Saman Sharifaie
Petroleum Geologist

API #15-023-21467

GEOLOGIST'S REPORT
DRILLING TIME AND SAMPLE LOG

COMPANY Murfin Drilling Co., Inc.
LEASE Mears #1-16
FIELD Ken
LOCATION 2140' FNL & 660' FWL
SEC 16 TWSP 2S RGE 37W
COUNTY Cheyenne STATE Kansas
CONTRACTOR Murfin Drilling #24
SPUD 07/05/17 COMP 07/15/17
RTD 4900' LTD 4899'
MUD UP 3500' TYPE MUD Chemical
SAMPLES SAVED FROM 3970' TO RTD
DRILLING TIME KEPT FROM 3970' TO RTD
SAMPLES EXAMINED FROM 3970' TO RTD
GEOLOGICAL SUPERVISION FROM 3670'
REFERENCE WELL Berexco - Ardene #1-17

ELEVATIONS
KB 3371'
DF
GL 3366'
Measurements Are All From Kelly Bushing

CASING
CONDUCTOR
SURFACE 8-5/8" at 345'
PRODUCTION 5-1/2" at 4899'

ELECTRICAL SURVEYS
CND; DIL; MEL; Sonic
Pioneer Wireline

Formation	Sample Tops	E-log Tops	Struct Pos.
Anhydrite	3266 (+105)	3266 (+105)	-3
Base Anhydrite	3298 (+73)	3293 (+78)	+5
Topeka	4074 (-703)	4071 (-700)	+4
Oread	4216 (-845)	4216 (-845)	+2
Lansing	4293 (-922)	4291 (-920)	+1
Mound City	4572 (-1201)	4570 (-1199)	+6
Marmaton	4608 (-1237)	4608 (-1237)	+2
Ft Scott	4698 (-1327)	4704 (-1333)	-5
Oakley	4778 (-1407)	4776 (-1405)	+2

16

REMARKS Due to fair to good shows of oil in several potential pay zones and positive DST results in LKC H & J zones, it is recommended and agreed upon by all parties that production casing be set to further evaluate this well.

Respectfully Submitted,

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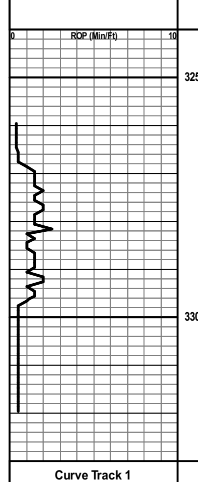
*Tops have been adjusted to electric logs

Curve Track 1 ROP (Min/Ft)	Depth	Lithology	Oil Shows	Geological Descriptions	Engineering Data



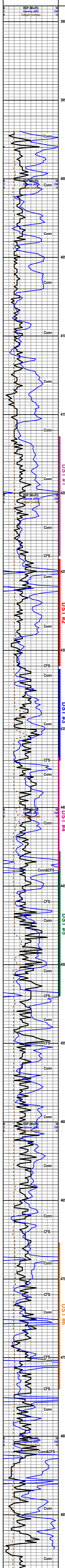
3250

Anhydrite 3266 (+105)

Base 3293 (+78)

3300

Curve Track 1 ROP (Min/Ft) Gamma (API) Caliper (inches)	Depth	Lithology	Oil Shows	Geological Descriptions	Engineering Data



3900

Pipe Strap @ 3910': 3.20' Short to Board
Deviation Survey: ½°

DAILY PENETRATION @ 7:00 AM

07/05/17 - Spudded at 4:30 PM
07/06/17 - Drilling at 345'
07/07/17 - Drilling at 3286'
07/08/17 - Drilling at 4020'
07/09/17 - Testing at 4240'
07/10/17 - Drilling at 4355'
07/11/17 - Testing at 4440'
07/12/17 - Testing at 4520'
07/13/17 - Drilling at 4752'
07/14/17 - CTCH at 4900'

3950

Sh., brn, gmy to slty, scat tan Ls & Chk

Ls., crm/lt gry, sing, fn xln, foss, pr vis por, pt dns to chky, calc cmt, blky, intbdd brn/lt gn Sh, n/s

Sh., gry, argil, pyrc IP & Sh., lt gry/lt gn, slty to sndy, sub-rndd

Ls., lt gry/purp/varic, mott, fn-med xln, foss IP, pr vis por, gran, fri, shly, n/s

4000

Ls., crm/lt gry, fn xln, foss, pr pp intfoss por, dns, brit to hd, abund gry/brn Sh, fr amt dd med brn/blk spkld stn, try to flky, gils IP, no odr, NSLO

Ls., crm/tan, fn xln, foss IP, pr intfoss por, dns to sub-chky, hd to sli brit, pyrc, sbang, scat dd blk sptd stn, lt-mod pt sat, gils, no odr, NSLO

Ls., crm/lt gry, mott IP, fn xln, Tr foss, no-pr vis por, dns cmt, hd, sbang, shly, n/s

Sh., brn/mar/purp, slty

Morgan Mud @ 4037'
Wt: 8.9
Vis: 67
Wl: 5.6
Chl: 600
LCM: 4#

Ls., crm/tan/lt gry, sli mott, fn xln, no-pr vis por, dns to sub-chky, sbang to blky, calc IP, pyrc IP, rr intbdd glau, n/s

Sh., brn/gry, dns, fri to brit, Tr sli sft

Sh., brn/gry/lt gn, slty to grny & Ls., a.a

4050

Ls., crm/lt gry, vf-fn xln, Oolc, NVP, dns to sub-chky, calc cmt, hd, pyrc IP, n/s

Sh., brn/lt gn, slty to sndy & Sh., gry, fiss, sli sft

Topeka 4071 (-700)

DST #1
(Oread)
4164'-4240'
30-60-30-60
IF: Blow built to ¼"
FF: No blow
Rec: 3' M (100%M)
IFP: 16 - 16
FFP: 17 - 17
ISIP: 29
FSIP: 28
IHP: 2090
FHP: 2057
BHT: 137º

Ls., crm, fn xln, pred foss, pr intfoss por, dns to sub-chky, hd to sli brit, pyrc, fr amt blk sptd stn, thk/try to asphc, lt pt sat, no odr, NSFO

Ls., crm/tan/wht, sing, vf xln, foss IP, rr intfoss por, pred NVP, dns/hd to sub-chky, sbang to blky, pyrc IP, n/s

Sh., brn/lt gn, slty

Deer Creek 4096 (-725)

4100

Ls., wht/crm, sing, vf-fn xln, sli foss IP, NVP, dns to sub-chky, calc cmt, sbang, n/s

Ls., a.a, sbang to blky

Ls., crm/tan/wht, vf-fn xln, foss IP, pr pp intfoss por, scat sndy/gran pcs w/ fr intgran por, dns to sub-chky, pyrc IP, scat dd med brn/blk spkld stn, flky, lt pt sat, no odr, NSLO

Sh., brn/dk orng/lt gn, slty to mdy

Sh., brn/dk orng, slty to mdy

Sh., gry/lt gry/lt gn, fiss, pyrc IP, Tr Sd

DST #2
(LKC A)
4242'-4310'
30-60-30-60
IF: Surface blow, dead @ 18 mins
FF: No blow
Rec: 5' SOSM (1%O, 99%M)
IFP: 17 - 16
FFP: 17 - 17
ISIP: 64
FSIP: 36
IHP: 2149
FHP: 2153
BHT: 138º

4150

LeCompton 4154 (-783)

Ls., tan/lt gry, sing, vf xln, NVP, dns to sub-chky, hd, blky to sbang, n/s

Ls., lt gry/tan/purp, vf-fn xln, rr foss, NVP, dns to sub-chky, calc cmt, sbang to sub-rndd, rr rexlzd pcs, pyrc IP, intbdd orng Cht & Sh, n/s

Sh., purp/brn/lt gn, sli slty

Sh., brn/purp/lt gn/gry, slty IP, pt dns, fri

DST #1

4200

Sh., lt gry/lt brn/purp, pt dns, blky, fri to brit

Sh., lt gry, sli slty to grny/sft

Oread 4216 (-845)

Ls., crm, fn xln, foss, pr intfoss & xln por, Tr frac por, pt dns to sub-chky, fri to brit, scat med-dk brn spkld stn, ptchy, mod pt sat, slw bld FO, Tr dl yel fluor, fr cut, fnt odr, SSFO

Morgan Mud @ 4240'
Wt: 9.0
Vis: 69
Wl: 6.0
Chl: 600
LCM: 4#
Deviation Survey @ 4240': 1º

Ls., brn/tan, sing, vf-fn xln, Tr pr intxln por, pred NVP, dns to sub-chky, blky to sbang, Tr dd spkld stn, lt-mod pt sat, no odr, no fluor, NSLO

Ls., tan/brn/crm, sing, micr-vf xln, NVP, v dns, hd, blky to sbang, n/s

4250

Sh., gry/lt gn/blk carb, brit to sft

Sh., a.a, pyrc IP, incr blk carb abund

Sst., lt gry/lt gn/tan, vf-fn gr, srtd, pr-fr intgran por, consl, fri to sli argil, rndd to sbang, sub-chky IP, Tr dd med brn/blk stn, lt-mod pt sat, flky, no odr, NSLO

DST #2

Sh., brn, slty to sndy, Tr grny

Sh., gry/lt gn, fiss IP, sli sft to brit, Tr pyrc

Lansing 4291 (-920)

DST #3
(LKC B-D)
4312'-4370'
30-60-30-60
IF: Blow built to ¼" & died back to surface blow @ shut-in
FF: No blow
Rec: 5' M (100%M)
IFP: 16 - 16
FFP: 18 - 17
ISIP: 68
FSIP: 43
IHP: 2145
FHP: 2131
BHT: 135º

Ls., lt brn, fn xln, foss, fr-gd Oolc & vug por, pt dns, brit to fri, fr amt dk brn/blk sptd stn, mod-gd pt sat, abund pp FO, irid OCW, scat G Bubls, yel fluor, gd cut, gd odr, GSFO

4300

Ls., tan/brn, sing, micr-vf xln, NVP, dns, hd, sbang to ang, n/s

Ls., tan/lt brn/lt gry, micr-vf xln, NVP, dns, hd, blky to sbang, n/s

Ls., crm/wht/tan, vf-fn xln, foss IP, pr pp intfoss & xln por, intbdd Sst w/ fr intgran por, sub-chky IP, Tr calc, scat med brn spkld stn, sub-sat, Tr irid pp FO, v fnt odr, VSSFO

DST #3

Sh., brn/lt gry, slty to sndy

Ls., crm, vf-fn xln, Tr foss, Tr pr intxln por, pt dns to sub-chky, brit IP, sbang, Tr med brn spkld stn, lt pt sat, rr slw bld pp FO, no odr, VSSFO

4350

Sh., gry/lt gn, fiss IP, fri to sli sft

Morgan Mud @ 4370'
Wt: 9.0
Vis: 59
Wl: 5.6
Chl: 600
LCM: 4#
Deviation Survey @ 4370': 1º

Ls., crm/lt gry/tan, fn xln, pr-fr pp intfoss & intxln por, scat vugs/incls, calc, pyrc IP, brit to sub-chky, fr amt med-dk brn sptd stn, sub-sat, abund pp FO, irid OCW, Tr G Bubls, dl yel fluor, fr cut, gd gsy odr, FSFO

Ls., a.a, pred crm, calc cmt, decr Shw abund, v fnt odr, VSSFO

Sh., brn/lt gry/lt gn, pred slty to sndy, pt dns, fri to brit

Ls., lt gry, sing, fn-med xln, Tr foss, Tr pr intxln por, rexlzd/gran, pt dns to sub-chky, sli fri, sub-rndd, n/s

Sh., brn/lt gry, slty, fri to sli argil

4400

DST #4

Sh., brn/gry/lt gn, slty to sndy, pyrc IP, fri to brit

Sh., brn/lt gry, slty, pt dns, brit to sli argil

Ls., tan/lt gry/crm, fn xln, foss, pr pp intfoss & xln por, dns to sub-chky, fri IP, scat med brn spkld stn, lt pt sat, slw bld pp FO, Tr irid, no fluor, fnt odr, VSSFO

Morgan Mud @ 4440'
Wt: 9.3
Vis: 69
Wl: 6.0
Chl: 600
LCM: 4#

Ls., crm/brn, vf-fn xln, foss IP, pr intxln & foss por, dns to sub-chky, calc IP, pyrc IP, Tr lt-med brn spkld stn, lt pt sat, no fluor, no odr, NSFO

Sh., gry/blk carb, pyrc IP

DST #4
(LKC G)
4368'-4440'
30-60-30-60
IF: Blow built to ½" & died back to ¼" @ shut-in
FF: No blow
Rec: 5' OSM (5%O, 95%M)
IFP: 17 - 17
FFP: 19 - 19
ISIP: 43
FSIP: 32
IHP: 2216
FHP: 2206
BHT: 137º

Sh., lt gry, rndd, sndy, fri

4450

Ls., crm/tan, fn xln, foss, fr pp intOolc & micr vug por, pred dns/hd, pcs w/ Shw pred brit, scat med-dk brn sptd stn, mod-gd sat, slw bld pp FO, irid OCW, abund G Bubls, Tr dl yel fluor, fr cut, gsy odr, FSFO

DST #5

Sh., gry/lt gn, fiss, sli sft

Sh., brn/lt gn/varic, slty

Sh., brn, pred slty, sft to brit

Sh., brn/gry, sli slty, brit to fri

Sh., gry, sli carb, fiss, brit

4500

Morgan Mud @ 4520'
Wt: 9.2
Vis: 71
Wl: 5.6
Chl: 600
LCM: 4#
Deviation Survey @ 4520': 1º

Ls., crm, vf-fn xln, foss, pr-fr intOolc & intfoss frac por, pt dns to sub-chky, calc cmt, fri to brit, abund med brn stn, lt-mod sat, slw-mod pp FO bld, rr G Bubls, irid OCW, fr amt yl fluor, fr-gd cut, fr odr, F-GSFO

Stark 4518 (-1147)

Sh., lt gry/blk carb

DST #5
(LKC H-J)
4428'-4520'
30-60-60-90
IF: BOB @ 10 mins, 15 secs
ISI: Blow built to 7½"
FF: BOB @ 7 mins, 45 secs
FSI: Blow built to 9¾"
Rec: 1556' GIP,
303' CGO (7%G, 93%O),
183' GOCM (41%G, 22%O, 37%M)
IFP: 72 - 109
FFP: 120 - 185
ISIP: 1333
FSIP: 1294
IHP: 2255
FHP: 2238
BHT: 146º
Gravity: 35.6 API

Sh., brn, slty IP, dns, fri to brit

Sh., brn/gry/lt gn/varic, slty IP, fiss IP

Ls., crm/mar, mott, fn xln, Tr foss, no-pr vis por, pt dns to sub-chky, calc cmt, sbang, intbdd rd Sh, n/s

4550

Sh., gry/lt gn, sli slty, fiss IP, brit to sli sft

Sh., brn/lt gn/varic, sli slty IP, pt dns, brit

Ls., crm, fn xln, foss, no-pr por, pt dns to sub-chky, shly IP, n/s

Mound City 4570 (-1199)

Sh., brn/purp/gry/lt gn, pt dns, brit to sli sft

Lenapah 4582 (-1211)

Ls., crm/tan, fn xln, sli foss, Tr pr intxln & pp intfoss por, pred NVP, pt dns to sub-chky, calc IP, sbang, n/s

Sh., gry/lt gn/varic, fiss IP, pyrc IP, brit to sft

4600

Sh., brn/dk orng/varic, slty

Marmaton 4608 (-1237)

Ls., crm/gry/tan, mott IP, fn xln, foss IP, no-pr vis por, pt dns to sub-chky, calc IP, fri to brit, intbdd rd Sh, n/s

Sh., purp/lt gn/varic, sli slty, calc, brit to fri

Sh., brn, slty, calc, brit to sli sft

Ls., crm/lt gry, mott IP, vf-fn xln, Tr foss, no-pr vis por, dns to sub-chky, sli calc, shly IP, n/s

4650

Sh., brn/gry/varic, sndy, calc, brit to argil

Ls., crm, sli mott, fn-med xln, foss, pr intxln & intfoss por, pt dns to sub-chky, calc, brit to fri, shly, rr (2-3 pcs) dd blk spkld stn, flky, no sat, no odr, NSLO

Sh., brn/lt gry/lt gn, slty, calc, sub-rndd to blky, fri to brit

DST #6
(Ft Scott, Breezy Hill)
4677'-4770'
30-30-30-45
IF: Blow built to ¼"
FF: No blow
Rec: 5'M (100%M)
IFP: 20 - 27
FFP: 26 - 30
ISIP: 1016
FSIP: 1061
IHP: 2411
FHP: 2379
BHT: 141º

Sh., gry/lt gn/blk carb

Sh., gry, slty, calc, sli sft

4700

Ft Scott 4704 (-1333)

Ls., crm/tan, vf-fn xln, foss IP, Tr pr intxln & pp intfoss por, pred NVP, dns to sli fri, calc IP, sbang to blky, rr dk brn/blk ptchy stn, spkld, v lt pt sat, gils IP, Tr pp FO bld on brk, no odr, VSSFO

DST #6

Ls., crm/tan, sing, vf xln, NVP, dns, blky, n/s

Ls., crm/tan/lt gry, vf-fn xln, Tr foss, no-pr vis por, dns to chky, calc cmt, rexlzd IP, sbang to blky, n/s

Sh., blk carb/gry, pyrc

Ls., crm/wht/lt gry, vf-fn xln, foss IP, Tr pr intxln por, pt dns to sub-chky, calc IP, pyrc IP, sbang, n/s

Ls., crm, fn xln, sli foss, pr intxln & pp intfoss por, pt dns to sub-chky, calc, pyrc IP, brit, sbang, rr med brn spkld stn, ptchy, no odr, NSFO

4750

Excello 4752 (-1381)

Morgan Mud @ 4767'
Wt: 9.1
Vis: 79
Wl: 5.6
Chl: 600
LCM: 4#
Deviation Survey @ 4770': 1º

Sh., blk carb

Breezy Hill 4758 (-1387)

Ls., crm/tan, fn xln, foss IP, pr pp intfoss & xln por, pt dns to sub-chky, sli calc, fri to brit, rr med brn spkld stn, lt sat, Tr pp FO bld on brk, rr irid, dl yel fluor, pred min, no odr, VSSFO

Ls., crm/tan/lt gry, fn xln, NVP, dns to chky, n/s

Oakley 4786 (-1505)

Sh., lt gry/blk carb

Celia 4783 (-1412)

Ls., tan/crm, fn xln, Tr pr intxln & pp intfoss por, pred NVP, dns to sub-chky, calc, blky, Tr blk spkld stn, lt pt sat, pred gils, rr slw bld pp FO, no odr, VSSFO

Ls., a.a, sbang to blky, incr Shw abund, v fnt odr, VSSFO

4800

Sh., brn/gry/lt gn/varic, slty to sft

Ls., crm/tan/lt gry, micr-vf xln, Tr foss, NVP, calc cmt, dns to sub-chky, hd, sbang, n/s

Sh., gry/lt gn/purp/varic, fiss IP, slty IP, sft to argil

Sh., brn/gry/blk carb, slty IP

Ls., crm/tan/varic, mott IP, vf-fn xln, Tr foss, Tr pr intxln por, pred NVP, dns to sub-chky, n/s

Sh., gry/lt gn/purp/varic, fiss IP, sndy IP

4850

Ls. & Sh., a.a

Sh., gry/lt gn/brn/varic, fiss IP, dns, brit to fri

Sst., lt gn/brn/varic, fn-med grn, pr srtd, pr intgran por, consl, rexlzd, sli blky, pyrc IP, shly, n/s

Sh., brn/gry/varic, slty IP, dns, brit

Morgan Mud @ 4900'
Wt: 9.4
Vis: 81
Wl: 6.0
Chl: 600
LCM: 4#

Sst. & Sh., a.a

RTD 4900 (-1529)

4900

Pipe Strap @ 4900': 1.02' Short to Board
Deviation Survey : 1º