

Robert L. Milford

PETROLEUM GEOLOGIST
Wichita, Kansas

GEOLOGISTS' REPORT

DRILLING TIME AND SAMPLE LOG

OPERATOR Murfin Drilling Company, Inc.
 LEASE Ruder Unit #3-36
 LOC. SPOT 100'S & 115' W of C E2 SE
 LOC. FOOTAGE 1,220' FSL 775' FEL
 SEC. 36 TWPSP 10S RANG 24W
 COUNTY Graham STATE KANSAS
 API 15-065-23943-00-00

CONTRACTOR Murfin Drilling Co., Inc. RIG NO. 16
 DRILLING STARTED 6-11-2013 COMPLETED 6-16-2013
 MUD DISPLACED 3,017' MUD TYPE Chemical
 DRILLING TIME KEPT FROM 3,350' TO RTD
 SAMPLES SAVED FROM 3,350' TO RTD
 SAMPLES EXAMINED FROM 3,350' TO RTD
 GEOLOGICAL SUPERVISION FROM 3,178' TO RTD

FORMATION NAME	LOG TOP DATUM	SAMPLE TOP DATUM
Stone Corral	1,957'	1,957' +400'
Base Stone Corral	2,000'	2,000' +357'
Topeka	3,457'	-1100 3,456' -1099
Heebner	3,679'	-1322 3,679' -1322
Toronto	3,701'	-1344 3,701' -1344
Lansing	3,714'	-1357 3,714' -1357
Stark	3,903'	-1546 3,903' -1546
B/KC	3,944'	-1587 3,944' -1587
Total Depth	4,001'	-1644 4,000' -1643

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ELEVATIONS
 KB 2,357'
 GL 2,352'

MESSURERS/RECKERS
 CASING RECORD
 Conductor _____
 Surface 8-5/8" @ 219'
 w/ 150 socks cement
 Production none

ELECTRICAL SURVEYS:
 Pioneer Wireline:
 Dual Induction Log
 Dual Compensated -
 Porosity Log
 Microresistivity Log
 Borehole Compensated-Sonic Log

36	0
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DATE	7:00 AM DEPTH	REMARKS
6-11-13	0'	Spud @ 1:30 pm. Plug down @ 5:15 pm. Drilled out plug @ 1:15 am on 6-12-13
6-12-13	720'	Cut 720' in last 24 hrs. Dev. 0.5° @ 2543'
6-13-13	2,600'	Cut 1,880' in last 24 hrs; 22 hrs drlg. Dev. 0.5° @ 2643'
6-14-13	3,520'	Cut 920' in last 24 hrs; 20 hrs drlg. DST #1 @ 3805'
6-15-13	3,805'	Cut 285' in last 24 hrs; 9.5 hrs drlg. DST #2 @ 3905'
6-16-13	3,920'	Cut 115' in last 24 hrs; 5.75 hrs drlg. RTD 4000' @ 11:13 am. P&A
6-17-13	4,000'	Cut 80' in last 24 hrs; 3 hrs drlg.

Remarks

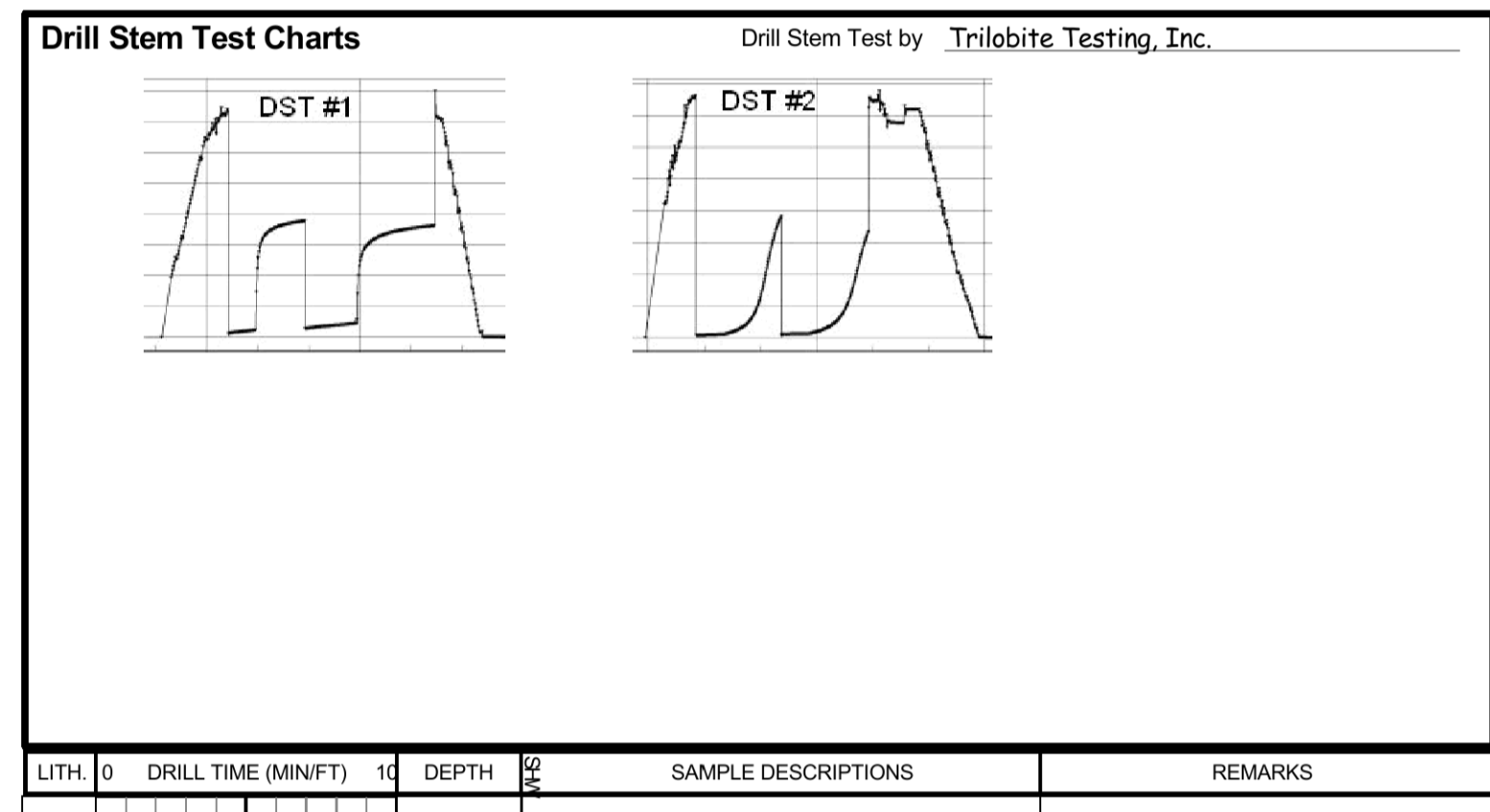
The electric log measurements correlate from even to 1' lower to the drilling measurements.

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



LITH.	0	DRILL TIME (MIN/FT)	10	DEPTH	LOG	SAMPLE DESCRIPTIONS	REMARKS
				1950			Stone Corral 1957' (+400) EL
				2000			B/Stone Corral 2000' (+357) EL

				3350		LS: wh-crm, fxln, fos in prt, some granular, vry chky-prtly dns, pr por, NS Sh: gry, some red-brn & grn LS: crm-gry, fos in prt, sub chky-prtly dns, pr por, NS Sh: mstly gry LS: crm-gry, fxln, fos in prt, sub chky, pr por, NS	Morgan Mud check @ 3041': 73 Vis, 8.7 Wt, 8.0 WL, 1,000 ppm Chl, 0# LCM Call depth 3050' @ 5:10 pm on 6-13-13 Samples start 3350' @ 1:43 am on 6-14-13
				3400		Sh: gry, some red-brn LS: crm-gry, fxln, fos in prt, some sli shly, sub chky-prtly dns, pr por, NS LS: crm-drk gry, fxln, fos in prt, some shly, some mottled, sub chky-prtly dns, pr por, NS Sh: gry, some red-brn & grn Sh: gry, some soft & gummy, some red-brn & grn	Topeka 3457' (-1100) EL
				3450		LS: crm-tan, fxln, fos in prt, sub chky-prtly dns w/ some chky-vry chky, pr por, NS LS: A.A. w/ LS: gry, fxln, sli shly, pr por, NS Sh: gry, some grn LS: wh-tan, fxln, ool-fos in prt, sub chky-prtly dns w/ some chky-vry chky, pr por, NS	Heebner 3679' (-1322) EL
				3500		LS: wh-tan, fxln, fos-ool in prt, chty (lt gry-tan), vry chky-prtly dns, some pr-fr intrprtcal por, NS LS: A.A., dcns amnt chky-vry chky, pr por, NS Sh: Black Carb LS: brn, fxln, fos, prtly dns, pr por, NS Sh: gry, some silty LS: wh-tan, fxln, ool-fos in prt, vry chky-prtly dns, pr por, NS LS: A.A., incrs chky-vry chky, pr-fr intrprtcal por, NS	Toronto 3701' (-1344) EL Lansing 3714' (-1357) EL
				3550		LS: wh-tan, fxln, ool-fos in prt, chty (wh-tan), sub chky-dns w/ some chky, pr w/ tr fr intrprtcal por, NS LS: crm, fxln, sli fos, chty (wh), sub chky-dns w/ some chky, pr por, NS Sh: gry, some grn & red-brn	Morgan Mud check @ 3748': 55 Vis, 9.1 Wt, 8.0 WL, 1,700 ppm Chl, 0# LCM DST #1 3677'-3805' Toronto-LKC 'F' zn IF: blow built to 3" IS: no blow back FF: blow built to 1.25" FSI: no blow back Rec: 190 SOCM (2% O, 98% M) IFP: 24-59#/30" ISIP: 946#/60" FFP: 69-113#/60" FSIP: 907#/90"
				3600		LS: crm, fxln, ool-fos, chty (crm-org), sli pyr, sub chk-prt dns, pr-fr intrprt & 1 pc ooc por, scat mstly lt brn spdt-sat stn, SSFO, no odor LS: wh-crm, fxln, sli ool-fos, chty (crm), sub chky-prtly dns w/ some chky, pr w/ tr fr intrprtcal por, tr brn spdt-patchy stn, 1 pc w/ VSSFO, no odor LS: A.A., pr por, rare stn, NSFO, no odor LS: wh-crm, fxln, fos-ool, chky-prt dns, pr-fr w/ some gd intrprt por, scat lt brn sub sat-sat stn, S-FSFO (mstly pin-point beads), sli odor LS: wh-crm, fxln, fos-ool, chky-prt dns, pr-fr intrprt por, scat lt brn sub sat-sat stn, SSFO (pin point beads), fnt odor LS: wh-crm, fxln, fos-ool in prt, some granular, chty (wh-crm), vry chky-prtly dns, pr-fr intrprtcal por, NS LS: crm-lt gry, fxln, sli fos, sub chky-prtly dns w/ some chky-vry chky, pr por, NS LS: A.A., w/ some lt-med gry & tan, pr por, NS Sh: Black Carb LS: tan-brn, fxln, fos, prtly dns, pr por, NS Sh: gry-grn	Ran 20 stand short trip prior to DST #1 Pipe Strap @ 3805': Strap long 0.02' Straight Hole Survey @ 3805': 0.5° Dev. Ran another bit (re-run) @ 3805' Morgan Mud check @ 3809': 58 Vis, 9.1 Wt, 8.0 WL, 2,000 ppm Chl, 0.5# LCM
				3650		LS: wh-tan, fxln, fos-ool in prt, chty (lt gry-tan), vry chky-prtly dns, some pr-fr intrprtcal por, NS LS: A.A., dcns amnt chky-vry chky, pr por, NS Sh: Black Carb LS: tan-brn, fxln, fos in prt, sub chky-prtly dns, pr por, NS Sh: gry & grn	Heebner 3679' (-1322) EL
				3700		LS: wh-tan, fxln, fos-ool in prt, chty (wh-tan), sub chky-dns w/ some chky, pr w/ tr fr intrprtcal por, NS LS: crm, fxln, sli fos, chty (wh), sub chky-dns w/ some chky, pr por, NS Sh: gry, some grn & red-brn	Toronto 3701' (-1344) EL Lansing 3714' (-1357) EL
				3750		LS: crm, fxln, ool-fos, chty (crm-org), sli pyr, sub chk-prt dns, pr-fr intrprt & 1 pc ooc por, scat mstly lt brn spdt-sat stn, SSFO, no odor LS: wh-crm, fxln, sli ool-fos, chty (crm), sub chky-prtly dns w/ some chky, pr w/ tr fr intrprtcal por, tr brn spdt-patchy stn, 1 pc w/ VSSFO, no odor LS: A.A., pr por, rare stn, NSFO, no odor LS: wh-crm, fxln, fos-ool, chky-prt dns, pr-fr w/ some gd intrprt por, scat lt brn sub sat-sat stn, S-FSFO (mstly pin-point beads), sli odor LS: wh-crm, fxln, fos-ool, chky-prt dns, pr-fr intrprt por, scat lt brn sub sat-sat stn, SSFO (pin point beads), fnt odor LS: wh-crm, fxln, fos-ool in prt, some granular, chty (wh-crm), vry chky-prtly dns, pr-fr intrprtcal por, NS LS: crm-lt gry, fxln, sli fos, sub chky-prtly dns w/ some chky-vry chky, pr por, NS LS: A.A., w/ some lt-med gry & tan, pr por, NS Sh: Black Carb LS: tan-brn, fxln, fos, prtly dns, pr por, NS Sh: gry-grn	Morgan Mud check @ 3748': 55 Vis, 9.1 Wt, 8.0 WL, 1,700 ppm Chl, 0# LCM DST #1 3677'-3805' Toronto-LKC 'F' zn IF: blow built to 3" IS: no blow back FF: blow built to 1.25" FSI: no blow back Rec: 190 SOCM (2% O, 98% M) IFP: 24-59#/30" ISIP: 946#/60" FFP: 69-113#/60" FSIP: 907#/90"
				3800		LS: wh-tan, fxln, fos-ool in prt, chty (lt gry-tan), vry chky-prtly dns, some pr-fr intrprtcal por, NS LS: A.A., dcns amnt chky-vry chky, pr por, NS Sh: Black Carb LS: tan-brn, fxln, fos in prt, sub chky-prtly dns, pr por, NS Sh: gry & grn	Heebner 3679' (-1322) EL
				3850		LS: wh-lt tan, fxln, fos-ool in prt, vry chky-prtly dns, pr por, vry scat brn-blk spdt-patchy stn, 1 pc w/ SSFO, no odor LS: tan, fxln, fos (fusl), prtly dns, pr por, NS LS: wh-tan, fxln, ool-fos in prt, fr vry chky-dns, pr w/ some fr intrprtcal por, scat lt brn sub sat-sat stn, S-FSFO, fnt odor Sh: red-brn, soft & gummy in prt, some gry LS: wh-crm, fxln, ool-fos in prt, sli chty (wh), vry chky-dns, pr intrprtcal w/ some fr-gd vug por, scat lt brn-blk spdt-patchy w/ tr-sub sat-sat stn, S-FSFO, no odor Sh: mstly gry, w/ red-brn, some soft & gummy, some grn LS: crm, fxln, ool (med) in prt, sub chky-prtly dns w/ some chky-vry chky, pr w/ tr fr intrprtcal por, tr brn-blk spdt-patchy stn, some live stn, NSFO, no odor LS: wh-tan, fxln, fos in prt, vry chky-prtly dns, pr por, NS	DST #2 3835'-3905' Lans 'H'-'J' zns IF: blow built to 0.25" FF: blow built to 1.25" FSI: no blow back Rec: 40' OCM (10% O, 90% M) IFP: 19-27#/30" ISIP: 951#/60" FFP: 21-32#/30" FSIP: 831#/60"
				3900		LS: wh-tan, fxln, fos in prt, vry chky-prtly dns, pr por, NS Sh: gry-grn, some red-brn Sh: gry & red-brn, some grn LS: crm-lt gry, fxln, fos in prt, sli chty (wh), sub chky-prtly dns w/ some chky, pr por, NS Sh: red-brn, some soft & gummy, & gry LS: crm-gry, fxln, fos in prt, some sdy, some shly (red-brn, mottled), sub chky-prtly dns, pr por, NS	Stark 3903' (-1546) EL
				3950		LS: wh-tan, fxln, fos in prt, vry chky-prtly dns, pr por, NS Sh: gry-grn, some red-brn Sh: gry & red-brn, some grn LS: crm-lt gry, fxln, fos in prt, sli chty (wh), sub chky-prtly dns w/ some chky, pr por, NS Sh: red-brn, some soft & gummy, & gry LS: crm-gry, fxln, fos in prt, some sdy, some shly (red-brn, mottled), sub chky-prtly dns, pr por, NS	B/KC 3944' (-1587) EL
				4000		LS: crm-gry, fxln, fos in prt, some sdy, some shly (red-brn, mottled), sub chky-prtly dns, pr por, NS	Morgan Mud check @ 4000': 52 Vis, 9.2 Wt, 8.0 WL, 1,900 ppm Chl, 1.5# LCM R.T.D. 4000' (-1643) L.T.D. 4001' (-1644)