliferous, sl pyritic, no vis por, slt amt of black tarry stain, nfo, no odor

Shale: red, gray, green

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

DST #5 (slid 5')
4232-4330
30-60-30-60
1st open: blow built to 1 3/4" died back to 1/14"
2nd open: no blow
no returns
Rec:
30' mud
hydro: 2121-2114 psi
If: 39-41 psi
ff: 40-42 psi
sip: 280-203 psi
bht: 129° F

Shale: gray, green, red, silty, blocky

Limestone: tan to gray, vf-xln, sl chalky, fossiliferous, no vis por

Shale: gray, green, red, silty, sandy

8:00am, 5/4/2019
wt 9.0, vis. 59, lcm 5#
Morgan Mud, Dave Lines

Limestone: white to tan, fxln, sl chalky, fossiliferous, 1% sample sl interxln por, fr sat lt stain, slsfo on break, no odor

Stark Shale 4330 (-1162)

Shale: gray, green, red, blocky, silty

Limestone: tan to lt gray, fxln, sl chalky, oolitic, no vis por, ns

Shale: dark to lt gray, black, blocky

Shale: red, gray, silty

Limestone: tan to white, f-mxln, sl chalky, dense, oolitic, fossiliferous, no vis por, ns

Mound City 4385 (-1217)

Shale: red, gray, dark gray, black, silty

Limestone: tan to lt gray, f-mxln, sl chalky, v-fossiliferous, sl pyritic, no vis por, ns

Shale: gray, red, green, silty, blocky

DST #6
4485-4535
30-60-60-90
1st open: bob 6 min
1st shut in: no blow
2nd open: bob 5 3/4 min
2nd shut in: surface blow died 20 min
Rec:
30' go 20/80
60' go 40/60
60' gmco 30/30/40
60' gmco 20/30/50
210' total
hydro: 2300-2166 psi
If: 22-56 psi
ff: 63-84 psi
sip: 924-936 psi
bht: 141° F
gravity: 37°

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

Shale: red, brown, gray, silty

Limestone: tan to white, fxln, mostly dense, oolitic, fossiliferous, no vis por, ns

Shale: red, brown, gray, silty

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

8:00am, 5/5/2019
wt 9.1, vis. 60, lcm 4#
Morgan Mud, Cade Lines

Limestone: white to lt gray, fxln, soft, silty,, no vis por

Shale: red, gray, black

Ft Scott 4502 (-1334)

Limestone: tan to white, m-fxln, oolitic, pyritic, sl cherty, fossiliferous, 10% sample fr pp to oolimoldic por, dark sat stain, fr-sfo with more on break, gd odor

Limestone: tan to gray, fxln, sl chalky, silty, fossiliferous, no vis por, ns

Shale: black, gray, red

Shale: red, gray, green

Limestone: tan, fxln, sl chalky, cherty, dense, sl-fossiliferous, no vis por, ns

Limestone: gray to brown, v-fxln, dense, fossiliferous, granular, no vis por, ns

Shale: black carbonaceous, gray, red

Limestone: tan to gray, fxln, cherty, fossiliferous, no vis por

Oakley 4589 (-1421)

Shale: red, gray, silty, black carbonaceous

8:00am, 5/6/2019
wt 9.2, vis. 64, lcm 4#
Morgan Mud, Dave Lines

Limestone: tan to white, fxln, chalky. sl cherty, fossiliferous, no vis por, ns

Limestone: tan to brown, fxln, sl cherty, mostly dense, dense, fossiliferous, no vis por, ns

Shale: gray, green, dark red, silty

Limestone: tan to white, f-mxln, chalky, sl cherty, fossiliferous, dense, no vis por, ns

Shale: lt to dark gray, dark red, green

Shale: black, lt to dark gray, red, blocky

Limestone: tan, fxln, sl chalky, dense, fossiliferous, no vis por

Shale: gray, red, silty

Limestone: lt gray to white, fxln, sl chalky, dense, sl fossiliferous, no vis por

Shale: red, gray, green, pyritic, silty

Sandstone: white to lt green, mdgr, sub rnd, mod sorted, calcareous, well cemented brittle, no vis por, ns

Shale: red, gray, silty, sandy, cherty

Sandstone: white to lt green, fn-mdgr, sub rnd, mod sorted, argillaceous, calcareous, no vis por, ns

Shale: red, gray, green, yellow, silty, sandy, cherty

RTD 4700 (-1532)

Geologist off location at 12:00pm, 5/6/2019

Murfin Drilling Co Inc
Jean 'A' #1-7
1320'fsl & 330'fel
7-1s-37w, Cheyenne County, Kansas
KB=3168, GL=3163
API: 15-023-21509