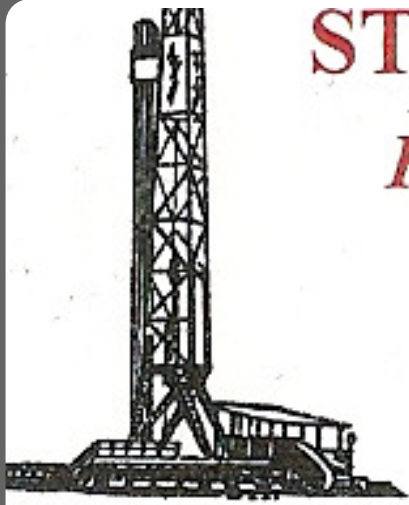


# STEVEN P. MURPHY, P.G.

*Petroleum Geologist (KS #228)*



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RR#1, Box 69

Otis, Kansas 67565

geomurphy@gbta.net

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

Well Name: Railroad #4

Location: Gove County

License Number: API # 15-109-22119-00-00

Spud Date: 8/10/13

Surface Coordinates: 1800' FSL & 745' FEL (NE SW E SE)  
Section 7-T14S-R31W

Bottom Hole Coordinates: Vertical well w/minimal deviation

Ground Elevation (ft): 2864'

K.B. Elevation (ft): 2872'

Logged Interval (ft): 3500'

To: TD

Total Depth (ft): 4590'

Formation: Topeka through Mississippian

Type of Drilling Fluid: Chemical (Mudco, Inc)

Region: Kansas

Drilling Completed: 8/18/13

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 Gemini Wireline (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 - 2342 (+530)

Anhydrite Base - 2364 (+508)

Heebner - 3869 (-997)

Toronto - 3890 (-1018)

Lansing - 3910 (-1038)

Muncie Creek Sh - 4070 (-1198)

Stark Sh - 4158 (-1286)

Hushpuckney Sh - 4194 (-1322)

Base KC - 4235 (-1363)

Pawnee 4358 (-1486)

Ft. Scott - 4414 (-1542)

Cherokee Sh - 4442 (-1570)

Johnson Zone - 4486 (-1614)

Morrow Sh - 4507 (-1635)

Mississippian - 4546 (-1674)

### DSTs

Drillstem testing was performed by Trilobite Testing (Scott City shop). The following are the results of DSTs:

**DST #1 3934-3970 (LKC C-D)**  
 45:45:45:45  
 IF: 1" blow, no return  
 FF: No blow, no return  
 Recovery: 70' WM (95% M, 5%W)  
 IHP: 1890 FHP: 1817  
 IFP: 19-36 ISIP: 885  
 FFP: 39-50 FSIP: 858  
 BHT - 114 F  
 Chlorides - 6,100 ppm

**DST #2 4500-4540 (Morrow Sst)**  
 19:30:15:30  
 IF: Surf blow died in 16 min, no return  
 FF: No blow, no return  
 Recovery: 5' Mud  
 IHP: 2266 FHP: 2200  
 IFP: 20-23 ISIP: 775  
 FFP: 25-27 FSIP: 622  
 BHT - 122 F


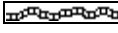
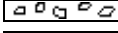
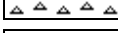
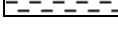









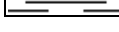
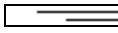
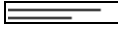


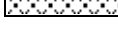
### COMMENTS

Based the negative results of drillstem tests, and sample & log analysis, it was recommended that this test be plugged at a RTD of 4590'.





Respectfully submitted,

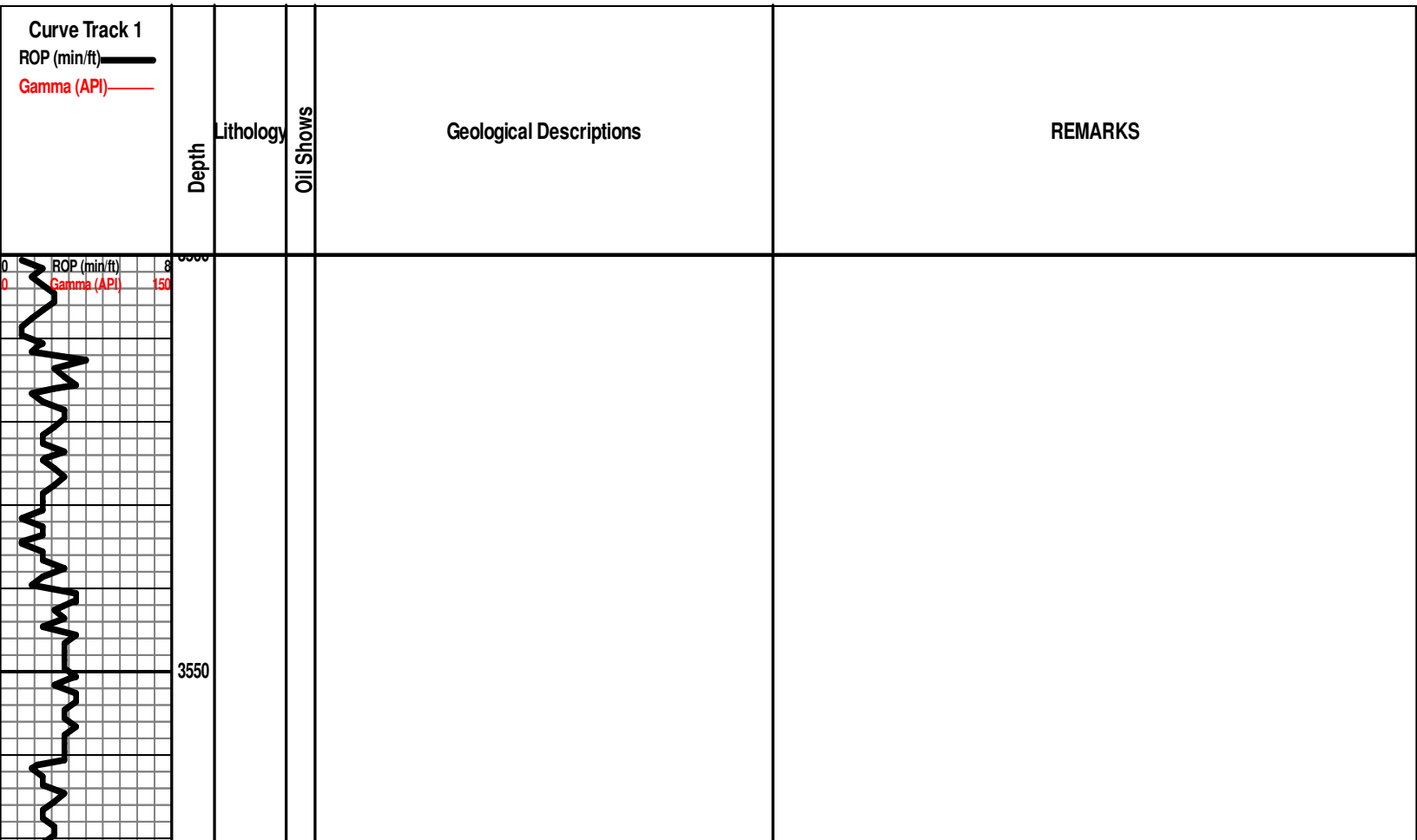
Steven P. Murphy, PG (KS License #228)  
 Consulting Petroleum Geologist

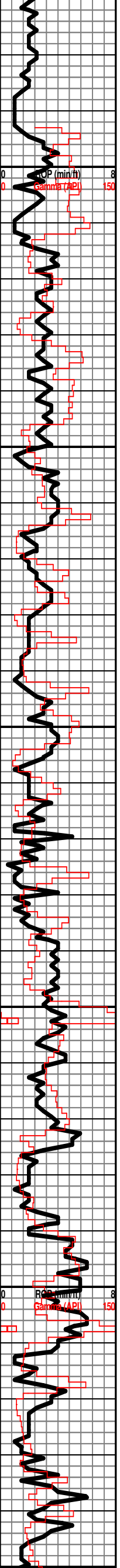
### ROCK TYPES

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

<b>OIL SHOW</b>  Even  Spotted  Ques	 Dead  Gas	<b>INTERVAL</b>  Core  Dst	<b>EVENT</b>  Conn  Rft  Sidewall
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3600

3650

3700

3750

3800

3850

ROP (min/ft)  
0 8

ROP (min/ft)  
0 8

Gamma (API)  
0 150

Gamma (API)  
0 150

LS: crm-tan-brn, fxl, oolitic, sl foss, minor chert, tight, NS

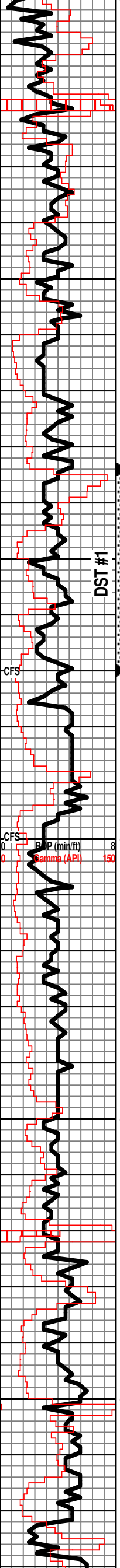
SH: blk, carb

LS: crm-tan, fxl, foss, chalky, dense, NS

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

LS: crm-tan, vxl, dense, sl foss, oolitic, NS

LS: crm-tan, fxl, sl foss, oolitic in pt, minor chert, fr inxl por, NS  
(w/assoc gry-grn-brn shales)



LS: crm-tan-gry, fxl n, sl foss, oolitic, fr-gd inter-ool por, NS

**HEEBNER 3870 (-998)**

SH: blk, carb

SH: gry-grn-blk-rust

**TORONTO 3891 (-1019)**

LS: wht-tan-gry, vfxln, sl foss, ool in part, dense, NS

SH: gry-grn-brn

**LANSING 3911 (-1039)**

LS: wht-crm, f-vfxln, oolitic, sl foss, dense, sl chalky, NS

LS: crm-gry, fxl n, oolitic, dense, minor chert, NS

LS: as above

SH: gry-brn-blk-red

Strap @ 3970' - 1.64' short to board  
Survey @ 3970' - 3/4 deg

LS: crm-tan, fxl n, oolic in pt, much dense, vssfo, spotty stn, sl odor

DST #1 3934-3970 (LKC C-D)  
45:45:45  
IF: 1" blow, no return  
FF: No blow, no return  
Recovery: 70' WM (95% M, 5%W)  
IHP: 1890 FHP: 1817  
IFP: 19-36 ISIP: 885  
FFP: 39-50 FSIP: 858  
BHT - 114 F  
Chlorides - 6,100 ppm

LS: wht-tan, fxl n, oolic, sl foss, f-gd vug por, ssfo, spotty stn, fr odor

LS: crm-tan, vfxln, dense, w/abund red-gry-grn shales

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

LS: crm-brn, vxl n, dense, sl foss, cherty, NS (sl odor)

SH: gry-brn-grn-red

LS: crm-gry, f-vfxln, mostly dense, rare pr inxln por, vssfo, sl stn, sl odor

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

NOTE: Multicolored shale caving

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

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

Shale caving

LS: as above

Shale caving

LS: as above

Shale caving

**MUNCIE CRK 4074 (-1202)**

Jet pit

LS: crm-gry, vfxln, dense, sl oolitic, cherty, tr fo, sl to spotty stn, sl odor

Shale caving

good samples again

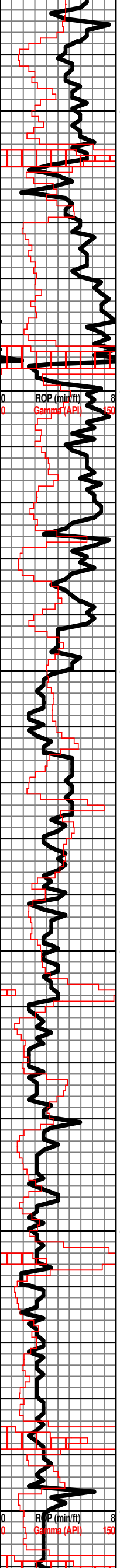
LS: crm-gry, vfxln, dense, minor chert, NS

SH: gry-blk-brn

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

LS: as above

SH: grn-brn-blk-rust



LS: crm-gry, vfxln, dense, NS

Red shale cavings

LS: as above

Shale cavings

**STARK 4159 (-1287)**  
SH: blk, carb

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

LS: as above

**HUSHPUCKNEY 4195 (-1323)**  
SH: blk, carb

LS: crm-brn-gry, vfxln, v. dense, NS

LS: as above

**BKC 4233 (-1361)**  
SH: gry-brn-blk-grn-red

LS: crm-gry, vfxln, dense, NS

SH: gry-grn-brn-red

SH: as above

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

SH: gry-blk-grn-red-rust (sl sandy)

SH: as above

SH: as above

SH: as above

SH: as above

LS: crm-gry, vfxln, dense, minor chert, NS

Shale flood: red-grn-blk-gry

LS: crm-tan, vfxln, dense, NS (shale flood)

Shale flood: as above

**PAWNEE**

Shale flood: as above

LS: as above (shale flood)

Shale flood: as above

LS: crm-tan, vfxln, dense, NS (shale flood)

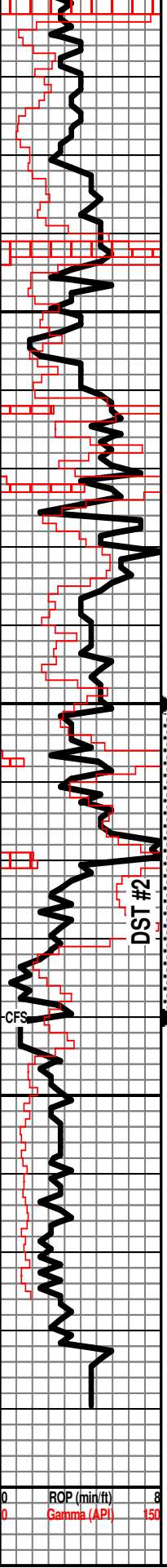
LS: as above (shale flood)

Add Mud

**MYRICK STATION**

SH: blk-gry-grn-red

Shale flood: as above



**FT SCOTT 4420 (-1548)**

Shale flood: as above

LS: wht-brn, vfxln, dense, NS (shale flood)

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

LS: as above

**CHEROKEE 4444 (-1572)**  
SH: blk, carb

LS: tan-brn, f-vfxln, mostly dense, rare fr inxln por, nsfo, spotty dead stn, sl odor

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

SH: blk-gry

SH: as above

**JOHNSON 4485 (-1613)**

LS: crm-tan-brn, vfxln, oolitic, nsfo, tr dead stn, no odor

LS: crm-brn-gry, vfxln, sl oolitic, sl foss, dense, NVP, NS w/abund gry-blk shale

**MORROW SHALE**

SH: grn-brn-gry-blk-yel

SH: as above

Sst: clr clusters, f-mgr, prly std, sub-ang, friable-firm, gd inter-gran por, lsf, even sat stn (some dead stn), fr odor

DST #2 4500-4540 (Morrow Sst)  
19:30:15:30  
IF: Surf blow died in 16 min, no return  
FF: No blow, no return  
Recovery: 5' Mud  
IHP: 2266 FHP: 2200  
IFP: 20-23 ISIP: 775  
FFP: 25-27 FSIP: 622  
BHT - 122 F

**MISSISSIPPIAN**

LS: wht-tan, vfxln, dense, chalky, grainy text, cherty, NS

LS: crm-tan-gry, vfxln, dense, chalky, minor chert, NS

LS: as above

SH: blk-gry

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

**RTD - 4590'**

0 RCP (min/ft) 8  
0 Gamma (API) 150