

# Robert L. Milford

PETROLEUM GEOLOGIST  
Wichita, Kansas

## GEOLOGISTS' REPORT

DRILLING TIME AND SAMPLE LOG

OPERATOR: **Murfin Drilling Company, Inc.**  
 LEASE: **Cotton Candy #1-14**  
 LOC. SPOT: **C W/2 W/2 W/2**  
 LOC. FOOTAGE: **2,640' FSL 330' FWL**

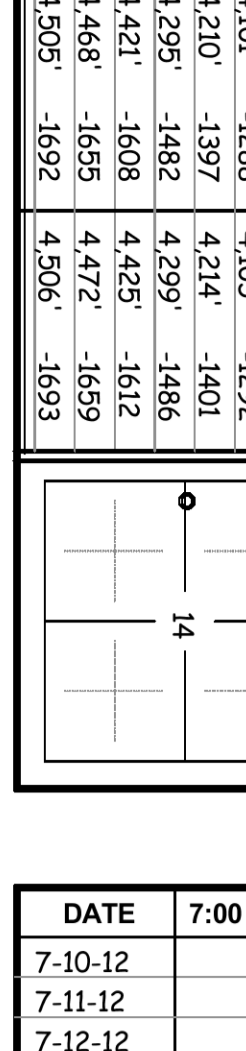
SEC: **14** TWP: **4S** RNG: **30W**  
 COUNTY: **Decatur** STATE: **Kansas**  
 API: **15-039-21154-00-00**

CONTRACTOR: **Murfin Drilling Co., Inc.** RIG NO.: **B**  
 DRILLING STARTED: **7-10-2012** COMPLETED: **7-18-2012**  
 MUD DISPLACED: **2,959** MUD TYPE: **Chemical**  
 DRILLING TIME KEPT FROM: **3,620'** TO: **RTD**  
 SAMPLES SAVED FROM: **3,620'** TO: **RTD**  
 SAMPLES EXAMINED FROM: **3,620'** TO: **RTD**  
 GEOLOGICAL SUPERVISION FROM: **3,427'** TO: **RTD**

MEASURED/RECORDED  
 CASING RECORD  
 CONDUCTOR  
 SURFACE: **8.5/gal @ 220'**  
 w/ 185 sacks cement  
 Production none

ELEVATIONS  
 KB: **2,813'**  
 GL: **2,808'**

FORMATION NAME LOG LOG DATE TOP DATUM TOP DATUM SAMPLE DATE  
 Stone Corral 2,597' -216 2,602' -211  
 Topeka 3,679' -866 3,682' -869  
 Heebner 3,846' -1033 3,849' -1036  
 Lansing 3,893' -1080 3,896' -1083  
 B/KC 4,101' -1288 4,105' -1292  
 Pawnee 4,210' -1397 4,214' -1401  
 Cherokee 4,295' -1482 4,299' -1486  
 Mississippian 4,421' -1608 4,425' -1612  
 Arbuckle 4,468' -1655 4,472' -1659  
 Total Depth 4,505' -1692 4,506' -1693



DATE	7:00 AM DEPTH	REMARKS
7-10-12	0'	Spud @ 3:30 pm. Plug down @ 7:30 pm. Started drilling out plug @ 3:30 am on 7-11-12
7-11-12	470'	Cut 470' in last 24 hrs. Dev.: 1° @ 1218', 0.75° @ 1723'
7-12-12	1,960'	Cut 1,490' in last 24 hrs; 21.5 hrs drlg.
7-13-12	2,982'	Cut 633' in last 24 hrs; 23 hrs drlg. DST #1 @ 3932'
7-14-12	3,932'	Cut 317' in last 24 hrs; 13.25 hrs drlg. DST #2 @ 3983'
7-15-12	3,983'	Cut 51' in last 24 hrs; 3.25 hrs drlg. DST #3 @ 4087'
7-16-12	4,087'	Cut 104' in last 24 hrs; 5 hrs drlg.
7-17-12	4,375'	Cut 288' in last 24 hrs; 17.75 hrs drlg. RTD 4506' @ 12:47 pm
7-19-12	4,506'	Cut 131' in last 24 hrs; 5 hrs drlg. P&A

**Remarks**

The electric log measurements correlate from 3' to 6' higher to the drilling measurements.

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

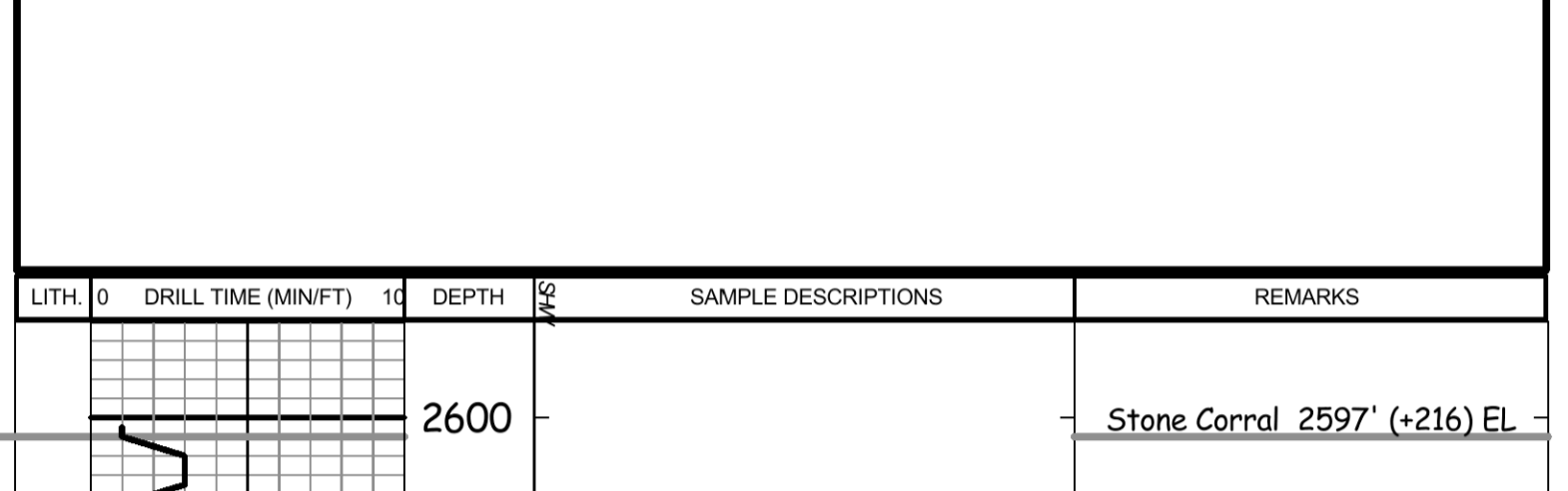
The drilling samples were deposited at the Kansas Geological Survey office in Wichita.

Respectfully submitted,

Robert L. Milford

### Drill Stem Test Charts

Drill Stem Test by Trilobite Testing, Inc.



LITH.	DRILL TIME (MIN/FT)	DEPTH	SAMPLE DESCRIPTIONS	REMARKS
		2600		Stone Corral 2597' (+216) EL
		2650		B/Stone Corral 2632' (+181) EL

LITH.	DRILL TIME (MIN/FT)	DEPTH	SAMPLE DESCRIPTIONS	REMARKS
		3600		Morgan Mud check @ 3609': 65 Vis, 9.0 Wt, 6.0 WL, 900 ppm Chl, 5# LCM
		3650	LS: crm-lt gry, fxl, fos in prt, some sli shly, sub chky-prtly dns w/ some chky, some pr-fr fos por, NS Sh: mstly red-brn, mstly soft & gummy, some gry & grn LS: crm-lt gry, fxl, fos in prt, sub chky-prtly dns w/ some chky, pr w/ some fr fos por, NS	
		3700	LS: lt gry- lt red-brn, fxl, shly in prt, sub chky-prtly dns, pr por, NS Sh: mstly red-brn, soft & gummy in prt, some gry w/ tr grn	Topeka 3679' (-866) EL
		3750	LS: wh-crm, fxl, fos in prt, vry chky-prtly dns, pr por, NS LS: A.A. LS: A.A., some sdy Calc Sd: crm, fn-vry fn grain, semi fri-brittle, pr vis por, NS Sh: red-brn, sdy in prt, soft & gummy in prt	
		3800	LS: crm-lt gry, fxl, fos in prt, sub chky-prtly dns, pr por, NS Sh: Black Carb (vry small amt) LS: tan, fxl, fos, prtly dns, pr por, NS Sd: lt-med gry, fn-vry fn grain, sli calc, shly in prt, semi fri-brittle, pr vis por, NS, no fluor, no cut, no odor Sh: red-brn, soft & gummy in prt, some gry & grn LS: crm-lt gry, fxl, fos in prt, sub chky-prtly dns, pr por, NS Sh: red-brn, some silty-sdy, some soft & gummy, some gry & grn	
		3850	LS: crm-lt gry, fxl, fos, sub chky-prtly dns w/ some chky, pr por, NS Sh: drk gry & trace Blk Carb LS: wh-crm, fxl, fos in prt, vry chky-prtly dns, pr por, NS LS: A.A. LS: A.A. w/ gd amt chky-vry chky, pr por, NS	Heebner 3846' (-1033) EL
		3900	LS: crm, fxl, fos, prtly dns, pr por, NS Sh: mstly drk gry & small amt Blk Carb LS: tan, fxl, fos, prtly dns, pr por, NS Sh: red-brn & gry, some grn LS: crm, fxl, ool, sub chky-prtly dns, fr-gd intrpl por, scat lt-med brn spdt-sat stn, F-5FSO, fnt odor Sh: red-brn, gry, grn LS: wh-crm, fxl, sli fos, chty (clr-wh-ogr), tr pyr, sub chky-prtly dns w/ some chky, pr w/ tr fr fos-vug por, tr lt brn spdt-edge stn, NSFO, no odor LS: lt gry-grn & tan, fxl, sli fos, some sli shly, sub chky-prtly dns, pr por, vry scat blk small spkld asph stn or mineral, NSFO, no odor Sh: red-brn w/ some gry & grn LS: crm, fxl, fos-ool, sub chk-prt dns, pr por, NS LS-Dol: crm-lt gry, fxl, fos-ool in prt, pr-fr w/ some gd intrprt-vug por, scat spdt-sub sat stn, S-F5FO, no odor LS: wh-lt gry, fxl, some sli shly, sub chky-prtly dns w/ some dns, pr por, NS	Toronto 3878' (-1065) EL Lansing 3893' (-1080) EL Ran 29 stand short trip prior to DST #1 DST #1 3911'-3932' Lansing 'B' zn IF: blow built to 5': ISI: no blow back FF: blow built to 8': FSI: no blow back Recovery: 310' TOTAL FLUID 124' MW (70% W, 30% M) 186' MW (90% W, 10% M) Chl ppm: 76,000 DST (mud man): 900 Mud IFP: 22-87#/30' ISIP: 1340#/60' FFP: 95-148#/60' F5IP: 1335#/90' Pipe Strap @ 3932': Strap long 0.76' Straight Hole Survey @ 3932': 0.75° Dev. Morgan Mud check @ 3932': 54 Vis, 9.3 Wt, 6.8 WL, 1,900 ppm Chl, 5# LCM
		3950	LS: crm, fxl, fos-ool, sub chk-prt dns, pr por, NS LS-Dol: crm-lt gry, fxl, fos-ool in prt, pr-fr w/ some gd intrprt-vug por, scat spdt-sub sat stn, S-F5FO, no odor LS: wh-lt gry, fxl, some sli shly, sub chky-prtly dns w/ some dns, pr por, NS	
		4000	LS: lt gry, fxl, sli shly, prtly dns, pr por, NS Sh: Black Carb (tr amt) LS: tan-brn, fxl, fos, mstly dns, pr por, NS Sh: red-brn, gry, grn LS: wh-crm, fxl, sli fos, chty (clr-wh-ogr), tr pyr, gd amt chky-vry chky w/ sub chky-dns, pr vis por, tr lt brn spdt-edge stn, 1 pc w/ V5SFO, no odor LS: tan, fxl, fos in prt, prtly dns, pr por, NS Sh: red-brn, gry, grn Sh: red-brn, some soft & gummy, w/ grn, brn, gry, intermixed w/ small amt of Shly Sd: gry, fn grain, sli glauc, hard & brittle, pr vis por, NS	
		4050	LS: wh-crm, fxl, fos in prt, chky-prtly dns, pr w/ some fr fos-vug por, scat lt-med w/ some drk brn spdt-sat stn, S-F5FO, no odor Sh: gry, grn, red-brn Sh: red-brn w/ gry & some grn LS: crm, fxl, fos in prt, chky-prtly dns w/ some vry chky, pr fos por, tr lt brn spdt-sub sat stn, 1 pc w/ V5SFO, no odor Sh: lt gry & grn, soft & gummy in prt Sh: red-brn, gry, grn LS: crm-lt gry, fxl, fos-ool in prt, some sli shly, some yell mottled, sub chky-prtly dns, pr por, NS Sh: red-brn, gry, grn	Stark 4053' (-1240) EL
		4100	LS: crm-lt gry, fxl, sli fos, sli chty (clr-wh-ogr), tr pyr, gd amt chky-vry chky w/ sub chky-dns, pr vis por, tr lt brn spdt-edge stn, 1 pc w/ V5SFO, no odor LS: tan, fxl, fos in prt, prtly dns, pr por, NS Sh: red-brn, gry, grn Sh: red-brn, some soft & gummy, w/ grn, brn, gry, intermixed w/ small amt of Shly Sd: gry, fn grain, sli glauc, hard & brittle, pr vis por, NS LS: wh-crm, fxl, fos in prt, chky-prtly dns, pr w/ some fr fos-vug por, scat lt-med w/ some drk brn spdt-sat stn, S-F5FO, no odor Sh: gry, grn, red-brn Sh: red-brn w/ gry & some grn LS: lt gry & grn, soft & gummy in prt Sh: red-brn, gry, grn LS: crm-lt gry, fxl, fos-ool in prt, some sli shly, some yell mottled, sub chky-prtly dns, pr por, NS Sh: red-brn, gry, grn	Morgan Mud check @ 4007': 54 Vis, 9.0 Wt, 6.4 WL, 1,700 ppm Chl, 5# LCM DST #3 3996'-4087' Lans 'H'-K' zns IF: blow built to 9.5': ISI: no blow back FF: BOB in 55': FSI: no blow back Rec: 380' TOTAL FLUID: 194' WM (30% W, 70% M) 181' MW (85% W, 15% M) 5' Mud (heavy) (100% M) Chl ppm: 69,000 DST: 1,700 Mud IFP: 34-119#/30' ISIP: 1379#/60' FFP: 134-222#/60' F5IP: 1375#/90'
		4150	LS: crm-lt gry, fxl, fos-ool in prt, some sli shly, sub chky-prtly dns, pr por, NS Sh: red-brn w/ gry, grn & small amt Calc Sh: lt purple LS: crm-lt gry, fxl, sli fos, sli chty (clr-wh-ogr), tr pyr, gd amt chky-vry chky w/ sub chky-dns, pr vis por, tr lt brn spdt-edge stn, 1 pc w/ V5SFO, no odor LS: tan, fxl, fos in prt, prtly dns, pr por, NS Sh: red-brn, gry, grn Sh: red-brn, some soft & gummy, w/ grn, brn, gry, intermixed w/ small amt of Shly Sd: gry, fn grain, sli glauc, hard & brittle, pr vis por, NS LS: wh-crm, fxl, fos in prt, chky-prtly dns, pr w/ some fr fos-vug por, scat lt-med w/ some drk brn spdt-sat stn, S-F5FO, no odor Sh: gry, soft & gummy, w/ some grn, & Calc Sh: reddish brn & purple-gry Sh: red-brn, gry-grn, calc in prt, w/ Calc Sh: A.A.	B/KC 4101' (-1288) EL
		4200	LS: crm-lt gry, fxl, sli fos, sli chty (clr-wh-ogr), tr pyr, gd amt chky-vry chky w/ sub chky-dns, pr vis por, tr lt brn spdt-edge stn, 1 pc w/ V5SFO, no odor LS: tan, fxl, fos in prt, prtly dns, pr por, NS Sh: red-brn, gry, grn Sh: red-brn, some soft & gummy, w/ grn, brn, gry, intermixed w/ small amt of Shly Sd: gry, fn grain, sli glauc, hard & brittle, pr vis por, NS LS: wh-crm, fxl, fos in prt, chky-prtly dns, pr w/ some fr fos-vug por, scat lt-med w/ some drk brn spdt-sat stn, S-F5FO, no odor Sh: gry, soft & gummy, w/ some grn, & Calc Sh: reddish brn & purple-gry Sh: red-brn, gry-grn, calc in prt, w/ Calc Sh: A.A.	Pawnee 4210' (-1397) EL
		4250	LS: crm-tan, fxl, fos-ool in prt, sub chky-prtly dns, pr por, NS Calc Sh: lt purple, w/ Sh: gry-grn & red-brn Sh: mstly gry-grn, w/ red-brn LS: crm-tan, fxl, sdy in prt, sub chky-prtly dns, pr por, 2 pcs w/ brn spdt stn, NSFO, no odor LS: gry, fxl, shly, grn, hrd, pr por, NS Shly LS: A.A. w/ LS: crm-tan, fxl, sli fos, sub chky-prtly dns, pr por, NS Calc Sh: lt-med gry, w/ Sh: red-brn, gry, some grn Calc Sh: med-drk gry Sh: drk gry & Blk Carb Sh: drk gry, grn & med gry Sh: A.A. (no sand) LS: crm-lt tan, fxl, sli fos, sub chky-dns, pr por, NS Sh: mstly grn, some yell mottled, w/ gry	Lwr Pawnee 4236' (-1423) EL
		4300	LS: crm-tan, fxl, sdy in prt, sub chky-prtly dns, pr por, 2 pcs w/ brn spdt stn, NSFO, no odor LS: gry, fxl, shly, grn, hrd, pr por, NS Shly LS: A.A. w/ LS: crm-tan, fxl, sli fos, sub chky-prtly dns, pr por, NS Calc Sh: lt-med gry, w/ Sh: red-brn, gry, some grn Calc Sh: med-drk gry Sh: drk gry & Blk Carb Sh: drk gry, grn & med gry Sh: A.A. (no sand) LS: crm-lt tan, fxl, sli fos, sub chky-dns, pr por, NS Sh: mstly grn, some yell mottled, w/ gry	Cherokee 4295' (-1482) EL
		4350	LS: crm-tan, fxl, sdy in prt, sub chky-prtly dns, pr por, 2 pcs w/ brn spdt stn, NSFO, no odor LS: gry, fxl, shly, grn, hrd, pr por, NS Shly LS: A.A. w/ LS: crm-tan, fxl, sli fos, sub chky-prtly dns, pr por, NS Calc Sh: lt-med gry, w/ Sh: red-brn, gry, some grn Calc Sh: med-drk gry Sh: drk gry & Blk Carb Sh: drk gry, grn & med gry Sh: A.A. (no sand) LS: crm-lt tan, fxl, sli fos, sub chky-dns, pr por, NS Sh: mstly grn, some yell mottled, w/ gry	
		4400	LS: crm-tan, fxl, sdy in prt, sub chky-prtly dns, pr por, 2 pcs w/ brn spdt stn, NSFO, no odor LS: gry, fxl, shly, grn, hrd, pr por, NS Shly LS: A.A. w/ LS: crm-tan, fxl, sli fos, sub chky-prtly dns, pr por, NS Calc Sh: lt-med gry, w/ Sh: red-brn, gry, some grn Calc Sh: med-drk gry Sh: drk gry & Blk Carb Sh: drk gry, grn & med gry Sh: A.A. (no sand) LS: crm-lt tan, fxl, sli fos, sub chky-dns, pr por, NS Sh: mstly grn, some yell mottled, w/ gry	Miss 4421' (-1608) EL Sand & Chert were up together in the same drilling sample
		4450	LS: crm-tan, fxl, sdy in prt, sub chky-prtly dns, pr por, 2 pcs w/ brn spdt stn, NSFO, no odor LS: gry, fxl, shly, grn, hrd, pr por, NS Shly LS: A.A. w/ LS: crm-tan, fxl, sli fos, sub chky-prtly dns, pr por, NS Calc Sh: lt-med gry, w/ Sh: red-brn, gry, some grn Calc Sh: med-drk gry Sh: drk gry & Blk Carb Sh: drk gry, grn & med gry Sh: A.A. (no sand) LS: crm-lt tan, fxl, sli fos, sub chky-dns, pr por, NS Sh: mstly grn, some yell mottled, w/ gry	Arbuckle 4468' (-1655) EL
		4500	LS: crm-tan, fxl, sdy in prt, sub chky-prtly dns, pr por, 2 pcs w/ brn spdt stn, NSFO, no odor LS: gry, fxl, shly, grn, hrd, pr por, NS Shly LS: A.A. w/ LS: crm-tan, fxl, sli fos, sub chky-prtly dns, pr por, NS Calc Sh: lt-med gry, w/ Sh: red-brn, gry, some grn Calc Sh: med-drk gry Sh: drk gry & Blk Carb Sh: drk gry, grn & med gry Sh: A.A. (no sand) LS: crm-lt tan, fxl, sli fos, sub chky-dns, pr por, NS Sh: mstly grn, some yell mottled, w/ gry	Morgan Mud check @ 4506': 69 Vis, 9.3 Wt, 6.8 WL, 2,600 ppm Chl, 5# LCM L.T.D. 4505' (-1692) R.T.D. 4506' (-1693) Ran 15 stand short trip after circ. @ TD, & prior to running electric logs Straight Hole Survey @ 4506': 1° Dev.