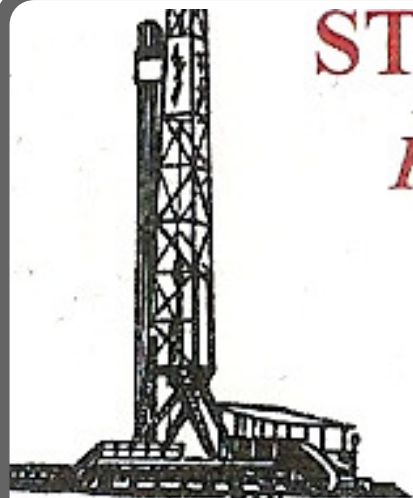


STEVEN P. MURPHY, P.G.

Petroleum Geologist (KS #228)



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Fax 785.387.2400

RR#1, Box 69

Otis, Kansas 67565

geomurphy@gbta.net

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

Well Name: Knopp #4

Location: Logan County

License Number: API # 15-109-21084-00-00

Spud Date: 5/7/12

Surface Coordinates: 335 FNL & 335 FWL (SE NW NW)
Section 13-T14S-R32W

Bottom Hole Coordinates: Vertical well w/minimal deviation

Ground Elevation (ft): 2816'

K.B. Elevation (ft): 2821'

Logged Interval (ft): 3500'

To: TD

Total Depth (ft): RTD - 4570' LTD - 4572'

Formation: Topeka through Mississippian

Type of Drilling Fluid: Chemical (Mudco, Inc)

Region: Kansas
Drilling Completed: 5/16/12

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

OPERATOR

Company: Pioneer Resources

Address: 80 Windmill Drive
Phillipsburg, KS 67661-9622

GEOLOGIST

Name: Steven P. Murphy, PG (Ks License #339)

Company: Consulting Petroleum Geologist

Address: 3365 CR 390
Otis, KS 67565

LogTops (Datum)

The open-hole logging was performed by Jeff Luebbers with Superior Well Services (Hays, KS shop). Logs included Compensated Neutron/Compensated Density, Dual Induction & Microlog.

Formation tops and datums from the open-hole logs include the following:

Anhydrite Top - 2270 (+551)
Anhydrite Base - 2295 (+525)
Topeka - 3576 (-755)
Heebner - 3804 (-983)
Toronto - 3820 (-999)
Lansing - 3839 (-1018)
Muncie Creek Sh - 3998 (-1177)
Stark Sh - 4086 (-1265)
Hushpuckney Sh - 4117 (-1296)
Base KC - 4166 (-1345)
Pawnee 4294 (-1473)
Myrick Station - 4333 (-1512)
Ft. Scott - 4350 (-1529)
Cherokee Sh - 4378 (-1557)
Johnson Zone - 4418 (-1597)
Morrow Sh - 4449 (-1628)
Basal Penn Sandstone - 4468 (-1647)
Mississippian - 4496 (-1675)

DRILL STEM TESTS #1-4

The following drillstem tests were performed by Will MacLean w/Trilobite Testing (Scott City, KS shop):

DST #1 3908-3940 (LKC "E-F")

30:30:30:45

IF: Wk blow built to 2-1/4", no return

FF: Wk blow built to 1-1/4", no return

Recovery: 53' GIP, 10' GMCO (3%G, 85%O, 12%M), 15' WCM (2%W, 98%M),

61' GWCM (2%G, 18%W, 80%M),

61' GOWCM (4%G, 4%O, 18%W, 74%M)

IHP: 1942 FHP: 1805

IFP: 25-76 ISIP: 1131

FFP: 80-97 FSIP: 1123

BHT - 111 F

Oil Gravity - 35

Water Chlorides - 36,000 ppm

DST #2 4020-4052 (LKC "H & I")

30:30:30:30

IF: 1/4" blow fell to surface blow, no return

FF: No blow, no return

Recovery: 5' OCM (1% O, 99% M)

IHP: 2010 FHP: 1868

IFP: 21-25 ISIP: 38

FFP: 25-25 FSIP: 31

BHT - 107 F

DST #3 4084-4110 (LKC "K")

30:30:30:30

IF: Wk blow built to 1", no return

FF: Wk surf blow, no return

Recovery: 63' GIP, 1' Oil, 61' OGCM (2% G, 2% O, 95% M), 61' WGM (3% G, 1% W, 96% M)

IHP: 2031 FHP: 1855

IFP: 24-52 ISIP: 1132

FFP: 56-79 FSIP: 1109

BHT - 107 F

DST #4 4252-4312 (Altamont-Pawnee)

45:45:45:60

IF: BOB in 17-1/2 min, no return

FF: BOB in 35-1/2 min, no return

Recovery: 453' MCW

IHP: 2157 FHP: 1926

IFP: 31-149 ISIP: 1140

FFP: 154-228 FSIP: 1142

BHT - 114 F

Chlorides - 24,000 ppm

DRILL STEM TESTS #5-8

DST #5 4320-4346 (MYRICK STATION)

30:30:30:30

IF: Wk surface blow, no return

FF: No blow, no return

Recovery: 5' OCM (2% O, 98% M)

IHP: 2200 FHP: 2021

IFP: 24-27 ISIP: 51

FFP: 26-8 FSIP: 39

BHT - 108 F

DST #6 4346-4376 (FT SCOTT)

15:15:15:15

Wk surface blow died in 4 min, no return

No blow, flushed, died, no return

Recovery: 2' Mud w/oil spots

IHP: 2150 FHP: 2082

IFP: 22-23 ISIP: 27

FFP: 23-23 FSIP: 26

BHT - 108 F

DST #7 4438-4406 (Cherokee Lime)

30:30:30:30

IF: Wk blow built to 3/4", no return

FF: No blow, no return

Recovery: 8' Mud w/oil spots

IHP: 2177 FHP: 2065

IFP: 26-32 ISIP: 780

FFP: 36-40 FSIP: 308

BHT - 112 F

DST #8 4402-4440 (Johnson Zone)

30:30:30:30

IF: Wk surface blow died in 24 min, no return

FF: No blow, no return

Recovery: 5' Mud

IHP: 2213 FHP: 016

IFP: 28-31 ISIP: 108

FFP: 30-32 FSIP: 64

BHT - 107 F

DRILL STEM TEST #9

DST #9 4442-4500 (Morrow Sst)

30:45:30:60

IF: BOB in 4 min, return BOB in 7 min

FF: BOB in 4 min, return BOB in 5 min

Recovery: 2,669' GIP, 252' MCO (10% M, 30% G, 60 %O),

189' Gsy Oil (30% G, 70% O), 252' Muddy Oil (90% O, 10% M), 189' Muddy Gsy Oil (10% M, 40% O, 50% G), 262' Oil (Gravity - 31)

IHP: 2209 FHP: 2136

IFP: 223-283 ISIP: 981

FFP: 287-393 FSIP: 918

BHT - 124 F

COMMENTS


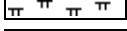

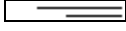
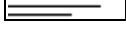


Based on the results of DSTs #1, #3, and #9, as well as sample & log analysis, it was recommended that casing be run to produce the Morrow Sandstone. Also, although not included in DST #8, the very lowest section of the Johnson Zone looks possibly productive. Before the well is abandoned, it is recommended that the lower lobe of the Johnson Zone, and the LKC "E, F & K" zones be evaluated through perforations. The following are the recommended perforation intervals:

Lower Johnson Zone: 4446-4448
 Morrow Sst: 4472-4487
 LKC "K" Zone: 4100-4104
 LKC "E" Zone: 3922-3925

Respectfully submitted,

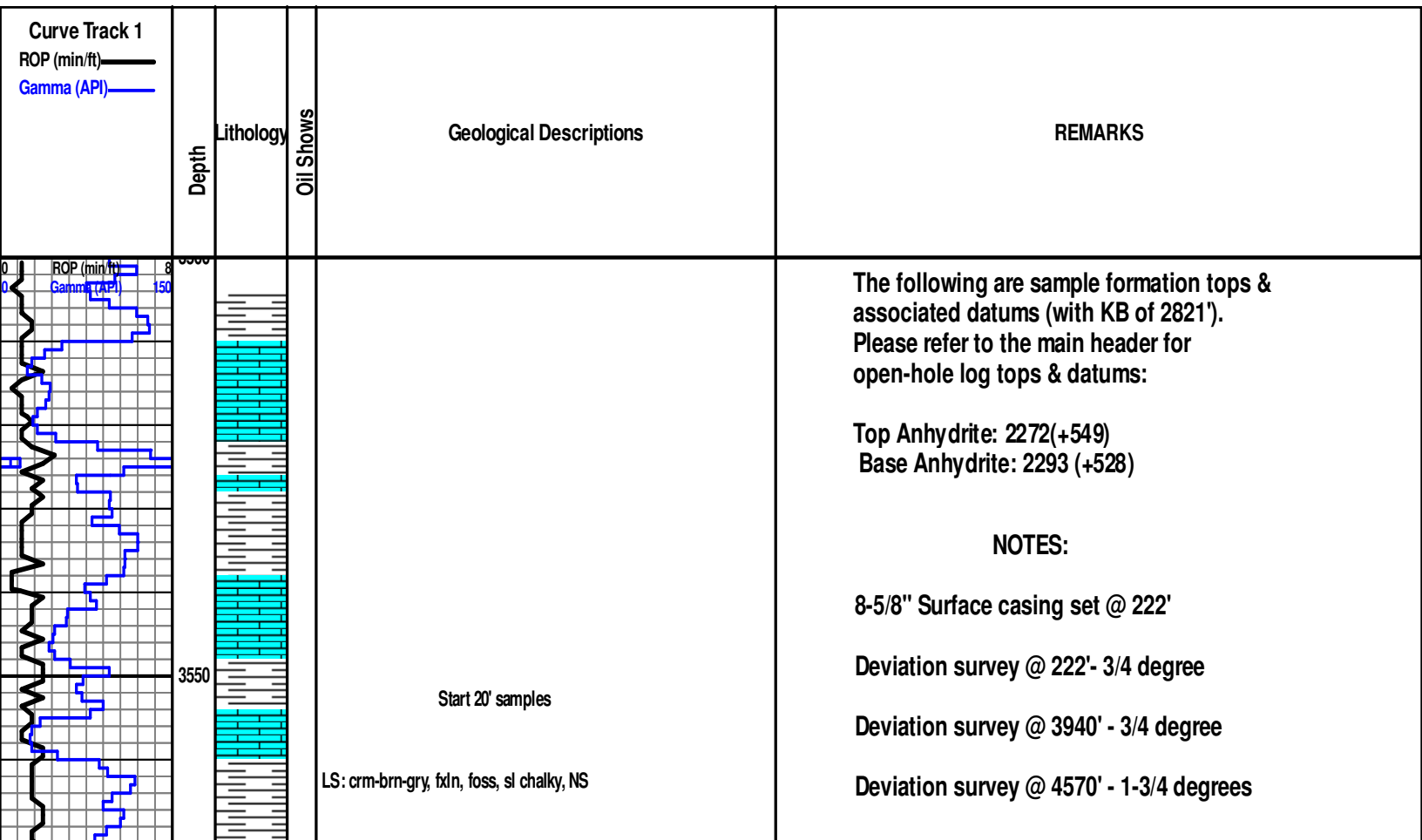
Steven P. Murphy, PG (KS License #228)
 Consulting Petroleum Geologist

ROCK TYPES

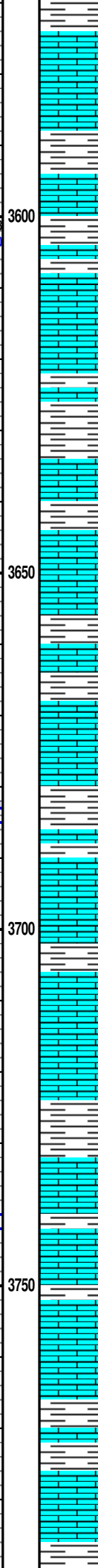
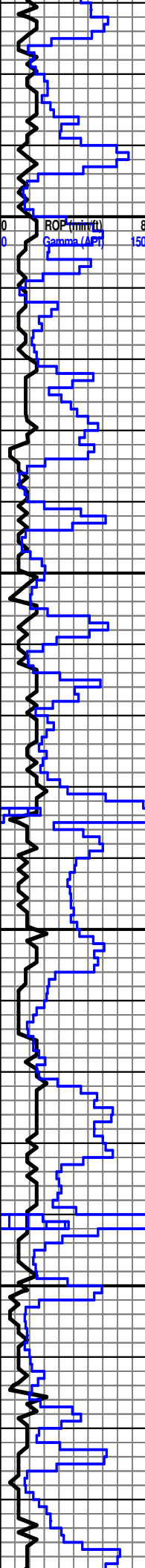
 Anhy  Bent  Brec  Cht  Clyst	 Coal  Congl  Dol  Gyp  Igne	 Lmst  Meta  Mrlst  Salt  Shale	 Shcol  Shgy  Slst  Ss  Till
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OTHER SYMBOLS

OIL SHOW  Even  Spotted  Ques	 Dead  Gas	INTERVAL  Core  Dst	EVENT  Conn  Rft  Sidewall
--	--	--	---



TOPEKA 3576 (-755)



LS: tan-gry, vfxln, sl foss, dense, NS

LS: crm-gry, vfxln, sl foss, chalky, dense, NS

LS: as above

LS: crm-tan-gry, fxl n, foss, fr inxln por, chalky, NS

LS: tan-gry, fxl n, foss, fr inxln por, sl chalky, sl mottled, NS

LS: crm-tan, fxl n, foss, fr-gd inxln por, sl chalky, NS

LS: as above

SH: blk, carb

LS: crm-gry, fxl n, foss, dense, mottled, NS

SH: gry-grn-red, silty

LS: crm-gry, vfxln, sl foss, dense, sl chalky, NS

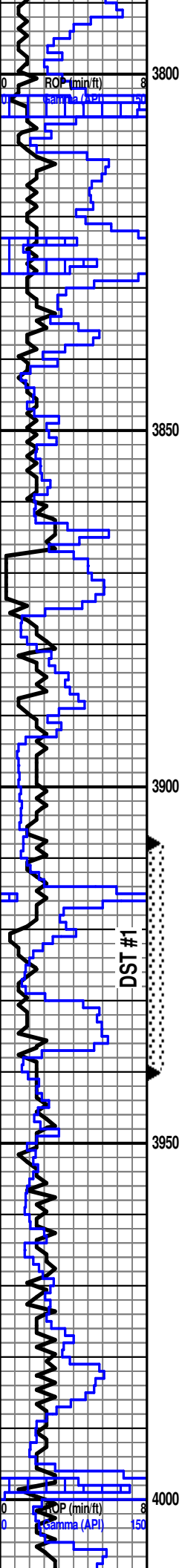
LS: crm-gry, fxl n, foss, sl chalky, fr inxln por, NS

SH: blk-gry

Start 10' samples

LS: crm-tan, vfxln, sl foss, dense, NS

LS: as above



LS: crm-gry, vfxln, dense, NS

HEEBNER 3802 (-981)

SH: blk, carb

SH: gry-grn-red

SH: as above

TORONTO 3819 (-998)

LS: crm-tan, fxlN, sl foss, dense, chalky, NS

SH: gry-grn

LANSING 3836 (-1015)

LS: wht-tan, vfxln, dense, chalky, NS

LS: crm-tan-gry, vfxln, oolitic in pt, dense, NS

SH: gry-grn

LS: wht-crm, fxlN, oolic in pt, chalky, dense, NS

LS: as above

SH: gry-grn-blk

LS: crm, vfxln, dense, sl chalky, NS

SH: grn-gry

LS: crm-gry, vfxln, dense, chalky, NS

● LS: crm-tan, fxlN, fr ppt por, ssfo (gsy on brk), even brn stn, str odor

● LS: wht-tan, fxlN, oolic, fr-gd ppt & vug por, fsfo (gsy on brk), even brn stn, str odor

LS: crm-tan, vfxln, dense, chalky, NS

LS: crm-tan, vfxln, sl oolic, dense, chalky, NS

LS: as above

LS: crm-tan-gry, vfxln, sl oolic, dense, chalky, NS

LS: as above

MUNCIE CREEK 3998 (-1177)

SH: blk, carb-gry-brn

LS: tan-brn, vfxln, mottled, dense, NS

SH: gry-grn

DST #1 3908-3940 (LKC "E-F")

30:30:45

IF: Wk blow built to 2-1/4", no return

FF: Wk blow built to 1-1/4", no return

Recovery: 53' GIP, 10' GMCO (3%G, 85%O, 12%M), 15' WCM (2%W, 98%M), 61' GWCM (2%G, 18%W, 80%M), 61' GOWCM (4%G, 4%O, 18%W, 74%M)

IHP: 1942 FHP: 1805

IFP: 25-76 ISIP: 1131

FFP: 80-97 FSIP: 1123

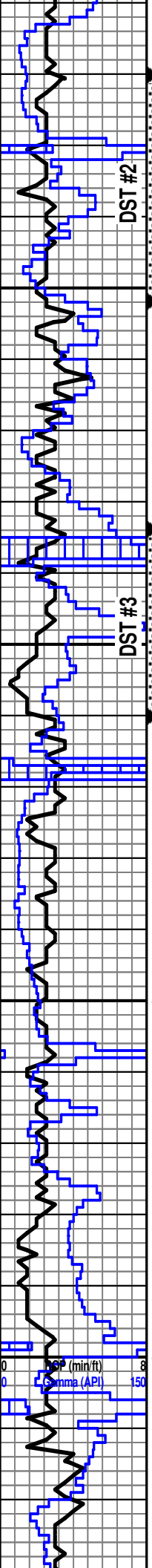
BHT - 111 F

Oil Gravity - 35

Water Chlorides - 36,000 ppm

Strap @ 3940' - 0.05' short to board

Survey @ 3940' - 3/4 degree



SH: gry-grn

LS: wht-tan-gry, vfxln, dense, sl chalky, NS

LS: wht-tan, fxlN, sl foss, mostly dense, rare ft inxln por, sssfo on brk, spotty brn stn, fr odor

SH: gry-blk-grn-mar

SH: as above

LS: crm-tan, fxlN, oolic, fr-gd vug por, fsfb, even sat stn, str odor

SH: grn-blk-gry-brn-red

LS: wht-tan-gry, vfxln, dense, sl chalky, NS

SH: gry-grn-brn

LS: wht-crm, fxlN, oolic in pt, pr-fr ppt por (mostly dense), vssfo, spotty stn, fr odor

LS: crm-gry, vfxln, dense, chalky, NS

LS: tan-gry, vfxln, dense, NS

SH: blk, carb

LS: crm-gry, vfxln, dense, NS

SH: gry-grn-brn

LS: crm-tan, fxlN, oolic, fr vug por, fsfb, even sat stn, fr odor

LS: crm-brn-gry, vfxln, sl chalky, dense, nsfb, minor edge stn, sl odor

SH: blk, carb

SH: gry-grn-mar

LS: crm-tan-gry, vfxln, dense, sl chalky, NS

LS: as above

SH: gry-blk-grn-mar

LS: crm-brn, vfxln, dense, chalky, NS

LS & SH: as above

SH: gry-blk-grn-mar

LS: crm-tan-gry, vfxln, dense, NS

SH: gry-grn-blk-mar

LS: crm-tan, vfxln, sl foss, oolitic in pt, dense, NS

LS: as above

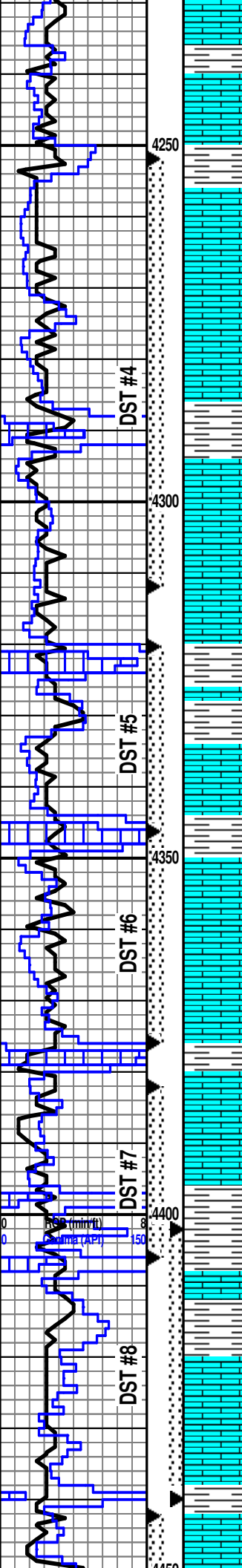
DST #2 4020-4052 (LKC "H & I")
 30:30:30:30
 IF: 1/4" blow fell to surface blow, no return
 FF: No blow, no return
 Recovery: 5' OCM (1% O, 99% M)
 IHP: 2010 FHP: 1868
 IFP: 21-25 ISIP: 38
 FFP: 25-25 FSIP: 31
 BHT - 107 F

STARK 4087 (-1266)

DST #3 4084-4110 (LKC "K")
 30:30:30:30
 IF: Wk blow built to 1", no return
 FF: Wk surf blow, no return
 Recovery: 63' GIP, 1' Oil, 61' OGCM (2% G, 2% O, 95% M), 61' WGM (3% G, 1% W, 96% M)
 IHP: 2031 FHP: 1855
 IFP: 24-52 ISIP: 1132
 FFP: 56-79 FSIP: 1109
 BHT - 107 F

HUSHPUCKNEY 4124 (-1303)

BKC 4159 (-1338)



SH: mar-grn-gry-red

LS: crm-tan-gry, vfxln, oolitic in pt, dense, NS

SH: blk-gry-grn-red

LS: crm-tan, f-vfxln, oolitic in pt, nsfo, rare spotty live stn, no odor

LS: crm-tan, fxl, oolitic-oolic, vssfo, spotty live stn, fr odor

LS: crm-tan-gry, vfxln, oolitic in pt,

LS: as above

SH: blk, carb

LS & CHT: crm-tan, fxl, sl chalky, sucrosic & oolic, gd inxln & vug por, gsfo, even sat stn, str odor (chert lite blue, vitreous, sharp)

LS & CHT: as above

LS: tan-brn-gry, vfxln, dense, chalky, nsfo, minor spotty stn, v sl odor

SH: blk, carb

LS: crm-tan-gry, fxl, oolitic, fr-gd ppt & vug por, fsfo, even sat stn, str odor

LS: as above

LS: tan-brn, vfxln, oolitic, dense, NS

SH: blk, carb

LS: tan-gry, fxl, foss, oolic in pt, fr ppt & vug por, much dense, fsfo, spotty stn, gd odor

LS: as above w/ssfo, spotty stn, sl odor

SH: blk, carb

LS: crm-tan-gry, f-vfxln, oolic-oolitic, sl chalky, fr-gd ppt/vug por, gsfo, even stn, str odor

LS: as above

SH: blk-gry-grn

LS: tan-brn, vfxln, dense, NS

LS: crm-tan, fxl, sl foss, mostly dense, ssfo, fr inxln por, spotty stn, fr odor

LS: crm-tan-brn, fxl, oolic in pt, fr-gd ppt & vug por, fsfo, even stn, str odor

SH: grn-gry-yel-red

LS: tan-brn, fxl, fr ppt por, minor vug por, ssfo, spotty stn, gd odor

DST #4 4252-4312 (Altamont-Pawnee)
 45:45:45:60
 IF: BOB in 17-1/2 min, no return
 FF: BOB in 35-1/2 min, no return
 Recovery: 453' MCW
 IHP: 2157 FHP: 1926
 IFP: 31-149 ISIP: 1140
 FFP: 154-228 FSIP: 1142
 BHT - 114 F
 Chlorides - 24,000 ppm

PAWNEE 4294 (-1473)

DST #5 4320-4346 (MYRICK STATION)
 30:30:30:30
 IF: Wk surface blow, no return
 FF: No blow, no return
 Recovery: 5' OCM (2% O, 98% M)
 IHP: 2200 FHP: 2021
 IFP: 24-27 ISIP: 51
 FFP: 26-8 FSIP: 39
 BHT - 108 F

MYRICK STATION 4331 (-1510)

FT SCOTT 4350 (-1529)

DST #6 4346-4376 (FT SCOTT)
 15:15:15:15
 Wk surface blow died in 4 min, no return
 No blow, flushed, died, no return
 Recovery: 2' Mud w/oil spots
 IHP: 2150 FHP: 2082
 IFP: 22-23 ISIP: 27
 FFP: 23-23 FSIP: 26
 BHT - 108 F

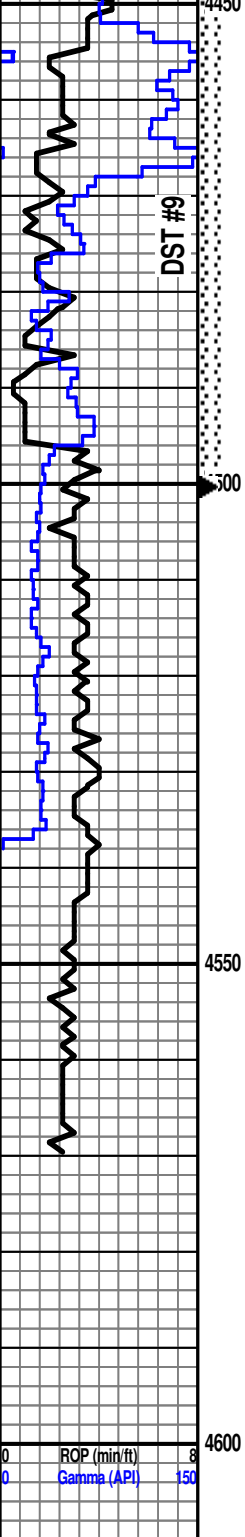
CHEROKEE 4377 (-1556)

DST #7 4438-4406 (Cherokee Lime)
 30:30:30:30
 IF: Wk blow built to 3/4", no return
 FF: No blow, no return
 Recovery: 8' Mud w/oil spots
 IHP: 2177 FHP: 2065
 IFP: 26-32 ISIP: 780
 FFP: 36-40 FSIP: 308
 BHT - 112 F

JOHNSON 4415 (-1594)

DST #8 4402-4440 (Johnson Zone)
 30:30:30:30
 IF: Wk surface blow died in 24 min, no return
 FF: No blow, no return
 Recovery: 5' Mud
 IHP: 2213 FHP: 016
 IFP: 28-31 ISIP: 108
 FFP: 30-32 FSIP: 64
 BHT - 107 F

MORROW SH
 4451 (-1620)



4450

SH: gry-grn-olive-brn-red-blk w/interbedded sst

SH: as above

- SST: clr-tan, f-mgr, prly std, sub-rd, friable to firm clusters, gsfo (gsy), even sat stn, str odor
- Interbedded shales & sst: as above, w/gsf, stn & odor
- Interbedded shales & sst: as above, w/gsf, stn & odor
- SST: clr-tan, f-mgr, prly std, sub-rd, friable to firm clusters, gsfo (gsy), even sat stn, str odor

500

LS: wht-tan, vfxln, oolitic & sandy, dense, sl chalky, NS

LS: as above

LS: as above

LS: tan-gry, vfxln, sandy & oolitic in pt, dense, NS

LS: crm-gry, vfxln, oolitic, dense, NS

LS: as above w/minor cht

LS: as above

RTD - 4570'

LTD - 4572'

4550

4600

ROP (min/ft) 8

Gamma (API) 150

4451 (-1630)

DST #9 4442-4500 (Morrow Sst)
 30:45:30:60
 IF: BOB in 4 min, return BOB in 7 min
 FF: BOB in 4 min, return BOB in 5 min
MORROW SST 4466 (-1645)
 Recovery: 252' MCO (10% M, 30% G, 60 %O),
 189' Gsy Oil (30% G, 70% O), 252' Muddy Oil
 (90% O, 10% M), 189' Muddy Gsy Oil
 (10% M, 40% O, 50% G), 262' Oil (Grav - 31),
 2.669' GIP
 IHP: 2209 FHP: 2136
 IFP: 223-283 ISIP: 981
 FFP: 287-393 FSIP: 918
 BHT - 124 F

MISSISSIPPIAN 4496 (-1675)

5-1/2" Production casing set @ 4568',
 cemented by Swift w/175 sacks of DA-2. A
 DV tool was set @ 2247' w/270 sacks of
 FMD