Jeff Christian

PETROLEUM GEOLOGIST

Wichita, Kansas

GEOLOGIST'S REPORT

DRILLING TIME AND SAMPLE LOG

OPERATOR MURFIN DRILLING CO., INC.

LEASE AFT # 1-5

LOCATION 330' FNL & 2190' FEL

SEC. 5 TWSP 3 S RNG 36 W

COUNTY RAWLINS STATE KANSAS

FIELD UNKNOWN

API 15-153-20920

CONTRACTOR COMPANY TOOLS RIG NO. 14

DRILLING STARTED 03/06/2013 COMPLETED 03/14/2013

MUD DISPLACED 3397' MUD TYPE CHEMICAL

DRILLING TIME KEPT FROM 3630' TO RTD

SAMPLES SAVED FROM 3630' TO RTD

SAMPLES EXAMINED FROM 3630' TO RTD

GEOLOGICAL SUPERVISION FROM 3710' TO RTD

ELEVATIONS

KB 3369'

GL 3359'

MEASUREMENTS FROM K.B.

CASING RECORD

Conductor NONE

Surface 8 5/8" @ 395'

W/ 350 SX

Production 5 1/2" @ 4846'

W/ 175 SX

ELECTRICAL SURVEYS:

PIONEER

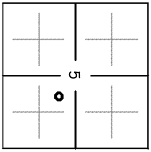
DIL

CNL/CDL

MEL

BHCS

FORMATION NAME	LOG TOP	LOG DATUM	SAMPLE TOP	SAMPLE DATUM
ANHYDRITE	3223'	(+146)	3221'	(+148)
NEVA	3724'	(-355)	3724'	(-355)
FORAKER	3843'	(-474)	3843'	(-474)
TOPEKA	4086'	(-717)	4086'	(-717)
LANSING	4295'	(-926)	4295'	(-926)
STARK	4518'	(-1149)	4518'	(-1149)
BKC	4568'	(-1199)	4563'	(-1194)
PAWNEE	4693'	(-1324)	4693'	(-1324)
CHEROKEE	4767'	(-1398)	4765'	(-1396)
TOTAL DEPTH	4853'	(-1484)	4850'	(-1481)



DATE	7:00 AM DEPTH	REMARKS
3/6/13	MIRT	SPUD 5:00 pm
3/7/13	396'	WOC dev. 1/2 deg.
3/8/13	1780'	DRLG. (lost circ: 1335' & 1391'; 4.5 hrs DT)
3/9/13	3619'	BIT TRIP dev. 1 deg.
3/10/13	3936'	DRLG.
3/11/13	4376'	TOH for DST # 1 dev. 1 deg.
3/12/13	4430'	TOH w/ DST # 2
3/13/13	4522'	TIH after DST # 3
3/14/13	4735'	DRLG. RTD 4850' @ 11:20 am dev. 1.5 deg.
		Finish Logging @ 11:00 pm

Remarks

5 1/2" production casing set to further test the Lansing / Kansas City formation.

Electric log measurements correlate about even compared to rotary measurements.

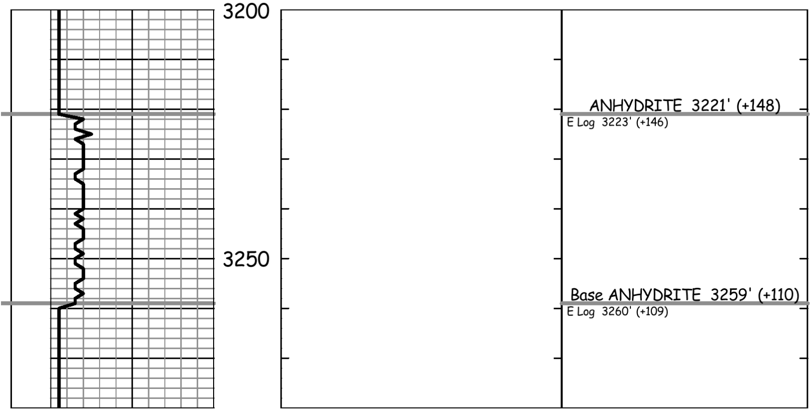
Samples deposited at the Kansas Geological Survey.

Respectfully Submitted,

Jeff Christ

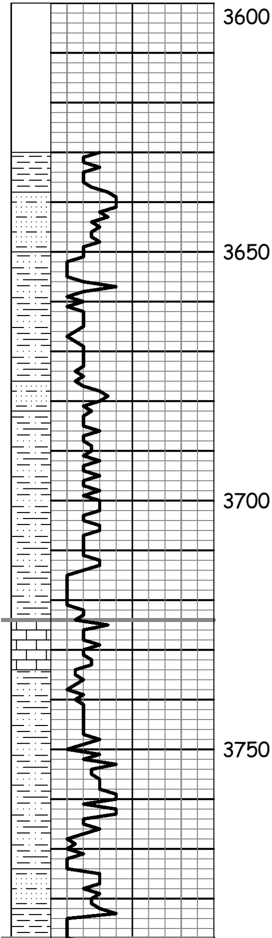
Jeff Christian

LITH.	0 DRILL TIME (MIN/FT) 10	DEPTH	SHW	SAMPLE DESCRIPTIONS	REMARKS



ANHYDRITE 3221' (+148)
E Log 3223' (+146)

Base ANHYDRITE 3259' (+110)
E Log 3260' (+109)



Sh: red, sndy w/ Sst: crm-lt gry, vy fn grn, rare fn-med grn, vy sli calc, hrd, pr vis por, ns

Same sct lt grn sst

Sh: red-brn, sndy

same

Sh: red-brn, sndy, sli inc Sst: as above

Same

Same

Sh; red-brn w/ Sst: lt gry, vy fn grn, fri in part, pr vis por, ns

Ls: wt-crm, fn xln, chlky, sndy, pr vis por, ns

Ls: crm-lt gry, fn xln, part dns, chlky in part, sli foss-ool, pr vis por, ns

Sh: red-brn, sndy

Same

Sh: as above w/ Sst: lt gry-lt grn, vy fn grn, hrd, pr vis por, ns

Same

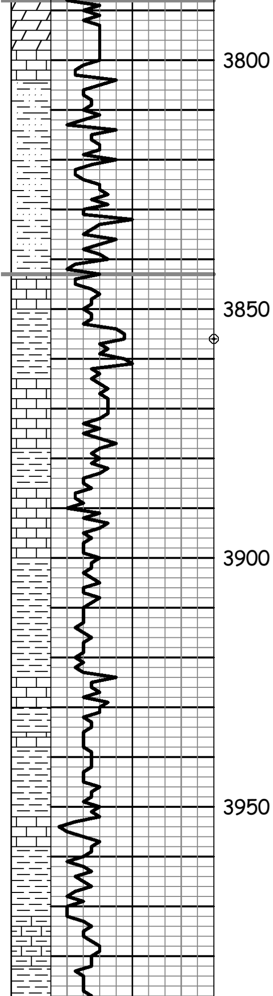
Bit Trip @ 3619':
Pipe Strap: .85' short to board

Morgan Mud Check @ 3619': 3/9/13
Wt. 8.6, Vis. 80, WL. 4.8, Chl. 1,000, LCM. 4

NEVA 3724' (-355)

E Log 3724' (-355)

RED EAGLE 3788' (-419)



Dolo: crm-lt gry, fn xln, sli suc, chrty (orng), pr vis por, ns

E Log 3788' (-419)

Ls: lt gry, fn xln, part dns, foss, chrty (orng-lt gry), pr vis por, ns

Sh: red-brn, sndy in part, gummy in part

Same

Same

FORAKER 3843' (-474)

E Log 3843' (-474)

Ls: wt-crm-lt gry, fn xln, chlky, sli sndy in part, pr vis por, ns

Ls: brn-gry, fn xln, dns, foss, shly

Ls: lt gry-gry-brn, fn x;ln, dns, foss, sct wt chlk

Sh: gry-some grn

Ls: crm-lt brn-lt gry, fn xln, dns, chlky in part, sli foss, pr pp-vug por, ns

Sh: gry, calc, silty

Morgan Mud Check @ 4000': 3/10/13
Wt. 9.0, Vis. 60, WL. 5.2, Chl. 1,000, LCM. 5

Sh: red-brn-gry

Ls: crm, fn xln, gnlr, foss-ool in part, chrty, pr vis por, ns

Ls: gry, fn xln, dns, sli foss

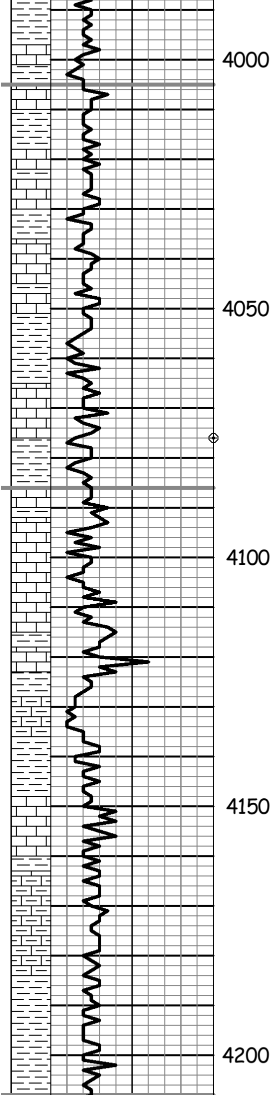
Sh: red-gry-lt prpl, calc

Sh: red-brn-gry, some grn

Same

Ls: lt gry-gry, fn xln, dns, foss, shly

Sh: red-brn, gummy, gry-grn, calc in part



Ls: lt gry-gry, fn xln, dns

STOTLER 4005' (-636)

E Log 4005' (-635)

Ls: lt gry-gry, fn xln, dns, foss-sli ool, pr vis por, ns

Sh: red, gummy

Ls: crm-lt gry, fn xln, dns, chlky in part, sli foss, pr vis por, ns

Ls: crm-lt brn-lt gry, fn xln, foss-ool, sct wt chlk, pr vis por, ns

Ls: as above w/ Sh: red, gummy

Sh: red, gummy, sndy & silty in part

Ls: crm-lt gry, fn xln, part dns, foss-ool, pr pp-vug por, ns

Sh: red-brn, gummy, some gry & grn

TOPEKA 4086' (-717)

E Log 4086' (-717)

Ls: wt-lt gry, fn xln, dns, sli chlky, sli ool, pr vis por, abndnt blk asph sptd stn, nsfo, no odor

Ls: wt-crm-lt gry, fn xln, dns, ool in part, pr vis por, ns

Same

Ls: lt brn-lt red, fn xln, vy sndy, few pcs moldic por, ns

Ls: as above w/ Sh: red-brn-gry

Sh: red-brn-gry

Ls: lt gry, fn xln, dns, some chlky, pr vis por, ns

Ls: lt gry-lt grn/gry, fn xln, dns, sli slty w/ Sh: gry-lt prpl, calc

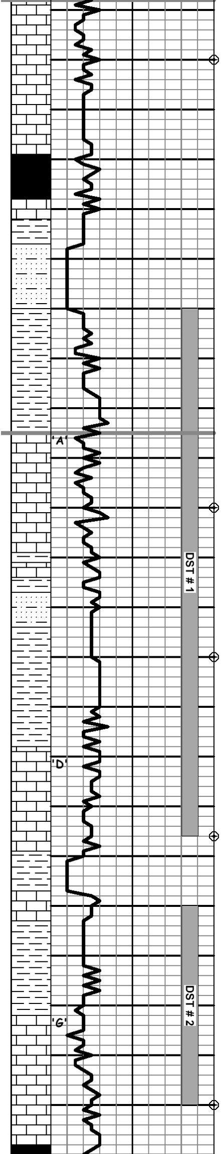
Same

SAme

Sh: gry

Same

OREAD 4208' (-839)



Ls: wt-lt gry, fn xln, sli foss, pr-fr vug por, sptd blk asph-tarry stn, nsfo, no odor

Ls; lt gry-lt brn, fn xln, dns, pr vis por, ns

Same, subchlky in part

Sh: drk gry-blk, calc

4250

Ls: lt gry-lt brn, fn xln, dns, pr vis por, ns

Sst: lt gry-lt brn, vy fn-fn grn, calc, fri, pr vis por, sct blk sptd gil stn, nsfo, no odor

Sh: red-brn, some gry & grn

Same

Ls: lt gry-lt brn, fn xln, dns, foss-sli ool in part, pr-fr foss-vug por, ssfo, no odor, drk brn sptd-subsat stn

4300

Ls: lt brn-lt gry, fn xln, dns, pr vis por, trc edge stn

Ls: crm-lt gry, fn xln, foss, pr-fr vug-foss por, ssfo, no odor, brn sptd-subsat stn

Sst: gry-brn, vy fn grn, calc, hrd-subfri, pr vis por, ssfo, no odor, brn sat stn

Sh: red-brn, gummy, some gry & grn

4350

Same

Ls: wt-lt gry, fn xln, sli chlky, foss-ool, pr-fr intrpart -pp-vug por, sli-fr sfo, sli odor, subsat-sat stn

Ls: crm-lt gry, fn xln, foss, sct pr-fr foss-vug por, ssfo, fnt odor, lt brn sptd-subsat stn

Ls: crm-lt gry, fn xln, dns, chlky in part, pr vis por, ns

Sh: drk gry-blk, carb in part

Ls: gry-some brn, fn xln, dns, sli foss in part, pr vis por, ns

4400

Sh: gry-grn, some red & brn

Sh: red-brn, gummy, gry & grn

Ls: crm-lt gry, fn xln, foss, pr-some fr-trc gd vug por, sli-fr sgfo, sli odor, brn-drk brn, sptd-mostly subsat stn, trc sat stn

Ls: wt-crm-lt gry, fn xln, chlky, part dns, sct pr vug por, nsfo, brn-blk sptd stn

Ls: as above

E Log 4208' (-839)

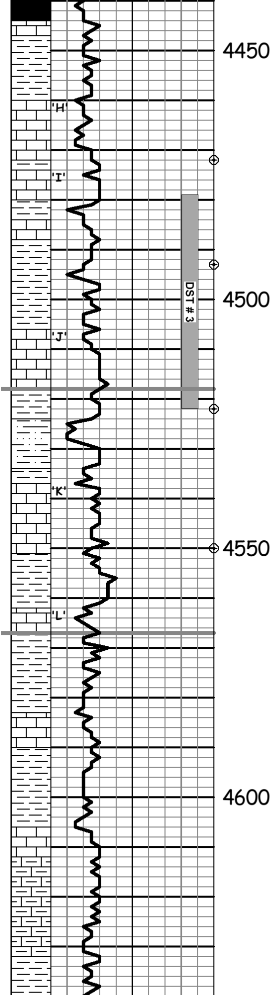
LANSING 4295' (-926)

E Log 4295' (-926)

DST # 1 4270' to 4376'
30"-60"-30"-90"
IF: BOB/1.5" ISI: Surface Blow/Died/15"
FF: BOB/3" FSI: No Return
RECOVERY: 2322' total fluid
380' MCO (60%O, 40%M)
564' SM&WCGO (30%G,50%O,10%W,10%M)
658' GO&WCM (20%G,20%O,20%W,40%M)
360' OCMW (20%O,50%W,30%M)
360' SMW w/ oil spts (90%W, 10%M)
IFP: 188-683# ISIP:1260#
FFP: 697-939# FSIP: 1262#
IHP: 2160# FHP: 2151#
BHT: 134 deg. F
CHL: 30,000 ppm (tester)
15,000 ppm (mud man)
RW: .23 @ 70 deg. F

Morgan Mud Check @ 4376': 3/11/13
Wt. 9.1, Vis. 51, WL. 5.6, Chl. 1,000, LCM. 4

DST # 2 4390' to 4430'
30"-60"-30"-90"
IF: BOB/5" ISI: Surface Blow/Died/45"
FF: BOB/6" FSI: No Return
RECOVERY: 1335' total fluid
30' CO (gravity 36 corrected)
490' SOCMW (10%O,70%W,20%M)
282' SOCMW (10%O,80%W,10%M)
523' SMW (90%W,10%M)
IFP: 93-417# ISIP:1250#
FFP: 412-594# FSIP: 1234#
IHP: 2216# FHP: 2199#
BHT: 139 deg. F
CHL: 23,000 ppm (tester)
19,800 ppm (mud man)
RW: .41 @ 54 deg. F



Sh: blk, carb

Sh: gry-grn, some mar, gummy in part

Ls: crm-lt brn, fn xln, dns, sli foss, sct wt chlk, pr vis por, ns

Ls: as above, abndnt wt chlk, ns

Ls: crm-lt brn-lt gry, fn xln, dns, sli foss, chlky in part, pr vis por, ns

Sh: red-brn, slty, some gry & grn

Sh: as above

Ls: crm-lt gry, fn xln, subchlky, part dns, foss, pr-sct fr vug-foss por, sli-fr sfo, sli odor, brn-drk brn sptd-subsat stn, some sat stn

Sh: lt gry-gry, gummy in part

Sh: red-brn, sndy, gummy in part, some gry & grn

Ls: wt-lt gry, fn xln, chlky in part, ool in part, pr introol por, ns

Ls: as above, less ool, more chlky

Sh: red-brn, gummy, some gry & grn

Ls: crm-lt gry, fn xln, chlky, part dns, sli foss, pr vis por, ns

Sh: red-brn, sli gummy

Ls: crm-lt gry, fn xln, dns, chlky in part, foss in part, pr vis por, ns

Sh: red-brn, gummy, some gry & grn

Ls: lt gry-lt brn, fn xln, part chlky, part dns, foss, pr vis por, ns

Sh: gry-grn-some lt prpl, calc

Sh: red-brn, gummy in part, some gry-grn, calc

Sh: as above, sndy-slty in part

Morgan Mud Check @ 4430': 3/12/13
Wt. 9.2, Vis. 52, WL. 5.6, Chl. 1,500, LCM. 4

DST # 3 4479' to 4522'
30"-60"-60"-90"
IF: Blow Built to 4" ISI: No Return
FF: Blow Built to 1" FSI: No Return
RECOVERY: 60' total fluid
40' CO (gravity 38 corrected)
20' MCO (60%O, 40%M)
IFP: 12-18# ISIP: 779#
FFP: 18-33# FSIP: 570#
IHP: 2262# FHP: 2250#
BHT: 126 deg. F

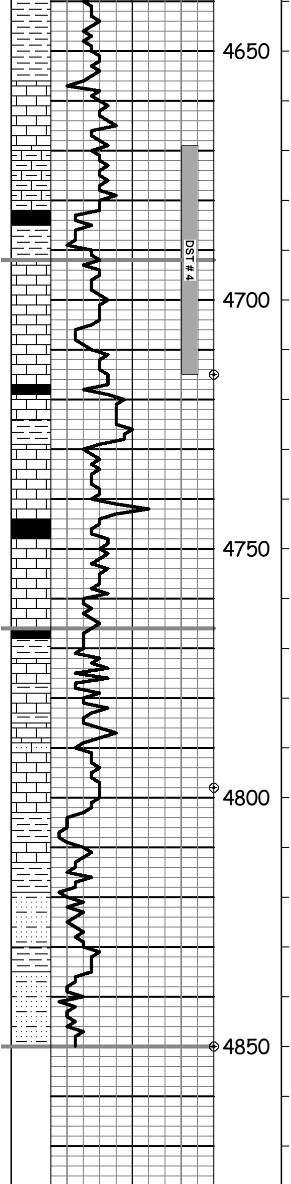
STARK 4518' (-1149)

E Log 4518' (-1149)

BKC 4567' (-1198)

E Log 4568' (-1199)

Morgan Mud Check @ 4584': 3/13/13
Wt. 9.2, Vis. 62, WL. 6.0, Chl. 1,500, LCM. 4



Same

Ls: wt-lt brn-lt gry, fn xln, part dns, vy chlky, ool in part, pr vis por, ns

Ls: lt gry-gry, fn xln, dns, subchlky in part, pr vis por, ns

Sh: lt gry, gummy w/ Ls: gry, fn xln, dns

Sh: gry-drk gry-blk, carb

Ls: crm-lt gry, fn xln, part dns, part chlky, foss, pr-some fr pp-vug por, sli-fr sgfo, sli odor, vy sct sptd-subsat-trc sat stn

Ls: crm-lt gry, fn xln, sli grnlr, foss-ool, pr intrxln por, ns w/ abndnt wt, gummy chlk

Ls: as above, more dns, less chlky

Sh: blk, carb

Ls: wt-lt gry, fn xln, chlky, part dns, sli foss, pr vis por, ns

Ls: wt-lt gry, fn xln, chlky in part, sli foss in part, pr vis por, ns

Ls: lt gry-lt brn, fn xln, dns, some chlky

Sh: drk gry, some blk, carb, gummy in part

Ls: crm-lt brn-lt gry, fn xln, part dns, part chlky, sli ool, in part, pr vis por, ns

Ls: as above w/ chert (orng-tan, foss in part)

Sh: gry, trc blk, carb

Ls: crm-lt brn-lt gry, fn xln, dns, part chlky, sli foss w/ chrt, as above, pr vis por, ns

chrty Ls: as above w/ sct Sst: clr-lt gry, fn-crs grn, pr srt, subang-subrnd, calc, well cmntd, sli glauc, pr vis por, ns

Ls: crm-lt brn-lt gry, fn xln, part dns, part chlky, part sndy, sli chrty, pr vis por, ns

sct Sh: gry-grn-red-brn

Ls: crm-lt brn-lt gry, fn xln, chlky, part dns,sli foss, pr vis por, ns

Sh: gry-grn-red-brn

Sst: clr, fn-crs grn, pr srt, subang-subrnd, calc in part, fri, fr por, ns

Sh: gry-grn, sndy in part

Sst: clr-yell-orng, med-crs grn, pr srt, subang, qtz cmnt, hard, fr por, ns

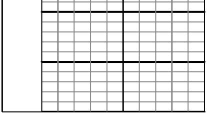
DST # 4 4669' to 4715'
30"-60"-30"-60"
IF: Blow Built to 1" ISI: No Return
FF: No Blow FSI: No Return
RECOVERY: 10' Mud w/ oil spts
IFP: 12-16# ISIP: 1144#
FFP: 15-16# FSIP: 1110#
IHP: 2418# FHP: 2408#
BHT: 131 deg. F

PAWNEE 4692' (-1323)
E Log 4693' (-1324)

CHEROKEE 4766' (-1397)
E Log 4767' (-1398)

Morgan Mud Check @ 4828': 3/14/13
Wt. 9.3, Vis. 69, WL. 5.6, Chl. 1,400, LCM. 4

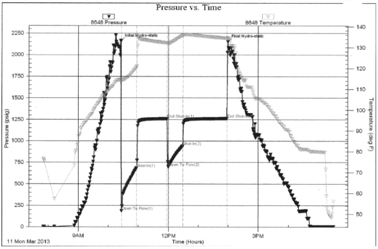
RTD 4850' (-1481)
E Log 4853' (-1484)



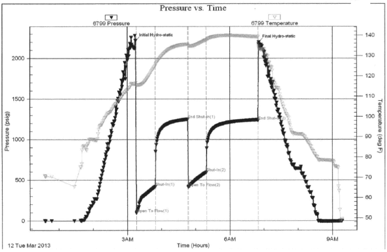
4900

Drill Stem Test Charts

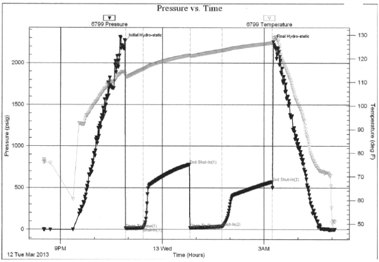
Serial #: 8648 **Inside** Murfin Drilling, Co. AFT #1-5 DST Test Number: **#1**

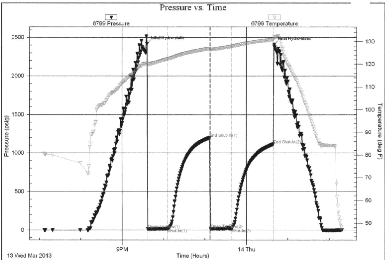


Serial #: 6799 **Inside** Murfin Drilling, Co. AFT #1-5 DST Test Number: **#2**



Serial #: 6799 **Inside** Murfin Drilling, Co. AFT #1-5 DST Test Number: **#3**



Serial #: 6799 **Inside** Murfin Drilling, Co. AFT #1-5 DST Test Number: **#4**