

Robert L. Milford

PETROLEUM GEOLOGIST
Wichita, Kansas

GEOLOGISTS' REPORT

DRILLING TIME AND SAMPLE LOG

OPERATOR **Murfin Drilling Company, Inc.**
LEASE **Franklin #1-16**

LOC SPOT **65 S & 70 W of E2 NENW**

LOC FOOTAGE **755' FNL 2,240' FWL**

SEC. **16** TWPSP **4S** RANG **33W**

COUNTY **Rawlins** STATE **KANSAS**

API **15-153-21082-00-00**

CONTRACTOR **Murfin Drilling Co., Inc.** RIG NO. **7**

DRILLING STARTED **11-25-2014** COMPLETED **12-2-2014**

MUD REPLACED **3,009** MTD TYPE **Chemical**

DRILLING TIME KEPT FROM **3:10** TO **RTD**

SAMPLES SAVED FROM **3:10** TO **RTD**

SAMPLES EXAMINED FROM **3:10** TO **RTD**

GEOLOGICAL SUPERVISION FROM **3:10** TO **RTD**

FORMATION NAME **TOP** LOG DATUM **TOP** SAMPLE DATUM

Stone Corral 2,799' -280' 2,802' +241'

Topoka 3,815' -736' 3,817' -738'

Heebner 3,986' -907' 3,988' -909'

B/KC 4,263' -1184' 4,265' -1186'

Pawnee 4,391' -1312' 4,393' -1314'

Cherokee 4,461' -1382' 4,463' -1384'

Mississippian 4,635' -1556' 4,637' -1558'

ELEVATIONS

KB **3,079'**
GL **3,074'**

MESSEREMBEN/ROCK

CASING RECORD
Casing
Surface **8.5/8" @ 289'**
w/ 225 sacks cement
Production none

ELECTRICAL SURVES

Pioneer Wireline
Dual Induction Log
Dial Compensated

FORMATION LOG

Porosity Log
Microresistivity Log
Barhole Compensated

SOIL LOG

Soil Log

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Total Depth 4,710' -1631'

DATE	7:00 AM DEPTH	REMARKS
11-25-14	0'	Spud @ 4:00 pm. Plug down @ 12:30 am on 11-26-14. Dev. 0.75" @ 259'
11-26-14	259'	Cut 259' in last 24 hrs. Drilled out plug @ 8:30 am w/ PDC bit.
11-27-14	2,330'	Cut 2,071' in last 24 hrs; 22 hrs drlg. Lost circ @ 3675' (dwn 2 hrs). Bit trip @ 3700'
11-28-14	3,707'	Cut 1,377' in last 24 hrs; 22 hrs drlg.
11-29-14	4,045'	Cut 338' in last 24 hrs; 17.5 hrs drlg. DST #1 @ 4045', DST #2 @ 4085'
11-30-14	4,085'	Cut 40' in last 24 hrs; 2.5 hrs drlg. DST #3 @ 4140'
12-1-14	4,140'	Cut 55' in last 24 hrs; 3 hrs drlg.
12-2-14	4,440'	Cut 300' in last 24 hrs; 18.75 hrs drlg. RTD 4710' @ 9:10 pm
12-3-14	4,710'	Cut 270' in last 24 hrs; 12.5 hrs drlg. P&A

Remarks

The electric log measurements correlate from 2' to 3' higher to the drilling measurements.

Formation tops and lithology on this report have been corrected to the electric log.

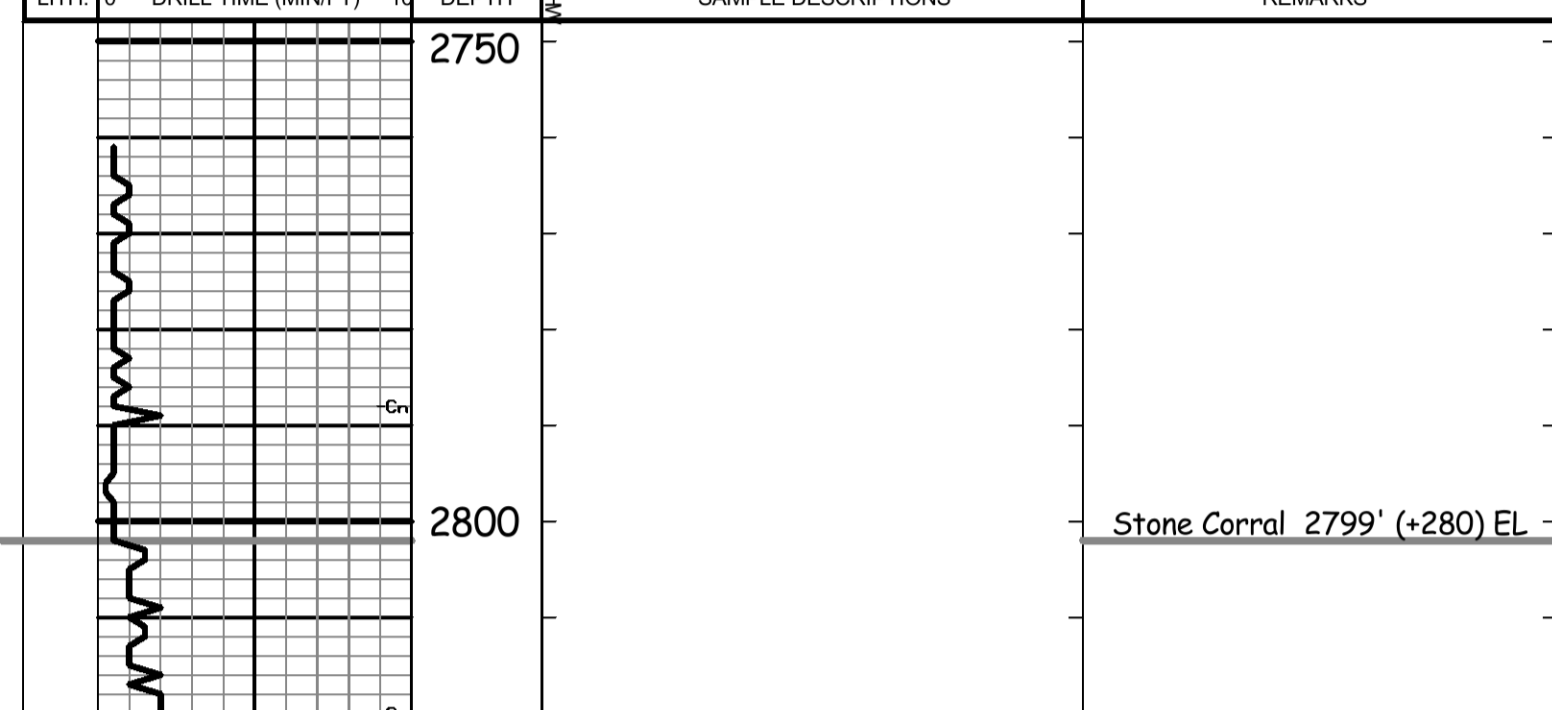
The drilling samples were deposited at the Kansas Geological Survey office in Wichita.

Respectfully submitted,

Robert L. Milford

Drill Stem Test Charts

Drill Stem Test by **Trilobite Testing, Inc.**



LITH	DRILL TIME (MIN/FT)	DEPTH (FT)	SAMPLE DESCRIPTIONS	REMARKS
		2750		
		2800		Stone Corral 2799' (+280) EL
		2850		B/Stone Corral 2835' (+244) EL
		3700	LS: crm-gr, fxl, sli fos, some shly, sub chky-prtly dns, pr por, NS LS: crm-gr, fxl, fos in prt, some shly, sub chky-prtly dns, pr por, NS Sh: red-brn, some gry-grn LS: mstly lt gry, some crm, fxl, sub chky-prtly dns, pr por, NS Sh: red-brn, some gry-grn LS: crm-lt gry, fxl, fos in prt, sub chky-prtly dns w/ some chky-vry chy, pr por, NS	Call depth 3410' @ 10:25 pm on 11-27-14 Lost circulation @ 3675'. Lost 160 bbls. Down 2 hrs 10 min. Bit trip at 3707'. Replaced PDC bit with button bit. Pipe Strap @ 3707': Strap long 0.07' Straight Hole Survey @ 3707': 1° Dev. Morgan Mud check @ 3707': 75 Vis, 9.2 Wt, 6.6 WL, 1,400 ppm Chl, 3# LCM (taken @ 7:20 am, during TOH for bit trip) Samples start 3710' @ 11:11 am on 11-28-14
		3750	LS: wh-lt gry, fxl, sli fos, sub chky-prtly dns w/ some chky-vry chy, pr por, NS Sh: red-brn, gry, grn LS: wh-lt gry, fxl, fos in prt, sub chky-prtly dns w/ some chky, pr-fr intrprtcl por, NS	
		3800	LS: wh-lt gry, fxl, fos in prt, sub chky-prtly dns, pr por, NS Sh: red-brn (some soft & gummy), some gry-grn LS: crm-tan, fxl, sli fos, sub chky-prtly dns, pr por, NS Sh: red-brn (some sdy), some gry-grn	Topoka 3815' (-736) EL
		3850	LS: crm-lt gry, fxl, fos in prt, shly in prt (red-brn, mottled), sub chky-prtly dns, pr por, NS LS: A.A., dcrs shly, pr w/ tr fr fos por, NS Sh: red-brn, some gry & grn Sdy LS-Calc Sd: crm, fxl, fr-vry fr grain, mstly hard & brittle w/ some semi fri, pr vis por, NS, w/ Sdy Sh: red-brn & grn	
		3900	LS: crm, fxl, ool-fos in prt, sub chky-prtly dns, pr por, scat blk mstly tarry sptd-patchy stn, NSFO, no odor LS: wh-crm, fxl, ool-fos in prt, sub chky-prtly dns w/ some chky-vry chy, pr w/ some fr intrprtcl por, tr blk tarry sptd stn, NSFO, no odor LS: A.A., NS Sh: Blk Carb LS: tan-brn, fxl, sli fos, prtly dns, pr por, tr blk tarry sptd stn, NSFO, no odor Sh: red-brn, gry, grn	
		3950	LS: crm-tan, fxl, ool-fos in prt, sub chky-prtly dns, pr w/ some fr intrprtcl por, vry scat blk tarry sptd stn, NSFO, no odor Sh: red-brn (mstly soft & gummy), some gry & grn LS: crm-lt gry, fxl, ool-fos in prt, sub chky-prtly dns, pr por, NS LS: wh-crm, fxl, sli fos, prtly dns, pr por, NS LS: wh-tan, fxl, ool-fos in prt, sub chky-prtly dns w/ some chky-vry chy, pr-fr intrprtcl w/ some small vug por, NS LS: A.A. w/ incrs wh, chky-vry chy, NS Sh: Blk Carb & drk gry LS: tan-brn, fxl, sli fos, prtly dns, pr por, NS Sh: red-brn (some sdy), gry, grn, w/ some lt gry, fr-vry fr grain, calc, semi fri-semi brittle, pr por, NS Sh: red-brn (some sdy, some soft & gummy), some grn & gry	DST #1 3983'-4045' Toronto-L/KC 'A' IF: blow built to 2" IS: no blow back Rec: 314' TOTAL FLUID: 63' MCW (80% W, 20% M) 188' MCW (97% W, 3% M) 62' MCW (75% W, 25% M) Chl ppm: 24,000 DST: 1,400 Mud IFF: 15-18#/30" ISIP: 524#/60" FFP: 45-177#/30" F5IP: 1294#/90" NOTE: severe plugging during IFF
		4000	LS: wh-crm, fxl, fos-ool, sub chky-prtly dns w/ some chky, pr w/ tr fr intrprtcl por, fr amnt lt-med brn sptd-sat stn, SSFO, no odor LS: wh-crm, fxl, fos-ool (small) in prt, sli chy (crm-lt gry), sli pyr, sub chky-prtly dns w/ some chky-vry chy, pr-fr intrprtcl w/ some fr-gd small medlc por, scat med-drk brn sptd-patchy stn, SSFO, no odor, some barren por Sdy LS-Calc Sd: lt gry, fr-vry fr grain, brittle, pr por, scat blk sub fat-stn, NSFO, no odor Sh: red-brn w/ gry & grn	Heebner 3986' (-907) EL Heebner field sample pick was 3984'
		4050	LS: crm-tan, fxl, ool-fos in prt, sub chky-prtly dns, pr w/ tr fr intrprtcl por, fr amnt lt-med brn sptd-sat stn, SSFO, no odor Sh: red-brn & grn, some gry LS: wh-lt gry, ool-fos in prt, sub chky-prtly dns w/ some chky, pr w/ some fr intrprtcl por, scat blk sptd-sat stn, SSFO, no odor LS: wh-lt gry, ool-fos in prt, sub chky-prtly dns w/ some chky-vry chy (incrs chk w/ depth), pr w/ some fr-fat-shly stn, SSFO, no odor LS: crm-brn, fxl, sli fos, sub chk-prtly dns, pr por, scat brn-blk sptd-patchy stn, VSSFO, no odor Sh: red-brn, gry & grn	DST #2 4035'-4085' L/KC 'B'-D' zns IF: blow built to 1.25" FF: no blow Rec: 3' Mud w/ oil spots in tool (100% M) IFF: 15-18#/30" ISIP: 524#/60" FFP: 19-21#/30" F5IP: 285#/60"
		4100	LS: wh-crm, fxl, fos in prt, sub chk-prtly dns, fr w/ some gd intrprtcl por, fr amnt lt-med brn sptd-sat stn w/ tr sat stn, S-FSFO, no odor LS: wh-lt gry, ool-fos in prt, sub chky-prtly dns w/ some chky, pr-fr intrprtcl por, scat blk sptd-sat stn, SSFO, no odor LS: A.A., tr stn, NSFO, no odor Sh: Blk Carb LS: tan-brn, fxl, sli fos, prtly dns, pr por, NS Sh: red-brn w/ gry & grn	DST #3 4082'-4140' L/KC 'D Prime' - 'G' zns IF: blow built to 1.5" FF: no blow Rec: 10' Mud (100% M) IFF: 23-27#/30" ISIP: 566#/60" FFP: 30-30#/30" F5IP: 346#/60"
		4150	LS: wh-tan, fxl, fos in prt, sub chky-prtly dns w/ some chky, pr-fr intrprtcl por, scat blk sptd-sat stn w/ some brn patchy stn, few pcs w/ VSSFO, no odor, tr barren por LS: crm-tan, fxl, sli fos, sub chky-prtly dns, pr por, NS Sh: red-brn (some soft & gummy), some gry & grn Sh: A.A.	Morgan Mud check @ 4140': 57 Vis, 9.2 Wt, 7.6 WL, 1,700 ppm Chl, 3# LCM (taken @ 10:00 am, conditioning after DST)
		4200	LS: wh-lt gry, fxl, fos-ool in prt, sli chy (crm-tan), sub chky-prtly dns w/ some chky-vry chy (incrs chk w/ depth), pr por, rare blk dead sptd-edge stn, NSFO, no odor Sh: red-brn, gry & grn Sh: red-brn (some silty) & gry-grn	Stark 4208' (-1129) EL
		4250	LS: crm-tan, fxl, fos-ool in prt, sub chky-prtly dns w/ some chky, pr por, NS Sh: gry, red-brn, some grn Sh: red-brn, gry, grn LS: crm-tan, fxl, fos in prt, sub chky-prtly dns, pr por, NS Sh: gry, red-brn, grn LS: A.A. Sh: gry & red-brn, some grn	B/KC 4263' (-1184) EL
		4300	LS: crm-gr, fxl, fos in prt, sub chky-prtly dns, pr por, NS Sh: gry, red-brn, some grn Sh: red-brn (some silty-sdy) & gry, some grn LS: crm-tan, fxl, fos in prt, sub chky-prtly dns, pr por, NS Sh: red-brn, some gry & grn	
		4350	LS: crm-lt gry, fxl, fos in prt, sub chky-prtly dns, pr por, tr blk sptd dead stn, NSFO, no odor Sh: lt gry (soft & gummy), some red-brn & grn (some soft & gummy), some gry Sh: red-brn & gry-grn Sh: red-brn & gry, some grn Sh: lt gry (soft & gummy), w/ some gry-grn & red-brn	Pawnee 4391' (-1312) EL
		4400	LS: wh-crm, fxl, fos-ool in prt, sub chky-prtly dns w/ some chky-vry chy, pr w/ tr fr intrprtcl por, NS LS: A.A. w/ incrs chky-vry chy, pr w/ tr fr intrprtcl por, NS LS: tan-gr, fxl, prtly dns, pr por, NS Sh: Blk Carb & drk gry LS: crm-brn, fxl, sli fos, sub chky-prtly dns w/ some chky, pr por, tr med-drk stringy brn stn (looks earthy), NSFO, no odor, (stn in chy rxcs) LS: wh-tan, fxl, fos-ool in prt, sub chky-prtly dns w/ some chky-vry chy, pr w/ tr fr intrprtcl por, NS LS: tan-brn, fxl, sli fos, prtly dns, pr por, NS Sh: Blk Carb & med-drk gry LS: crm-tan, fxl, fos in prt, sub chky-prtly dns w/ some chky, pr por, NS LS: wh-tan, fxl, fos-ool in prt, sli chy (crm-org), sub chky-prtly dns w/ some chky-vry chy, pr por, NS Sh: gry & grn, some red-brn LS: crm-tan, fxl, fos in prt, sub chky-prtly dns, pr por, NS Sh: red-brn, grn, gry Sdy LS-Calc Sd: crm, fxl, fr-med grain sd, some semi fri, sub chy, pr vis por, NS Sh: red-brn & gry-grn	Morgan Mud check @ 4493': 62 Vis, 9.5 Wt, 7.2 WL, 3,800 ppm Chl, 1# LCM
		4450	Sh: red-brn & gry-grn w/ small amnt of Sd: clr, fr-crs grain, sli calc, semi fri-brittle, pr vis por, NS, w/ some crs loose grains, clr, sub rnd-sub ang LS: red-brn & gry-grn, w/ some Sd: clusters A.A., pr-fr por, NS & some loose grains A.A. A.A. Sh: red-brn & gry-grn w/ some Sd: clr-lt gry, fr-med grain, some calc, some shly (red-brn), fri-brittle, pr-fr por, NS Sh: A.A. w/ some red-brn, soft & gummy, & some crs loose grains, clr, sub rnd-sub ang Sh: red-brn, gry & grn, w/ small amnt Sd clusters & loose grains A.A. Sh: A.A. w/ some yell, & some Sdy Sh: red-brn, w/ some Sd: clr-lt gry, fr-med grain, calc, fri-brittle, pr-fr por, NS, & some LS: crm, fxl, some mottled yellow, sub chky-prtly dns, pr por, NS A.A. w/ incrs amnt of Sh	Cherokee 4461' (-1382) EL
		4500	Sh: red-brn & gry-grn, grn, w/ some yell & mottled, some mottled yell, fr weathered por, NS Sh: red-brn & mustard yell, some gry & grn, w/ some chky-yell, mstly weathered, some fresh, fr-gd weathered por, NS, some LS: crm-yell, fxl, sub chky-prtly dns, pr por, NS, & some Sd clusters & loose grains A.A. Ch: wh-crm, fresh & weathered, some mottled yellow, fr-gd weathered por, NS, w/ small amnt of LS: crm-tan, fxl, sub chky-prtly dns, pr por, NS	Miss. 4635' (-1556) EL
		4550	Ch: A.A., w/ incrs mottled yell & yell, & LS: A.A. Sh: red-brn, gry, grn (incrs in smpls) Ch: A.A. w/ dcrs amnt yell, & LS: A.A.	
		4600	Ch: A.A. w/ small amnt yell mottled, & LS: A.A. LS: crm-lt gry, fxl, prtly dns, pr por, NS LS: crm-drk tan, fxl, chy (wh-crm, fresh, some transl), prtly dns-dns, pr por, NS A.A.	Ran 12 stand short trip @ 4710' after CFS L.T.D. 4710' (-1631) R.T.D. 4710' (-1631) Straight Hole Survey @ 4710': 0.25° Dev.