



WESLEY D. HANSEN Consulting Petroleum Geologist

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KGS
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Kansas License #418



Scale 1:240 (5"=100') Imperial
Measured Depth Log

Well Name: Murfin Drilling Company, Inc. #4-17 Jones "A"

API: 15-023-21516

Location: 1980' FSL, 1980' FEL of Section 17-1S-37W

License Number: 30606

Region: Cheyenne Co, KS

Spud Date: 9-12-2019

Drilling Completed: 9-21-2019

Surface Coordinates: 1980' FSL, 1980' FEL of Section 17-1S-37W

Bottom Hole Vertical hole

Coordinates:

Ground Elevation (ft): 3225'

K.B. Elevation (ft): 3230'

Logged Interval (ft): 3870' To: RTD

Total Depth (ft): 4770'

Formation: Cherokee at RTD

Type of Drilling Fluid: Chemical - displaced at 3500'

Printed by MUD.LOG from WellSight Systems 1-800-447-1534 www.WellSight.com

OPERATOR

Company: Murfin Drilling Co., Inc.

Address: 250 N. Water

Suite 300

Wichita, KS 67202

GEOLOGIST

Name: Wesley D. Hansen

Company: Wesley D. Hansen - Consulting Petroleum Geologist

Address: 212 N. Market, Suite 257

Wichita, KS 67202

Cellular: 316-772-6188

COMMENTS

Contractor: Murfin Drilling Co., Inc. Rig #3
Pusher: Jay Ruzicka

Surface Casing: 8 5/8" set at 298' w/275 sx
Production Casing: 5 1/2" set at +/- 4770'

Mud by: Morgan Mud - Dave and Cade Lines were the engineers.

DST's by: Trilobite - James Winder was the tester.

Logs by: Pioneer Wireline (DIL, CN-CD, MEL, BHCS) - Ian Mabb was the engineer.

Deviation Surveys: 1 deg. @295'; 1/4 deg. @1650'; 1/2 deg. @2148'; 1/2 deg. @2647'; 1/4 deg. @3403'; 1 1/4 deg. @4264'; 3/4 deg. @4420'; 1 1/2 deg. @4770'

BIT RECORD

Bit #	Size	MFG	Type	Depth Out	Footage Cut	Hours on bit
1	12 1/4"	HTC	B37DX	295'	295'	4
2	7 7/8"	HTC	T506	3403'	3105'	42 1/2
3	7 7/8"	Smith	F12Y	4770'	1367'	73 1/4

FORMATION TOPS AND STRUCTURAL COMPARISON

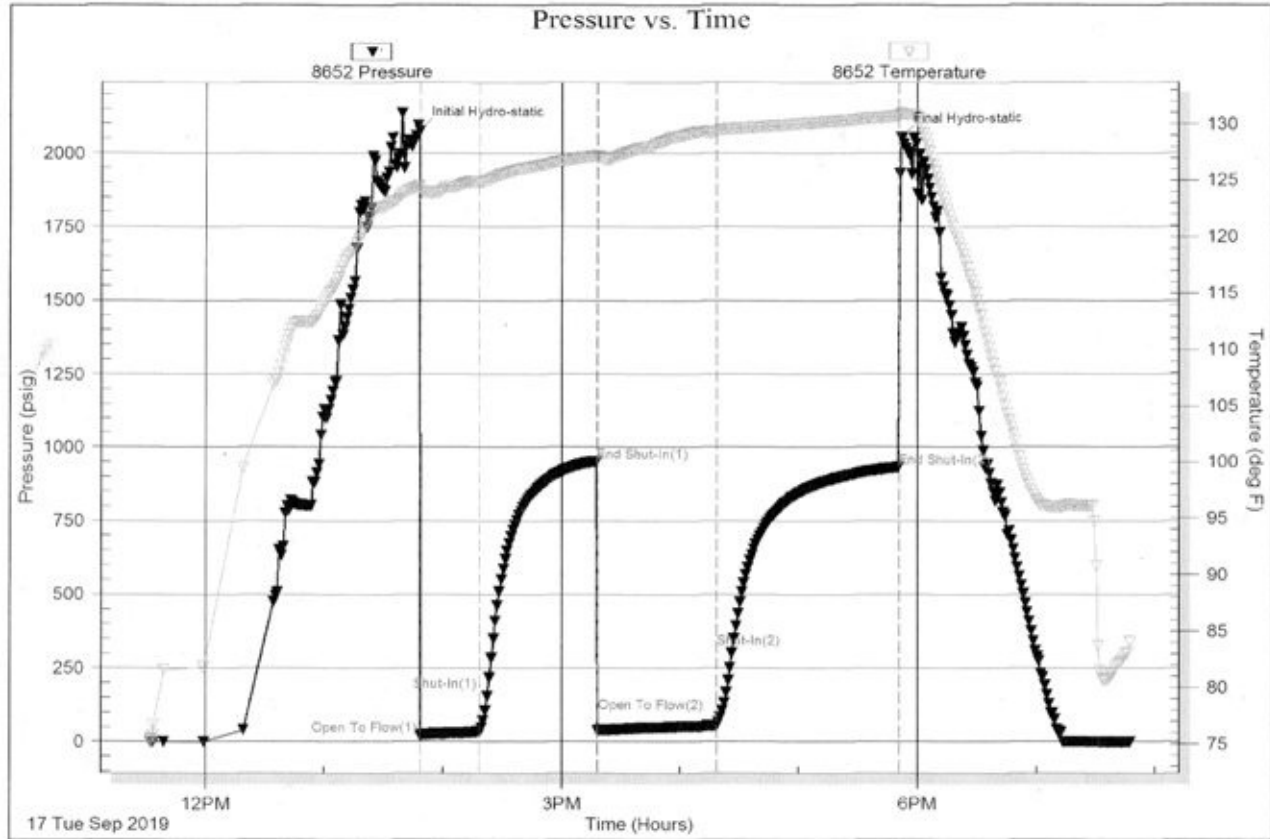
FORMATION	SAMPLE TOPS		LOG TOPS		COMPARISON WELL Berexco Vada #1-17 1980' FSL, 1980' FWL Sec. 17-1S-37W 3216' KB
	Depth	Datum	Depth	Datum	
Anhydrite	3191'	+39	3192'	+38	3175' +41
B/Anhydrite	3222'	+8	3221'	+9	3210' +6
Neva (est.)	3642'	-412	3641'	-411	3628' -412
Red Eagle	not picked		3706'	-476	3694' -478
Foraker	not picked		3758'	-528	3747' -531
Stotler	not picked		3903'	-673	3891' -675
Topeka	3977'	-747	3979'	-749	3965' -749
Oread	4116'	-886	4116'	-886	4104' -888
Lansing	4191'	-961	4193'	-963	4178' -962
Stark Shale	4415'	-1185	4414'	-1184	4400' -1184
Mound City	4471'	-1241	4470'	-1240	4457' -1241
Fort Scott	4587'	-1357	4592'	-1362	4584' -1368
Oakley	4680'	-1450	4678'	-1448	4670' -1454
RTD	4770'	-1540			
LTD			4771'	-1541	

DRILL STEM TESTS

DST No. 1 Lansing "A" and "D"
Interval: 4148'-4264'
Times: 30-60-60-90
Recovery: 70' SOCM (3g, 6o, 91m)
FP: 21-34/37-53 SIP: 952-931
HP: 2075-2053 BHT: 131 deg. F

IFP: 1/2 inch blow built to 1 1/2 inches
ISIP: no return blow
FFP: blow built to 1/4 inch
FSIP: no return blow

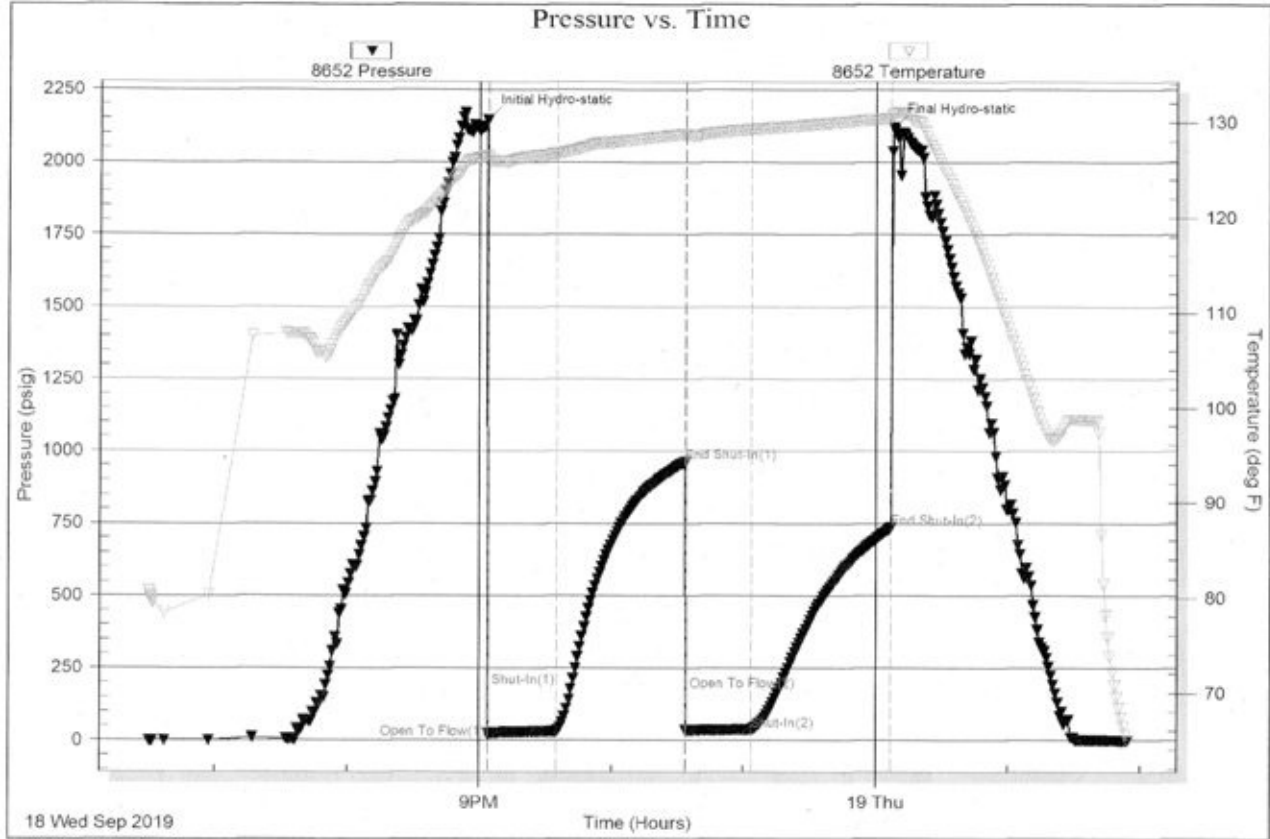
Serial #: 8652 Outside Murfin Drilling Co., Inc. Jones 'A' #4-17 DST Test Number: 1



DRILL STEM TESTS

DST No. 2 Lansing "G" - "H" - "J"
Interval: 4262'-4420'
Times: 30-60-30-60
Recovery: 30' mud w/trace oil
FP: 23-30/34-37 SIP: 962-735
HP: 2147-2118 BHT: 130 deg. F

IFP: weak blow built to 1 1/4 inch
ISIP: no return blow
FFP: no blow
FSIP: no return blow

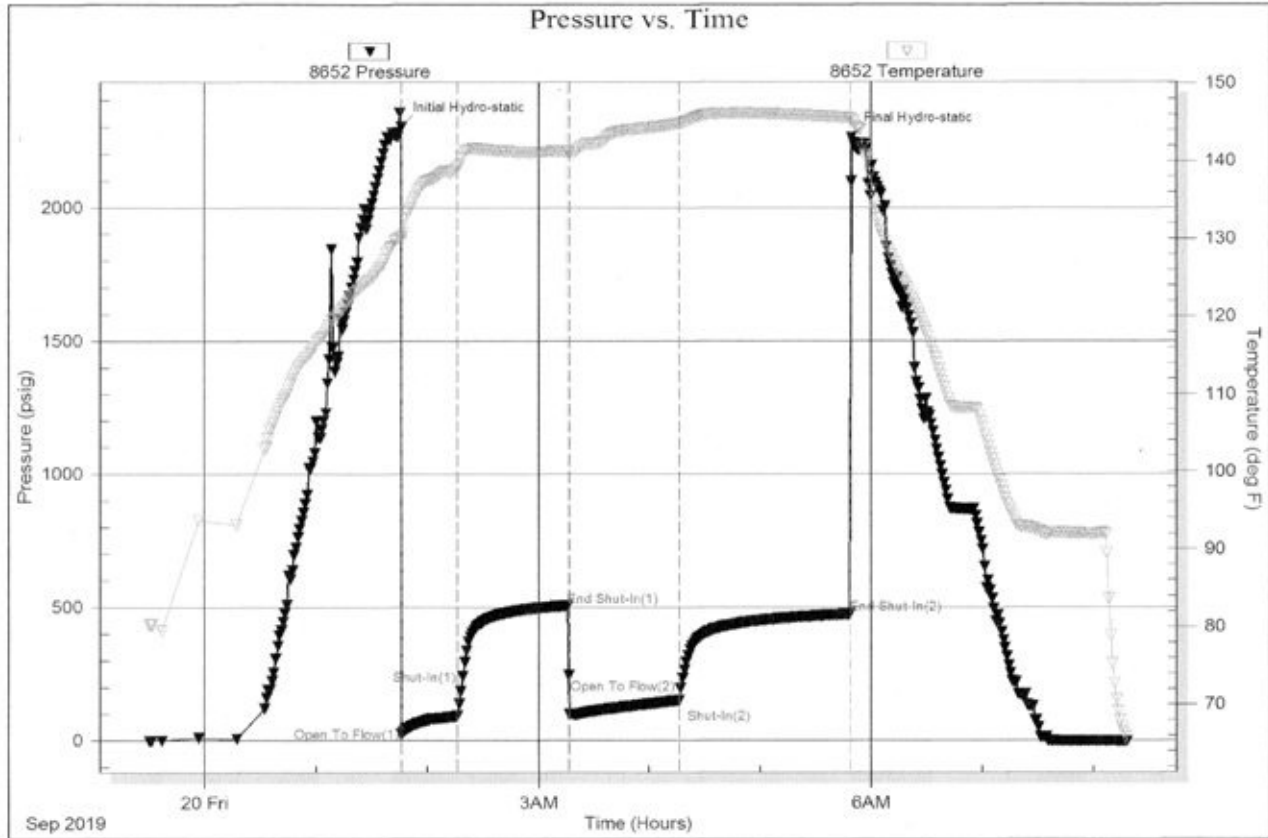


DRILL STEM TESTS

DST No. 3 Fort Scott
 Interval: 4573'-4611'
 Times: 30-60-60-90
 Recovery: 500' GIP, 145' CGO (34g, 66o); 225'
 G&MCO (20g, 24m, 56o)
 FP: 24-92/98-151 SIP: 505-474
 HP: 2302-2263 BHT: 146 deg. F

IFP: blow built to B.O.B. in 14.75 minutes,
 total of 23.25 inches
 ISIP: blow built to 1/4 inch then died back
 FFP: blow built to B.O.B. in 10.25 minutes,
 total of 43.75 inches
 FSIP: blow built to 2 inches, then slowly died
 back

Serial #: 8652 Outside Murfin Drilling Co., Inc. Jones 'A' #4-17 DST Test Number: 3












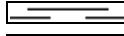




Triobite Testing, Inc




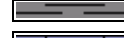


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ROCK TYPES

 Congl
 Igne
 Anhy
 Cht
 Coal
 Congl
 Gyp

 Lmst
 Salt
 Shale
 Shcol
 Siltstone
 red sst
 Sst

 Carb sh
 Dol
 Dtd
 Grayshale
 Sandylms
 Redshale
 Greenshale

 Sltstn
 Shlyslts
 Sndy/siltyshale
 Silty dolo
 Shy dolo
 Shaly ls
 Dolomite

ACCESSORIES

FOSSIL

- Algae
- Amph
- Belm
- Bioclst
- Brach
- Bryozoa
- Cephal
- Coral
- Crin
- Echin
- Fish
- Foram
- Fossil
- Gastro
- Oolite
- Ostra
- Pelec
- Pellet
- Pisolite
- Plant

- Strom
- Fuss
- Oomold

MINERAL

- Anhy
- Arggrn
- Arg
- Bent
- Bit
- Breclrag
- Calc
- Carb
- Chtdk
- Chtl
- Dol
- Feldspar
- Ferrpel
- Ferr
- Glau
- Gyp

- Hvymin
- Kaol
- Marl
- Minxl
- Nodule
- Phos
- Pyr
- Salt
- Sandy
- Silt
- Sil
- Sulphur
- Tuff
- Chlorite
- Dol
- Sand
- Slt

- Bent
- Coal
- Dol
- Gyp
- Ls
- Mrst
- Sltstrg
- Ssstrg
- Carbs
- Clystn
- Dol
- Grysh
- Gryst
- Lms
- Sandylms
- red shale
- green shale
- Sltstn

STRINGER

- Anhy
- Arg

OTHER SYMBOLS

INTERVALS

- Core
- Dst
- Dst

EVENTS

- Rft
- Dst top & bottom

OIL SHOWS

- Even
- Spotted
- Quest.

- Trace
- Dead
- Gas show

Curve Track 1 ROP (min/ft)	Depth	Lithology	Geological Descriptions	Remarks
	<p>3150</p> <p>3200</p>			<p>Report Depth and Activity</p> <p>9-12-2019 MIRT, Spud at 1:30 PM, surface set at 298'</p> <p>9-13 Drlg. @ 450'</p> <p>9-14 Drlg. @ 2240'</p> <p>9-15 Bit trip @ 3403'</p> <p>9-16 Drlg. @ 3865'</p> <p>9-17 Short trip at 4264' for DST #1</p> <p>9-18 Drlg. @ 4345'</p> <p>9-19 Drlg. @ 4445' post DST #2</p> <p>9-20 DST #3 @ 4611'</p> <p>9-21 RTD @ 4770', logging complete, prepare to run 5 1/2" casing</p> <p>Anhydrite 3191' (+39)</p>

Base/Anhydrite
3222' (+8)

Base/Anhydrite 3222' (+8)

3250

Depth Change

ROP (min/ft) 0 10

3800

3850

CONN

CONN

CONN

3900

Sh: red, silty IP, firm to occ soft and mushy; minor tan, offwhite frxn Ls

very pred. Sh: AA, some gray; Ls: some red tinted dense

influx Ls: tan, lt gray gran., NVP, N.S.; decr. shale %

Ls: tan, lt brn, gray gran. NVP; influx gray dense, silty and shaly

Ls: various tan, gray, brn pred. gran. with poor-NVP, with spotty dead black, gilsonitic stain IP; some gray, brn more cryptoxln; Sh: red AA, some more soft mushy

Sh: influx red, incr. soft mushy; decr. Ls %

flood Ls: common tan, offwhite gran. with spotty dead stain AA, occ tarry, nfo, no odor; influx offwhite, tan mic-vfxln dense and white chalky; much decr. Sh %, some lt-med gray

Ls: mix AA with spotty dead stain; Sh: incr. % silty red, lt to med gray; scatt. micac. and pyritic Siltst

Ls: various gran. AA with spotty dead stain; more lt gray, tan mic-vfxln dense, NVP, N.S.; occ chips with subsat. black tarry stain, nfo, no odor; Sh: red, gray

Tripped PDC bit at 3403'
Strap was 1.33' long to board at 3403'

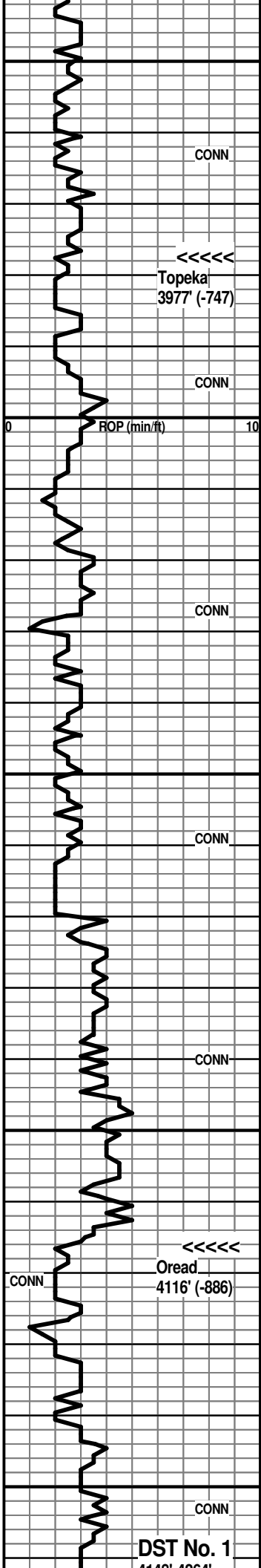
start 1' drilling time

7:00 AM at 3865' on 9-16-2019

start 10' samples

Morgan Mud Check at 3921'
9:35 AM on 9-16-2019

wt	vis	wl	pH	chl
8.9	62	6.8	11.5	600
PV	YP	GelS	lcm	solids
19	21	13/29	3#	4.3%



3950

CONN

TOPEKA 3977' (-747)

CONN

ROP (min/ft)

4000

CONN

4050

CONN

4100

CONN

Oread 4116' (-886)

CONN

4150

CONN

DST No. 1

flood Ls: tan, offwhite fn-vfxln and gran with patchy to subsat. tarry stain, nfo, no odor; much decr. Sh %

Ls: mix AA with shows AA; some new gray, tan cryptoxln, NVP; Sh: incr. % red, some silty, some soft mushy, lt gray

flood Sh: soft mushy red; trace offwhite vfg dolomitic Sst; very minor Ls %

very pred. shale AA; minor tan, gray gran. to cryptoxln

flood Ls: various tan, lt brn, lt gray vf-cryptoxln. some gran., poor-NVP, N.S.; decr. red shale

Ls: various dense AA; some offwhite mic-vfxln dense; Sh: incr. % red, red-brn

Ls: mix tan, lt gray cryptoxln; lesser offwhite, tan mic-vfxln dense; Sh: AA

Ls: flood tan cryptoxln; lesser offwhite mic-vfxln dense, subchalky to chalky; minor shale

Ls: mix AA with some greenish-gray cryptoxln; Sh: influx red, red-brn, some lt gray

Ls: pred. tan, lt gray cryptoxln; some tan, offwhite gran., poor-NVP, N.S.; influx Sst: lt red vfg calcar.; Sh: red

flood Sst: lt red, offwhite, lt gray vfg, N.S.; tight cryptoln Ls's AA

decr. Sst AA; Ls: tan, cryptoxln; tan, lt gray gran. poor-NVP, N.S.; 2-3 chips tan gran. with patchy tarry stain (new??); Sh: incr. red, red-brn

Ls: influx tan, lt gray, lt brn cryptoxln, NVP; 2 chips offwhite gran. with spotty tarry stain (new??)

Ls: influx brn, gray silty/shaly

mix various cryptoxln AA; brn, gray silty/shaly AA; Sh: red, red-brn;

Sh: red, red-brn silty IP; Ls: lt to med brn, gray, tan cryptoxln, mottled yellow/brn gran., NVP; 1-2 chips with patchy, tarry stain AA, (cavings?)

pred. Sh: red, red-brn silty and shaly Siltst; much decr. Ls %

Ls: influx offwhite, tan fnxln, some ppt por. with speckled black dead stain; lesser lt to med brn cryptoxln

flood Ls: lt to med brn, lt gray pred. cryptoxln, NVP, N.S.

Ls: various cryptoxln AA; some offwhite subchalky

Ls: more gray, lt brn cryptoxln, NVP; Sh: sl influx red, red-brn, some gray

Ls: lt gray, tan, lt brn pred. cryptoxln, NVP; Sh: AA

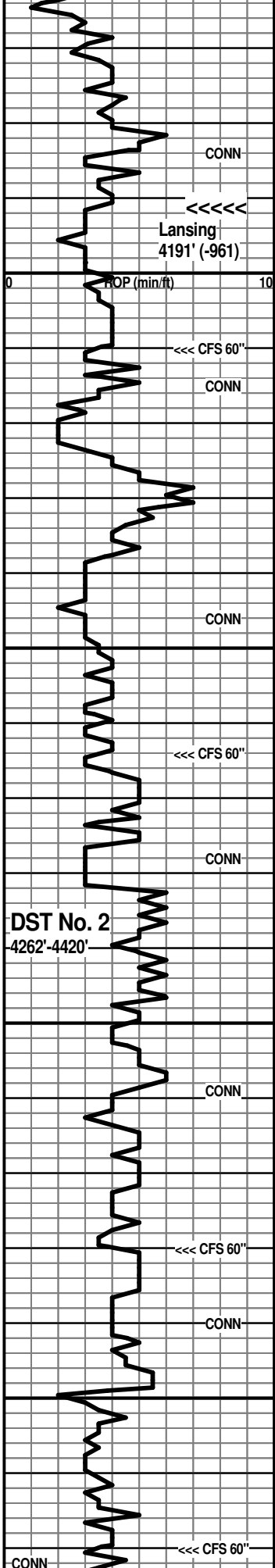
Topeka 3977' (-747)

Oread 4116' (-886)

4148'-4264'

D
S
T

1



Lansing
4191' (-961)

4200

4250

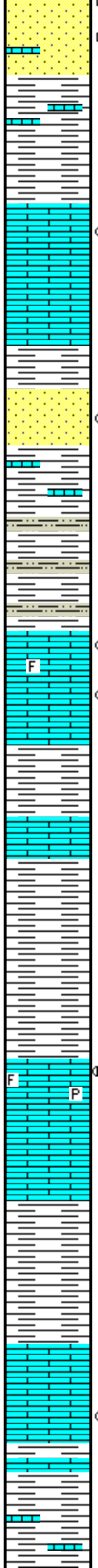
4300

4350

D
S
T

2

DST No. 2
4262'-4420'



Sst: good influx offwhite, lt gray vfg calcar., many clusters with spotty dead stain, nfo, no odor; decr. Ls and shale

Sh: abund. red, red-brn silty IP; decr. Sst AA; still common various cryptoxln Ls's AA

pred. Sh: red, dark red-brn, some mushy red, vc gray

flood Ls: pred. tan, lt gray cryptoxln, NVP; lesser offwhite mic-vfxln dense, N.S.; scatt. tan gran. with some inter-particle and ppt por. with spotty brn stain, vsf sfo; occ tan cryptoxln with stain in fract. and on chip edge

Ls: tan, lt brn cryptoxln, NVP; incr. offwhite mic-vfxln dense, subchalky

Sh: red-brn

Sst: offwhite, lt gray vfg with spotty to sat. black dead stain, nfo, no odor

Sh: red, red-brn, occ lt gray, gray-green; common Ls: tan, lt to med brn cryptoxln

Sh: red-brn, silty IP; with red-brn Siltst, vf sandy and micac.; occ gray, lt green shale

Shale and Siltst AA

Ls: tan, lt gray cryptoxln to gran. with poor inter-particle and vug. por. with brn to black stain;

Ls: offwhite, tan gran., sl foss. with vug. and some fossil moldic por. with patchy brn to black stain, vsf sfo; other tan cryptoxln and offwhite subchalky to chalky with N.S.

Sh: red, red-brn, silty IP; lt to med gray

Ls: influx offwhite mic-vfxln dense

Sh: red, red-brn, some soft and mushy; lt to med gray

Sh: flood red-brn soft, mushy

Ls: offwhite, tan fvxln, foss. IP with poor-fair inter-particle and vug. por. with spotty brn to black stain, sl sfo, no odor, occ finely pyritic; common offwhite mic-vfxln dense subchalky, some with spotty black stain

Ls: influx offwhite subchalky to chalky with more tan, lt gray vf-cryptoxln, NVP, N.S.

Ls: mix tan, lt brn, lt gray cryptoxln, lesser offwhite dense AA; N.S.

Ls: lt gray cryptoxln and lt gray vfxln, dense, shaly; Sh: lt to med gray

Sh: good influx red, red-brn, lt to med gray

Sh: AA; some lt green and soft, mushy red

Ls: mix tan, lt brn cryptoxln to sl gran. and offwhite, tan mic-vfxln dense, NVP, N.S.

Ls: mix AA; rare offwhite vf-cryptoxln with spotty black stain, nfo, no odor; Sh: incr. % lt to med gray, gray-green, red-brn

flood Sh: red, red-brn; lesser med gray; some Ls: pred. tan, lt brn, lt gray cryptoxln, NVP, N.S.

Lansing 4191' (-961)

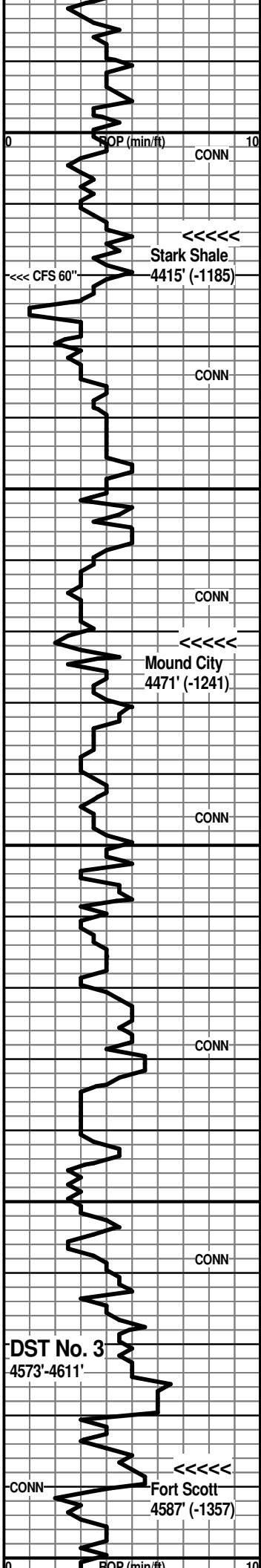
DST No. 1 Lansing "A" and "D"
Interval: 4148'-4264'
Times: 30-60-60-90
IFP: 1/2 inch blow built to 1 1/2 inches
ISIP: no return blow
FFP: blow built to 1/4 inch
FSIP: no return blow
Recovery: 70' SOCM (3g, 6o, 91m)
FP: 21-34/37-53 SIP: 952-931
HP: 2075-2053 BHT: 131 deg. F

7:00 AM at 4264' on 9-17-2019

Morgan Mud Check at 4264'
11:00 AM on 9-17-2019
wt vis wl pH chl
9.0 80 7.2 11.0 1000
PV YP GeIS lcm solids
26 22 13/34 2# 5.0%

7:00 AM at 4345' on 9-18-2019

DST No. 2 Lansing "G" - "H" - "J"
Interval: 4262'-4420'
Times: 30-60-30-60
IFP: weak blow built to 1 1/4 inch
ISIP: no return blow
FFP: no blow
FSIP: no return blow
Recovery: 30' mud w/trace oil
FP: 23-30/34-37 SIP: 962-735
HP: 2147-2118 BHT: 130 deg. F



Sh: very pred. red, red-brn

very shaly AA with sl influx Ls: tan, offwhite fnxn with patchy to sat. brn stain, vsl sfo, no odor, gen. poor visible por.

Ls: flood offwhite, tan mic-vfxln dense, subchalky to chalky IP; lesser tan, lt gray cryptoxln, NVP, N.S.

Sh: med to dark gray, some black; red-brn; Sst: offwhite, lt gray vfg calcar., N.S.

Sh: influx red-brn silty to vfg sandy; other vc gray, green, red

Sh: mix AA

Ls: flood offwhite, lt gray mic-vfxln dense; lesser lt gray, lt brn cryptoxln; Sh: red-brn silty, sandy AA

Ls: lt gray, tan, lt brn cryptoxln; lesser offwhite mic-vfxln dense, subchalky to occ chalky; one chip tan cryptoxln with stain (likely cave)

Sh: red, red-brn, vc gray; silty, vf sandy red-brn; Ls: tan, lt gray cryptoxln and offwhite fn gran. to dense

flood Ls: mix tan, lt brn cryptoxln and offwhite mic-vfxln dense, subchalky to chalky, N.S.

Ls: various dense AA; Sh: influx pred. red-brn, some red-maroon; lt to med gray

flood Ls: lt gray, tan, lt brn cryptoxln; lesser offwhite, lt gray mic-vfxln dense, N.S.

Ls: mix various AA; Sh: red, red-brn, red-maroon, purplish-gray; trace bryozoan foss. fragments

Ls/Sh mix AA

various shales AA; Ls: mix offwhite, lt gray vfxln to dense subchalky

Sh: strong influx red-brn, red-maroon, some silty

Sh: various AA, silty to vf sandy; minor Ls

Sh: very pred. red silty to vf sandy; minor tan, lt gray cryptoxln Ls

Ls: influx tan, lt brn, lt gray sl gran., NVP; other offwhite chalky; decr. Sh % AA

Ls: flood lt gray mic-vfxln dense, silty and shaly

Ls: lt gray silty and shaly AA; other lt gray, brn cryptoxln; Sh: good influx med to dark gray

4600' spl - Sh: vc gray, red-brn, green-gray; Ls: several chips tan fn gran., finely oolitic IP with ppt brn stain, sl sfo, no odor

10' spl - Ls: more tan fn gran., oolitic IP with some inter-particle and inter-oolitic por., with ppt to subsat. stain sl to fair sfo, no odor; flood lt to med gray vf-cryptoxln,

Morgan Mud Check at 4391'
 11:00 AM on 9-18-2019
 wt vis wl pH chl
 9.1 62 7.2 10.5 1300
 PV YP GelS lcm solids
 22 20 10/38 3# 5.7%

Stark Shale 4415' (-1185)

7:00 AM at 4445' on 9-19-2019

Mound City 4471' (-1241)

Morgan Mud Check at 4498'
 10:45 AM on 9-19-2019
 wt vis wl pH chl
 8.9 63 6.8 11.5 1000
 PV YP GelS lcm solids
 23 22 13/42 3# 4.3%

DST No. 3 Fort Scott
 Interval: 4573'-4611'
 Times: 30-60-60-90
 IFP: blow built to B.O.B. in 14.75 minutes, total of 23.25 inches
 ISIP: blow built to 1/4 inch then died back
 FFP: blow built to B.O.B. in 10.25 minutes, total of 43.75 inches
 FSIP: blow built to 2 inches, then slowly died back
 Recovery: 500' GIP, 145' CGO (34g, 66o); 225' G&MCO (20g, 24m, 56o)
 FP: 24-92/98-151 SIP: 505-474
 HP: 2302-2263 BHT: 146 deg. F

Fort Scott 4587' (-1357)

NVP, N.S.; scatt. mottled tan/orange chert

7:00 AM at 4611' on 9-20-2019

Morgan Mud Check at 4611'
10:05 AM on 9-20-2019
wt vis wl pH chl
9.1 75 6.4 10.5 1000
PV YP GelS lcm solids
25 24 12/38 2# 5.7%

Sh: lt to med gray, lesser red-brn, red-maroon; Ls: sl influx offwhite, tan, lt brn gran., poor-NVP, N.S.

flood Ls: offwhite, lt gray mic-vfxln dense, NVP, N.S.

Ls: offwhite, lt gray mic-vfxln dense AA; with lt gray, tan cryptoxln

Ls: mix AA; trace lt brn opq chert; Sh: sl influx dark gray to black

Ls: various tan, gray, brn gran. and cryptoxln, poor-NVP, N.S.; Sh: fairly minor red-brn, med gray

Ls: mix AA with new offwhite, tan mic-vfxln dense, subchalky to occ chalky

Ls: various cryptoxln, gran. and dense AA; Sh: sl incr. dark gray

Oakley 4680' (-1450)

Sst: tan, lt gray vfg well cemented, quartzitic IP, silica to dolomitic cement; some offwhite, lt gray vfg, calcar.; Ls: tan, offwhite sl gran. to cryptoxln

Ls: lt gray, tan, lt brn gran. IP, pred. cryptoxln; lesser offwhite subchalky; Sh: sl influx mushy red

Ls: mix lt to med brn, lt gray cryptoxln

Ls: various AA; Sh: sl incr. red-brn, med to dark gray, some black, dark red-maroon

Sh: red-brn, red-maroon, lt to med gray, lt maroon; Ls: influx offwhite subchalky to chalky

Ls: gray, gray-brn cryptoxln, NVP; offwhite, lt gray mic-vfxln dense, some chalky; Sh: mix AA; Sst: occ offwhite vfg calcar.

Sh: good influx dark red-brn, dark red-maroon, lt to med gray; decr. Ls %; Sst: scatt. offwhite, lt gray fg calcar., N.S.

Sst: tan, offwhite, lt gray quartzitic, hard, NVP;

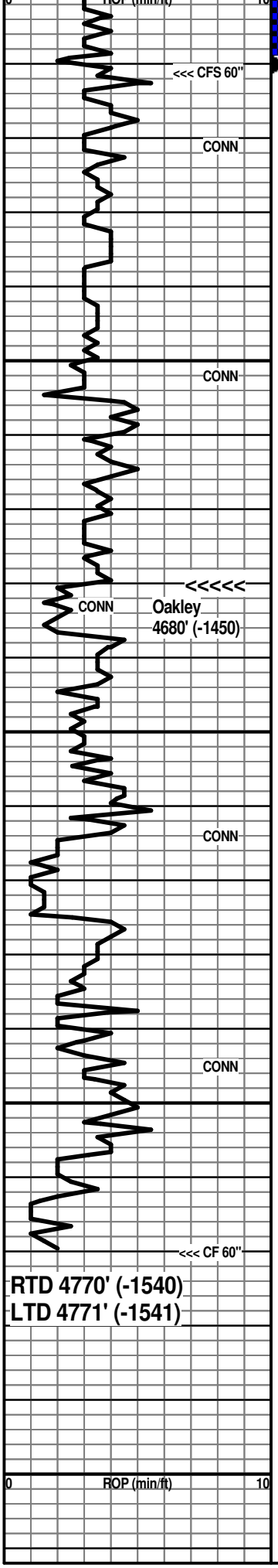
Sst: flood dark red-brn, brn vfg shaly to sandy shale; with vc shales AA

Because of the positive results of DST No. 3, 5 1/2" casing was set for completion.

RTD reached at 8:50 CDT - CFS 60" - CTCH total of 90" - Survey - TOFL

Respectfully submitted,

Wesley D. Hansen
Petroleum Geologist
Kansas License No. 418



4650

4700

4750

4800

RTD 4770' (-1540)
LTD 4771' (-1541)