GEOLOGIST'S REPORT

DRILLING TIME AND SAMPLE LOG

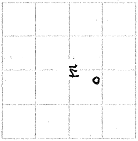
COMPANY Murfin Drilling Co., Inc.
LEASE Youngmeyer 'A' #1-14
FIELD WC
LOCATION 1400' FNL + 2400' FEL
SEC 14 TWSP 29S RGE 8E
COUNTY Elk STATE KS
CONTRACTOR C&G Drilling Co., Rig #1
SPUD 6/30/17 COMP 6/18/17
RTD 3280' LTD 3279'
MUD UP 1000' TYPE MUD chem
SAMPLES SAVED FROM 1000' TO RTD
DRILLING TIME KEPT FROM 1000' TO RTD
SAMPLES EXAMINED FROM 1000' TO RTD
GEOLOGICAL SUPERVISION FROM 1000' TO RTD
GEOLOGIST ON WELL Ken Wallace

ELEVATIONS
KB 1604'
DF
GL 1598'
Measurements Are All From KB

CASING
SURFACE 8 5/8" @ 52', 61 sx
PRODUCTION 5 1/2" @ 3264'

ELECTRICAL SURVEYS
DIL, CDL/CNL, MEL, BHCS

FORMATION TOPS	LOG	SAMPLES
Heebner	1320(+284)	1322(+282)
Kansas City	2056(-452)	2066(-462)
BKC	2271(-667)	2275(-671)
Altamont	2379(-775)	2383(-779)
Pawnee	2468(-864)	2470(-866)
Excello	2543(-939)	2547(-943)
Miss	2830(-1226)	2829(-1225)
Arbuckle	3183(-1579)	3189(-1585)
RTD		3280(-1676)
LTD	3279(-1675)	



REMARKS

Production casing set to further evaluate DST #2.

Ken Wallace

6/30/17 Spud, set 52' Surface casing
7/2/17 CG Drilling SD for week
7/10/17 Start up
7/11/17 Depth 2018'. Bit trip. Button for PDC
7/12/17 2250', Ran DST #1
7/13/17 2739', Drilling
7/14/17 2898', Ran DST #2, drilling
7/15/17 3030', Ran DST #3, drilling
7/16/17 3202', Ran DST #4
7/17/17 3280' RTD, Ran logs, running prod pipe
7/18/17 Ran prod pipe.

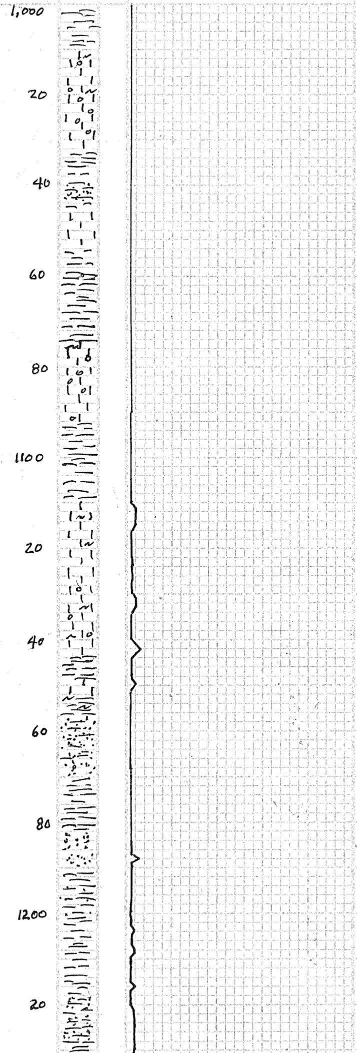
LEGEND

▦	▤	▨	▧	▩	▭	▭	▭	▨
Anhydrite	Salt	Sandstone	Shale	Carb sh	Limestone	Dol.Lime	Chert	Dolomite

SCALE " = 100'

LOG 7708

DEPTH | DRILLING TIME — Minutes Per Foot / Rate of Penetration Decreases | SAMPLE DESCRIPTIONS | REMARKS



Sh, gy; sm Ls, gy, ool, foss

Ls, wh, ool, foss

Sh, gy, mica, sm grn, bl

Sh, gy; sm vfgd ss, argl

Ls, tan-gy, fxln, cky

sh, dkgy, bl

1070' – No sample

Ls, md brn, foss, ool, cky

1106' No Sample
Sh, gy, sm rd

Ls, offwh, sm brn, granlr, sl foss, cky

Ls, md gy, foss, sl ool

sh, gy

sh, gy, slty, sm vfgd, argl ss

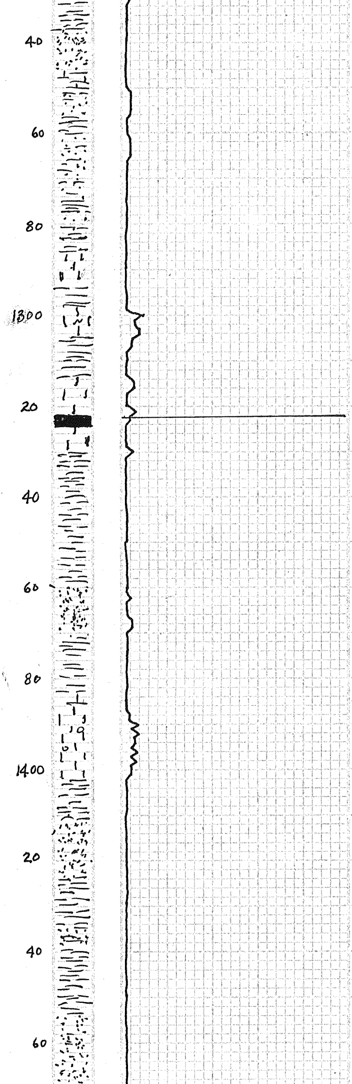
sh, gy, rd

ss, lt gy, vfgd, psrtd, p rnd

Sh, gy, slty in pt, mica

sh, gy, sm brn, rd, much pyr

AA; sm slty/sdy



ss, ltgy, argl, vfgd, psrtd, p rd

ss, AA, f srtd, p-f rnd, w/ gy sh

sh, gy, rd, grn, sdy/slty

Ls, ltgy, fxln, cky

Ls, offwh, gnlr, sl foss, cky

sh, gy, rd, pyr

Ls, brn-tan, fxln-gnlr, cky

sh, bl

Heebner Sh
1322 (+282)
E-log 1320 (+284)

sh, gy, sm brn

AA, mica, pyr

sh, AA w/ ss, ltgy, fgd, argl, p srtd, p rnd

sh, gy

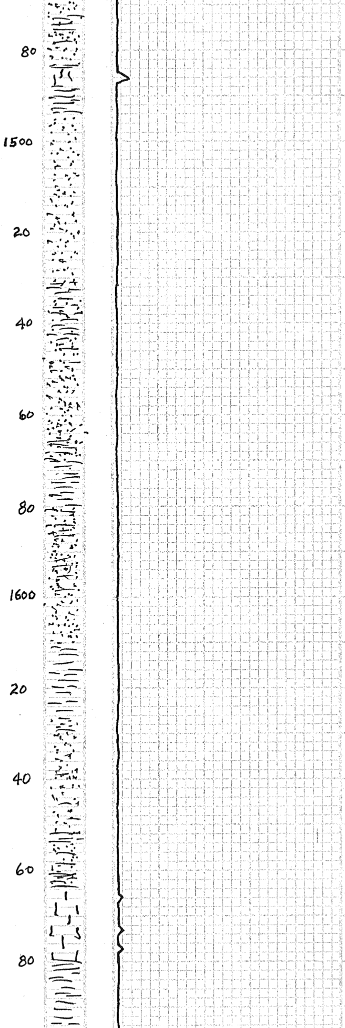
Ls, tan, fxln, sl ool, cky

ss, cl-wh, fgd, g srtd, g-f rnd

sh, gy, sm rd

AA

ss, ltgy, fgd-vfgd, psrtd, prnd



AA w/ sm gy, rd sh

SS, AA

sh, gy, rd

ss, wh, fgd, gsrtd, grnd,
gd IGφ, fri

AA

AA, more argl w/ black
lamin/streaks

sh, gy, rd, w/ vfgd
argl ss

ss, gy, vfgd, wsrtd,
grnd; sm gysh

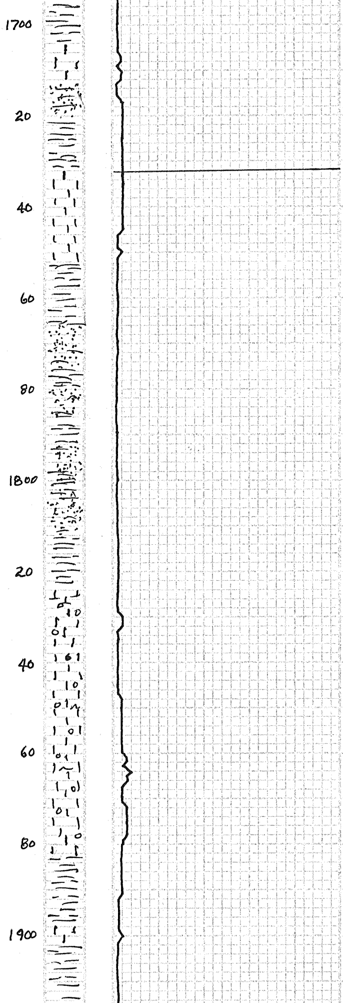
sh, gy, tr rd

ss, gy, vfgd, argl w/
black specs (S&P tex)

sh, gy

Ls, tan, fxln, cky

sh, gy



Ls, wh, foss, ool, cky

SS, vfgd, argl (slough?)
w/ gy, sh

Lansing
1732(-128)
E-Log 1700(-96)

Ls, ltgy, sl foss, cky

Sh, gy, mic, pyr

AA w/ ltgy intbed ss,
vfgd

Sh, gy, mica, sdy

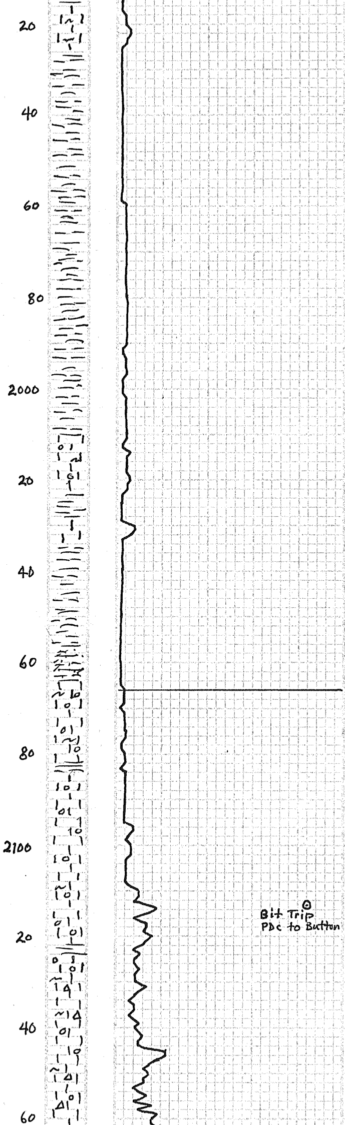
Sh, brn, gy, tr rd

Ls, brn, fxln, ool in
pt, cky

AA

Sh, gy, bl, tr grn

Sh, dkgy, tr rd



Ls, tan, fxln, sl foss, cky

Sh, bl, brn

Sh, ltgy

AA

Ls, tan-ltgy, sl ool, foss, cky

Sh, dk gy

Ls, brn, fxln, cky

Sh, gy, sdy near base

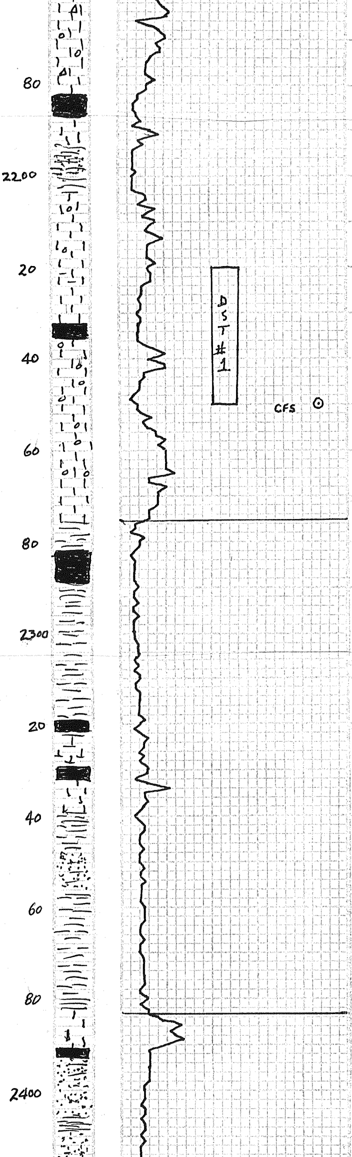
Kansas City
2066 (-462)
E-log 2056 (-452)

Ls, md brn, fxln, ool, foss, cky

Lsgy, ool, cky, sl foss

Ls, tan, fxln, dse, ool in pt

Ls, tan, fxln, sl foss, Δty



Sh, bl

ss/slst, ltgy, mic

Ls, brn, tan, ool, sm fxln,
sl foss

DST #1 2220-2250'
30-60-30-60
Rec: 240' MCW
135' HMCW
FP's 24-138/145-195#
SIP's 673-671#

Ls, dk gy, fxln, sl cky

sh. bl

Ls, tan ool, sl foss, fpptø,
nstngd od, gd fL, NSFO
2250 15" - Ls, ltbn-tan,
ool, sm fxln, NVø, NSFO,
Nstn, NFL

Ls, gy-tan, fxln, sl ool,
cky, NS, NFL

B/KC
2275 (-671)
E-log 2271 (-667)

sh, grn, gy, brn

sh, bl

sh, dk brn-bl, gy

sh, bl

sh, bl
Ls, tan, fxln, cky
sh, ltgy, sl slty/sdy

ss, ltgy-ltgrn, vfgd,
psrtd, prnd, argl

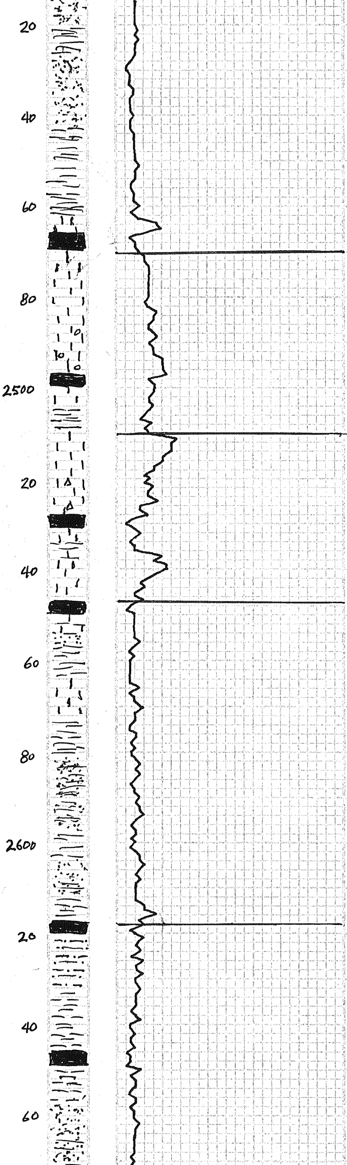
sh, ltgy-ltgrn

Altamont
2383 (-779)
E-log 2379 (-775)

Ls, offwh, fxln, sm
tan, cky
sh, bl

sh, grn-gy w/ ss, ltgy,
vfgd, abd bl specs
psrtd, prnd

sh, gy, bl, lamin



ss, AA

ss AA w/ gy, sm rd, sh

sh, gy, sm rd

Pawnee
2470 (-866)
E-log (-864)

sh, bl

Ls, md-dk brn, fxln, sl cky

Ls, gy-tan, vfxln, frac φ, sl foss, sl cky, sl ool

sh, bl

Ft. Scott
2510 (-906)
E-log 2506 (-902)

sh, gy, sm grn

Ls, tan-buff, sl ool, fxln in pt, sl foss

Ls, tan, fxln, Δty

sh, bl

Ls, md brn, fxln, argl, sl cky, sl odor, NSFO, NStn, sl FL

Excello
2547 (-943)
E-log 2543 (-939)

sh, bl

sh, ltgy-dkgy, calc, w/ ss, md gy, vfgd, argl

Ls, dkgy, fxln, cky

sh, dk gy

sh AA, sm slty/sdy

Oakley
2618 (-1014)
E-log 2614 (-1010)

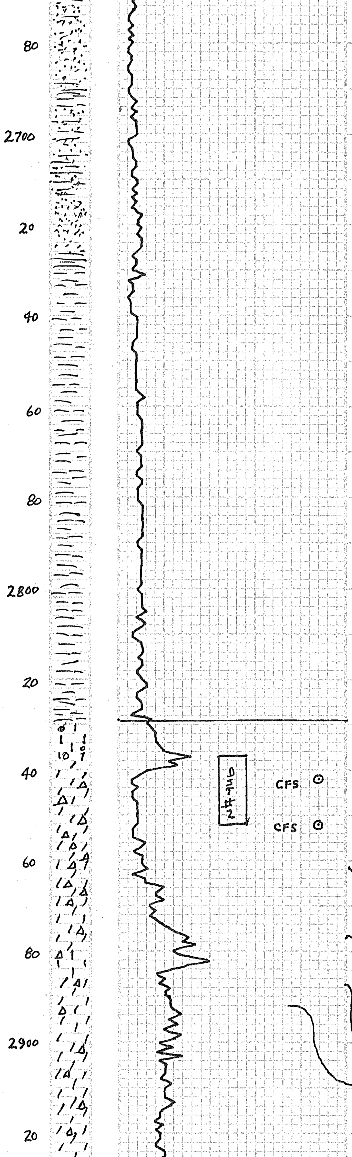
sh, bl

slst/sh, gy

sh, ltgy, Mica

sh, bl

ss, gy, sl mica, vfgd, S&P tex



ss, lt gy, fgd, psrtd, prnd, (s&p tex)

sh, slty, gy, mica

ss, lt gy, psrtd, prnd, f-vfgd

sh, gy, dk gy, sm rd

sh, lt gy-gy

DST#2 2837-2852'
30-60-30-60
Rec: 325' GIP,
40' CO, 155' ONCM,
(8% oil, 32% w),
95' OMCW (1% oil, 89% w)
FP's 29-99/112-140#
SIP's 848-838#

sh, dk gy

AA; much pyr

sh, tan, brn, sm gy

Miss
2829 (-1225)
E-log 2830 (-1226)

Ls, tan, ool, sm cxln, foss, NVφ, Nstn, NSFO, NFL, Nod

2842' 15" – Dol, brn, sucro, fppt φ, FSFO, gd od, gas bubbl, gd FL (<1%)

2852' – Dol, brn, sucro, NVS, NVφ Nstn

Dol tan, sucro, sct spt stn (10%), FSFO on bk, gd od, Δty (gy), FFL in stn pcs (10%)

15" – Dol, brn, sucro, FSFO (10%), fw pcs gvgφ, GSFO, gd sat FL, gd od

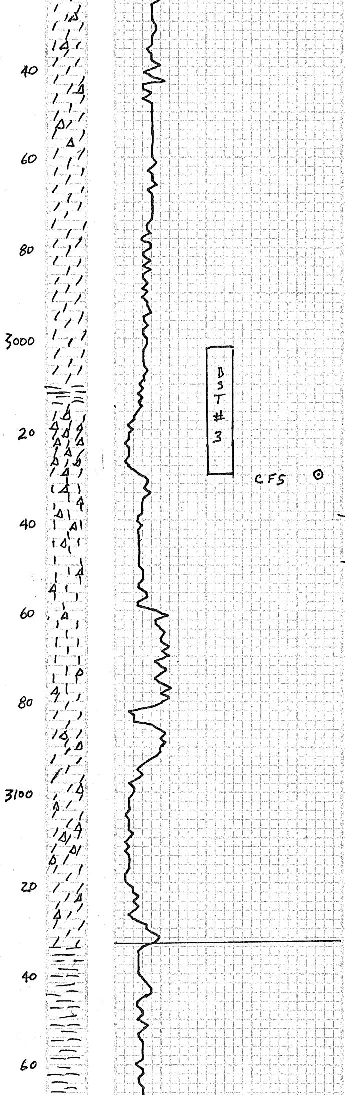
Dol, tan, f sucro, NSFO, Nstn, ft od, Δ (wh, ool) NFL

Dol, dk brn, dse, Δty (gy, mtld), gd od

Ls, tan-gy, cxln, ool in pt, sl foss, sm dd stn, tFL, fod, NSFO

Dol, dk brn, dse, sl od, slΔty, NFL, NSFO, Nstn

AA



AA

Dol, dk brn, dse,

DST #3 3002-3030'
30-60-30-60
Rec: 120' ospkm
(tr oil, 100'm),
85' ospkwcm
(tr oil, 31% w)
FP's 25-68/76-114#
SIP's 921-914#

AA, sm pyr

sh, gy, sm rd

Δ w/ Ls, 80% weath/20% fresh Δ, fvgφ, SSFO, 5 Gas Bubb, gd FL, gd FL (65%), spt stn (75%)

3030' 15" - Δ w/ Ls (offwh, tan), 90% weath, 30% fresh), tr vgφ, tr FO, sl od, tr FL

Δ w/ Ls, gy, brn, mtld, sl FL, tr stn, f od, NFO

Δ, Ls (tan, gy), Δ (gy, bone mtld), fresh, NS, Nstn, NO, NFL

Ls, lt tan, fxln, dse, NS

Dol Ls, tan, gy, dse, fxln, sl cky, Δty

Dol, lt tan, dse, sl cky, Δty

Dol, md brn, sucro, gd IGφ, Δ (wh), NSFO, NO NFL

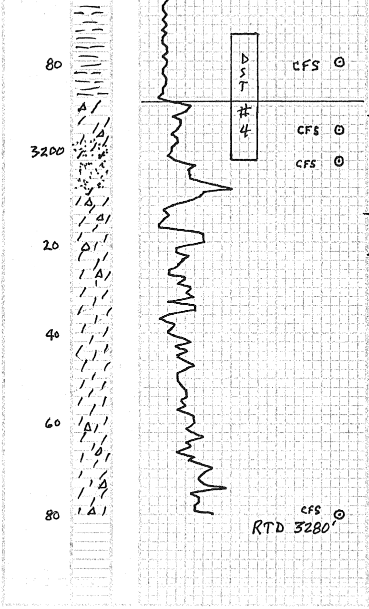
AA

Kinderhook
3133 (-1529)
E-log 3131 (-1527)

Ls, buff, fxln, cky, pyr

Sh, dk brn, bl, gy, pyr, gd od

AA



AA, much pyr

3180' 15" - AA

3195' 15" - Dol, ltgy, sucro,
sm fxln, fracϕ, tr edge
stn (gilsonite), tr FL, gd od
Δty
30" AA

3202' 15" - Dol, ltgy, sdy,
fw pcs fgd wh SS, tr edge
stn (<1%), NSFO, gd od,
Δ (wh, ool),
30" SS, AA (15%), NS

Dol, tan, sucro, gd vgϕ,
NS, sl Δ, NFL, f od

Dol, tan - lt brn, f-md
Xln, fIGϕ, NS, NFL

Dol, tan - ltgy, fxln,
sl cky

Dol, tan, sucro, pIGϕ,
NS, NFL, N od

Dol, tan, sucro - fxln,
sl Δ (ool, wh), NS, N od

3280' 15" - Dol, lt tan, brn,
dse, sucro, NS, NFL,
N od

Arbuckle
3189 (-1585)
E-log 3183 (-1579)

DST#4 3174 - 3202'
30-60-30-60
Rec: 60' M
115' WCM
FP's 25-68/75-102#
SIP's 830-772#

TRILOBITE TESTING, INC

DRILL STEM TEST REPORT

Murfin Drilling Co, Inc.

250 North Water
Suite 300
Wichita, Ks 67202
ATTN: Shauna Gunzelman/Ken

14/29S/8E Elk Ks

Youngmeyer A #1-14

Job Ticket: 63581 **DST#: 1**

Test Start: 2017.07.11 @ 23:23:00

GENERAL INFORMATION:

Formation: **Hertha**
Deviated: No Whipstock: ft (KB)
Time Tool Opened: 01:22:10
Time Test Ended: 06:34:39

Interval: 2220.00 ft (KB) To 2250.00 ft (KB) (TVD)
Total Depth: 2250.00 ft (KB) (TVD)
Hole Diameter: 7.88 inches Hole Condition: Fair

Test Type: Conventional Bottom Hole (Initial)
Tester: Jimmy Ricketts
Unit No: 80

Reference Elevations: 1604.00 ft (KB)
1598.00 ft (CF)
KB to GR/CF: 6.00 ft

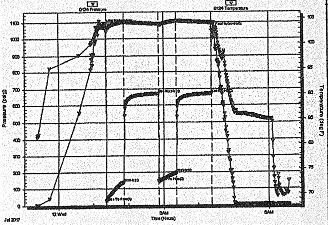
Serial #: 9124 **Inside**
Press@RunDepth: 195.06 psig @ 2221.00 ft (KB)
Start Date: 2017.07.11 End Date: 2017.07.12
Start Time: 23:23:00 End Time: 06:34:39

Capacity: 8000.00 psig
Last Calib.: 1899.12.30
Time On Btm: 2017.07.12 @ 01:16:10
Time Off Btm: 2017.07.12 @ 04:24:50

TEST COMMENT: IF - Weak blow building to strong blow 11 minutes into initial flow period.
FF - Weak blow building to strong blow 16 minutes into final flow period.

Pressure vs. Time

PRESSURE SUMMARY



Time (Min.)	Pressure (psig)	Temp (deg F)	Annotation
0	1075.79	103.26	Initial Hydro-static
6	24.29	102.39	Open To Flow (1)
36	138.14	104.31	Shut-In(1)
96	672.53	103.96	End Shut-In(1)
96	145.34	103.71	Open To Flow (2)
126	195.06	104.46	Shut-In(2)
186	671.37	104.21	End Shut-In(2)
189	1055.44	103.95	Final Hydro-static

Recovery

Length (ft)	Description	Volume (bbl)
240.00	Mud cut water 83% W & 17% M	1.20
135.00	Heavy mud cut water 67% W & 33% M	1.46

Gas Rates

	Choke (inches)	Pressure (psig)	Gas Rate (Mcf/d)

TRILOBITE TESTING, INC

DRILL STEM TEST REPORT

Murfin Drilling Co, Inc.

250 North Water
Suite 300
Wichita, Ks 67202
ATTN: Shauna Gunzelman/Ken

14/29S/8E Elk Ks

Youngmeyer A #1-14

Job Ticket: 63582 **DST#: 2**

Test Start: 2017.07.13 @ 16:40:00

GENERAL INFORMATION:

Formation: **Mississippian**
Deviated: No Whipstock: ft (KB)
Time Tool Opened: 18:49:40
Time Test Ended: 00:42:20

Test Type: Conventional Bottom Hole (Initial)
Tester: Jimmy Ricketts
Unit No: 80

Interval: 2837.00 ft (KB) To 2852.00 ft (KB) (TVD)
Total Depth: 2852.00 ft (KB) (TVD)
Hole Diameter: 7.88 Inches Hole Condition: Fair

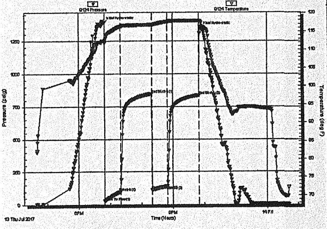
Reference Elevations: 1604.00 ft (KB)
1598.00 ft (CF)
KB to GR/CF: 6.00 ft

Serial #: 9124 **Inside**
Press@RunDepth: 140.42 psig @ 2838.00 ft (KB)
Start Date: 2017.07.13 End Date: 2017.07.14
Start Time: 16:40:00 End Time: 00:42:20

Capacity: 8000.00 psig
Last Calib.: 1899.12.30
Time On Btm: 2017.07.13 @ 18:47:20
Time Off Btm: 2017.07.13 @ 21:53:39

TEST COMMENT: IF - Weak blow building to strong blow 15 minutes into initial flow period.
IS - 3 inch blow back during initial shut-in period.
FF - Weak blow building to strong blow 10 minutes into final flow period.
FS - 9 inch blow back during final shut-in period.

Pressure vs. Time



PRESSURE SUMMARY

Time (Min.)	Pressure (psig)	Temp (deg F)	Annotation
0	1384.97	112.31	Initial Hydro-static
3	28.87	111.87	Open To Flow (1)
33	99.40	116.28	Shut-In(1)
92	848.32	116.75	End Shut-In(1)
93	112.02	116.59	Open To Flow (2)
123	140.42	117.58	Shut-In(2)
183	837.78	117.83	End Shut-In(2)
187	1342.05	117.30	Final Hydro-static

Recovery

Length (ft)	Description	Volume (bbl)
95.00	Oil & mud cut water 1%O 89%W 10%M	0.47
155.00	Gassy oil and cut mud 8%G 8%O 32%W	0.84 M
40.00	Clean oil 100%O	0.43
325.00	Gas in pipe 100%G	3.52

Gas Rates

	Choke (inches)	Pressure (psig)	Gas Rate (Mcf/d)

TRILOBITE TESTING, INC

DRILL STEM TEST REPORT

Murfin Drilling Co, Inc.

250 North Water
Suite 300
Wichita, Ks 67202
ATTN: Shauna Gunzelman/Ken

14/29S/8E Elk Ks

Youngmeyer A #1-14

Job Ticket: 63583 **DST#: 3**

Test Start: 2017.07.14 @ 20:02:00

GENERAL INFORMATION:

Formation: **Lower Mississippian**
Deviated: No Whipstock: ft (KB)
Time Tool Opened: 22:43:50
Time Test Ended: 04:00:30

Interval: 3002.00 ft (KB) To 3030.00 ft (KB) (TVD)
Total Depth: 3030.00 ft (KB) (TVD)
Hole Diameter: 7.88 inches Hole Condition: Fair

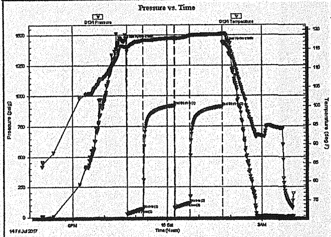
Test Type: Conventional Bottom Hole (Initial)
Tester: Jimmy Ricketts
Unit No: 80

Reference Elevations: 1604.00 ft (KB)
1598.00 ft (CF)
KB to GR/CF: 6.00 ft

Serial #: 9124 **Inside**
Press@RunDepth: 114.34 psig @ 3003.00 ft (KB)
Start Date: 2017.07.14 End Date: 2017.07.15
Start Time: 20:02:00 End Time: 04:00:30

Capacity: 8000.00 psig
Last Calib.: 1899.12.30
Time On Btm: 2017.07.14 @ 22:37:30
Time Off Btm: 2017.07.15 @ 01:48:09

TEST COMMENT: IF - Weak blow building to 6 inches initial flow period.
FF - No blow building to 4 inches final fow period.



PRESSURE SUMMARY

Time (Min.)	Pressure (psig)	Temp (deg F)	Annotation
0	1445.34	115.64	Initial Hydro-static
7	25.17	114.40	Open To Flow (1)
38	67.82	117.32	Shut-In(1)
96	921.21	117.97	End Shut-In(1)
97	75.94	117.75	Open To Flow (2)
126	114.34	118.51	Shut-In(2)
188	914.15	118.92	End Shut-In(2)
191	1425.30	119.05	Final Hydro-static

Recovery

Length (ft)	Description	Volume (bbl)
85.00	Oil specked water cut mud TrO 31%W 69	0.42
120.00	Oil specked mud TrO 100%M	0.59

Gas Rates

	Choke (inches)	Pressure (psig)	Gas Rate (Mcf/d)

TRILOBITE TESTING, INC

DRILL STEM TEST REPORT

Murfin Drilling Co, Inc.

250 North Water
Suite 300
Wichita, Ks 67202
ATTN: Shauna Gunzelman/Ken

14/29S/8E Elk Ks

Youngmeyer A #1-14

Job Ticket: 63584 **DST#: 4**

Test Start: 2017.07.15 @ 22:38:00

GENERAL INFORMATION:

Formation: **Arbuckle**
Deviated: No Whipstock: ft (KB)
Time Tool Opened: 01:36:00
Time Test Ended: 07:16:10

Interval: 3174.00 ft (KB) To 3202.00 ft (KB) (TVD)
Total Depth: 3202.00 ft (KB) (TVD)
Hole Diameter: 7.88 inches Hole Condition: Fair

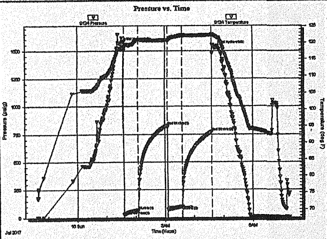
Test Type: Conventional Bottom Hole (Initial)
Tester: Jimmy Ricketts
Unit No: 80

Reference Elevations: 1604.00 ft (KB)
1598.00 ft (CF)
KB to GR/CF: 6.00 ft

Serial #: 9124 **Inside**

Press@RunDepth:	101.51 psig @	3175.00 ft (KB)		Capacity:	8000.00 psig
Start Date:	2017.07.15	End Date:	2017.07.16	Last Calib.:	1899.12.30
Start Time:	22:38:00	End Time:	07:16:10	Time On Btm:	2017.07.16 @ 01:29:30
				Time Off Btm:	2017.07.16 @ 04:42:30

TEST COMMENT: IF - Weak blow building to 6 inches initial flow period.
FF - Weak blow building to 2 inches final flow period.



PRESSURE SUMMARY

Time (Min.)	Pressure (psig)	Temp (deg F)	Annotation
0	1560.19	118.14	Initial Hydro-static
7	25.39	117.69	Open To Flow (1)
37	67.81	120.90	Shut-In(1)
96	830.46	120.78	End Shut-In(1)
97	74.94	120.48	Open To Flow (2)
127	101.51	122.27	Shut-In(2)
187	771.87	122.28	End Shut-In(2)
193	1525.06	121.93	Final Hydro-static

Recovery

Length (ft)	Description	Volume (bbl)
115.00	Water cut mud 8% W & 92% M	0.57
60.00	Drilling mud 100% M	0.30

Gas Rates

	Choke (inches)	Pressure (psig)	Gas Rate (Mcf/d)