WELLSITE GEOLOGIST'S REPORT

VERNON C. SCHRAG
CONSULTANT GEOLOGIST

MURFIN
DRILLING COMPANY, INC.
WICHITA, KANSAS

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

Well Name:	Thornburg #2-6		
Location:	N2 S2 NE SW SEC 06-08S-14W		
Licence Number:	API: 15-141-20451	Region:	Osborne Co., KS
Spud Date:	July 27, 2012	Drilling Completed:	SWDW, August 1, 2012
Surface Coordinates:	1900' FSL & 1980' FWL		
Bottom Hole Coordinates:			
Ground Elevation (ft):	1852'	K.B. Elevation (ft):	1857'
Logged Interval (ft):	1300' To: RTD	Total Depth (ft):	3830'
Formation:	Arbuckle		
Type of Drilling Fluid:	Chemical Premix (Displaced)		

Printed by MUD.LOG from WellSight Systems 1-800-447-1534 www.WellSight.com

OPERATOR:

Company: Murfin Drilling Co., Inc.
Address: 250 North Water, Suite 300
Wichita, KS 67202-1216

DRILLING CONTRACTOR:

Murfin Drilling Company, Rig #16 (Company Tools)

DP 4.5" XH (16.6#); DC 6.25" x 2.50" x 415', Kelly + Sub 41.75', Tool Joint 5.5" ; Bit: HTC GXZOC, 7-7/8", jets 16-16-18; Kelly Bushing 5' above ground level; Andy Dinkel (tool pusher).

SURFACE CASING:

8-5/8" casing at 216'

CIRCULATION SYSTEM:

Continental EMSCO D-375, 6x14 duplex pump, 60-62 spm, Chemical, premix, Morgan Mud, Inc., McCook, Nebraska, David Lines.

GAS DETECTION SYSTEM:

USB-1208LS-41, portable hot-wire, Delphian 3.0 volt catalytic bead conbustible gas detector.

OPEN HOLE LOGS:

DN, DI (SP) (Run-1); ML/Sonic (Run-2); 5" detail LTD-2700'; 2" DI to suface casing; LogTech-Pioneer Wireline, Hays, KS, Kenyon Bange, Log total depth (3829') was one foot high to rotary total depth (3830').

DRILL STEM TEST #1:

Topeka: Interval: 2800-2825 (25'): No Blow: Times: 30-60-30-60: Recovery: 2' mud w/oil spots; HP: 1354-1323; SIP: 220-186; FP: 16-16, 16-17; BHT: 93 F; dual packers, 30' DC, jars, joints; Trilobite Testing, Inc., Jason McLemore.

DRILL STEM TEST #2:

Toronto, Lansing A thru D: Interval: 3011-3125 (114'): Blow: weak incr 2-1/4" IFP, no RB, weak incr 3" FFP, no RB; Times: 30-60-60-90: Recovery: 122' TF, 2' Oil (100%O, 31 grav), 120' MW (5%M, 95%W, Rw 0.35 @ 110 F, chl 12k); HP: 1536-1509; SIP: 1198-1195; FP: 66-88, 90-123; BHT: 97 F; dual packers, 30' DC, jars, joints; Trilobite Testing, Inc., Jason McLemore.

ROP
ROP (min/ft)
DST
Lithology
Porosity and Show
Depth
Geological Descriptions
Total Gas
TG (units)
ROP 0 15
Hot-Wire 0 100
CONN
STONE CORRAL
START DIGITAL ROP 07/27/2012 - 3:31 pm
B/ ANHY
START 10' SAMPLES
3 OZ CARBIDE DROP AT CONN 1530: PUMP RATE 60.83 SPM, RESPONSE TIME 9.0 MIN; AVE AV = 240.12 FPM.
71/12
59 UNITS
10 SEC GAS TEST FROM AGITATOR TO DETECTOR
172 UNITS
START DISPLACEMENT AND INSTALL COMMERCIAL DRILLING MUD AT 2482.
3 OZ CARBIDE DROP AT CONN: 2704: 60.83 SPM, RESPONSE IN 19.3 MIN. BOT UP 14.58 MIN, AVE AV = 185.50 FPM.
54/18
36 UNIT INCR
CARBIDE RECYCLE
CARBIDE RECYCLE
MORGAN MUD: 2825: 07/29- 9am: VIS 62, WT 8.8, FIL 6.8, pH 11.5, CHL 2000, LCM 0#.
DST #1: TOPEKA: 2800-2825: NO BLOW: 30-60-30-60; 2' MUD; SIP: 220-186, FP: 16-16, 16-17.
TRIP
HEEBNER
TORONTO
LANSING
26/23
3 UNIT SHALE GAS
32/26
6 UNIT CONN GAS
33/28
5 UNIT GAS SHOW
AGITATOR SLIPPED DOWN INTO MUD, IS PROBABLY REASON FOR UNUSUAL CONN KICKS
52/25
27 UNIT CONN GAS
30/24
6 UNIT GAS SHOW
60/24
36 UNIT CONN GAS
MORGAN MUD: 3125: WHILE TESTING; 07/30-2pm: VIS 49, WT 9.2, FIL 7.2, pH 11.0, CHL 3000, LCM 0#.
DST #2: LANSING: 3011- 3125: WEAK BLOW; 30-60- 60-90; 2' OIL, 120' MW; SIP: 1198-1195; FP: 66-88, 90-123.
63 UNIT CONN GAS
88/25
TRIP
MUNCIE
ADJUST AGITATOR
STARK
HUSH
BKC
MARMATON
MORGAN MUD: 3390: 07/31- 3pm: VIS 59, WT 9.3, FIL 7.2, pH 11.0, CHL 3400, LCM 7#.
PAWNEE
FT SCOTT
CHEROKEE
VIOLA
SIMPSON
ROUGH DRILLING
BACKSPIN
ARBUCKLE
SHORT TRIP BEFORE LOGS
LOG-TECH PIONEER WIRELINE LTD 3829'
RTD

ANHYDRITE 1126 (+731)

B/ ANHYDRITE 1163 (+694)

SALT 1534 (+323)

Shale: gray, green;

LS: lt-brown; vf-xtal; dense, blocky; no visible porosity; N.S.

Shale: gray, green, maroon;

LS: lt brown, lt gray; mic-vf xtal; anhydritic; no visible porosity; N.S.

Shale: gray, green, maroon;

CHASE GROUP 1715 (+142)

DOL: lt brown, tan; vf-xtal; sli sucrosic; tight int xtal porosity; N.S. trace.

Shale: mostly greens, grays; some maroon; w/ anhydrites;

Shale: as above w/trace coarse quartz grains; N.S.

WINFIELD 1766 (+91)

LS: lt-md gray; vf-xtal; v-finely granular; v-tight int xtal porosity at best; N.S.

Shale: greens, gray, dk gray, minor maroon; anhydrites;

Shale: as above;

TOWANDA 1836 (+21)

LS: white, lt gray; mic-vf xtal; anhydritic; no visible porosity; N.S., 1880.

Shale: mostly gray, green as above;

LS: white, lt gray; mic-vf xtal; anhydritic; no visible porosity; N.S.

LS: lt gray, mottled dk gray; vf-xtal; anhydritic; fos-frag; fair int frag porosity; N.S., 1940.

LS: as above.

LS: lt gray, lt brown; vf-xtal; dense; no visible porosity; N.S.

Shale: gray, green, maroon;

LS: white, lt gray; mic-vf xtal; chalky; no apparent porosity; N.S.

Shale: gray, green, maroon;

LS: white, lt gray; mic-vf xtal; chalky; poor apparent porosity; N.S.

LS: as above.

Shale: gray, green, maroon;

LS: lt grayish brown; vf-xtal; dense; no visible porosity; N.S.

Shale: gray, green, maroon;

LS: lt grayish brown; vf-xtal; dense to chalky in part; no visible porosity; N.S.

LS: white, lt grayish brown; mic-vf xtal; dense to chalky; no visible porosity; N.S.

LS: as above;

Shale: gray, green, maroon

LS: white, lt grayisy brown; mic-vf xtal; dense; no apparent porosity; N.S.

Shale: gray, green, maroon;

NEVA 2181 (-324)

(Corrected Top)

LS: lt gray; vf-xtal; v-finely oomoldic; poor oomoldic porosity; N.S., 2210 sample.

LS: lt gray, lt brown; vf-xtal; dense; no visible porosity; N.S.

LS: lt gray; vf-xtal; finely oolitic to oomoldic as above; poor oomoldic porosity; N.S.

NOTE: native mud samples are very poor and basically non-descript from here down, consisting of 99% gray, green & maroon shales thru to below mudup depth, 2600.

Poor samples.

Poor samples.

FORAKER 2306 (-449)

LS: lt brown; vf-xtal; finely oomoldic; poor- fair oom porosity; N.S., only trace, poor samples, 2360,

Poor samples.

Poor samples.

Poor samples.

Poor samples.

Poor samples.

Poor samples.

Poor samples.

STOTTLER 2574 (-717)

Poor samples.

Shale: greenish gray; silty in part; marly; soft; sticky;

TARKIO 2626 (-769)

LS: lt brown to md-dk grayish brown; shaley in part; sli fos; poor apparent porosity; N.S.

Shale: gray, green; marly; pyritic;

LS: grayish brown; vf-xtal; dense; no apparent porosity; N.S.

LS: lt-md brown; vf-xtal; dense; no visible porosity; N.S.

LS: lt-brown, lt grayish brown; vf-xtal; dense; rough; no visible porosity; N.S.

LS: as above.

Shale: greenish-gray; marly; sticky;

LS: lt-brown to grayish-brown; vf-xtal; sli fos; trc shells; dense; rough; no visible porosity; N.S.

Shale: greenish-gray; marly; coarse sulfides; mixed w/lt brown lime as above;

Shale & lime as above.

LS: lt-md grayish brown; vf-xtal; scattered fusulinids & shell frags; nacreum; dense; no visible porosity; N.S. 2760.

Shale: grayish-green; very silty to marly in part; pyritic;

Shale: grayish-green to dark gray, marly; lime fossils (fusulinids)

TOPEKA 2779 (-922)

LS: lt-brown, mottled grayish-brown in part; vf-xtal; finely pyritic in part; few fusulinids; dense; no visible porosity; N.S.

LS: even lt-brown; vf-xtal; dense, platey to blocky; sub-vit in part; sli chalky; tight int xtal por at best; N.S.

LS: most lt-brown, some lt-md grayish-brn; vf-xtal; dense; chalky in part; only few chips scattered vug porosity w/stain & sli show oil; spotted to sat dry stain; spotted fluor; weak odor; 2825-30 & 60".

LS: grayish brown; vf-xtal; silty; no visible porosity; N.S.

LS: brown, grayish-brown; vf-xtal; dense; smooth; blocky; no visible porosity; N.S.

LS: grayish brown, off white; mic-vf xtal; chalky; fusulinids; no visible porosity; N.S.

LS: brown, grayish brown w/dk gray spots & streaks; shaley; vf-xtal; fos; poor apparent porosity; N.S.

LS: lt-brown; vf-xtal; chalky; trc crinoids; poor apparent porosity; N.S.

Shale: black; 2900.

LS: dense; indistinct;

Shale: grayish green; marly; soft; sticky; 2910.

LS: lt brown, lt gray; mic-vf xtal; dense; smooth; no visible porosity; N.S. 2920.

LS: as above but more chalky; N.S.

LS: lt brown, dense; md-dk grayish-brown, shaley; vf-xtal; trace fos-chert; no apparent porosity; N.S.

Shale: gray, green; pyritic;

LS: lt-md grayish brown; vf-xtal; marly or argill in part; mostly dense; no visible porosity; N.S.

Shale: black; 2960.

LS: lt-brown; vf-xtal, scattered c-xtal calcites; rough textured; fair vug porosity; dull mineral fluor; N.S. 2970.

LS: lt brown, scattered gray spots; vf-xtal; rough to smooth; many fos fusulinids; poor apparent porosity; N.S.

LS: lt-md brown; mic-vf xtal; dense; smooth; no visible porosity; N.S.

LS: lt-md brown, grayish brown; mic-vf xtal; dirty in part; no visible porosity; N.S.

LS: lt brown, lt gray w/few brn sh streaks; mic-vf xtal; chalky in part; trace chert; poor apparent por; N.S.

HEEBNER 3012 (-1155)

Shale: black; carbon; 3030.

LS: indistinct;

Shale: green, gray; pyrites;

LS: white to lt grayish brown; vf-xtal; tight vug porosity w/ dk brn stain & sli show oil, no odor, only dull fluor; 3041-30", 3050.

LS: white, lt gray; vf-xtal; dense; no visible porosity; N.S.

Shale: green, gray; sli marly; pyritic; lime fos;

LANSING 3057 (-1200)

LS: lt-brown, grayish brown, some greenish; vf-xtal; oolitic in part; tight int ool porosity; trc vug por w/lt brn stain, no oil show; 3070.

LS: lt brown, grayish-brown; vf-xtal; dense to chalky in part; smooth; trc vug porosity w/lt brn stain & v-sli show oil; no odor; 3190.

LS: lt-brown; vf-xtal; poor to fair vug porosity w/lt brown spotted stain; sli show oil; no odor; several chips; 3120.

Shale: green, gray; calc in part; pyritic;

LS: v-lt brown; vf-xtal; fine vugular porosity; lt brown spotted stain; v-sli show oil; no odor; 3125-30".

LS: white, v-lt brown as above; chalky in part; scattered vugs & washed out looking stain, no oil; 3130, 3140.

LS: dk grayish brown; vf-xtal; poor apparent porosity; N.S.

Shale: gray, pyritic;

LS: dk grayish-brown, mottled in part; vf-xtal; granular; no visible porosity; N.S.

Shale: green, gray;

LS: lt brown; vf-xtal; dense to chalky in part; no visible porosity; N.S.

LS: lt brown; vf-xtal; grain suptd oolite; tight int ool porosity; N.S. 3280.

LS: white, lt gray; mic-vf xtal; dense to chalky in part; smooth; no visible porosity; N.S.

MUNCIE CREEK 3197 (-1340)

Shale: dk gray; indistinct;

Shale: green, gray, dk gray; pyrites

LS: white to lt brown; mic-vf xtal; dense to chalky; trc spar; sli ool; trc chert; no visible porosity; N.S.

LS: as above;

Shale: green, gray;

LS: lt brown to lt gray; vf-xtal; dense to chalky; trace oolite; granular in part; tight int grain porosity; N.S.

LS: even grayish-brown w/minor green clay contacts; mic-vf xtal; dense; no visible porosity; N.S., 3270.

LS: white, lt brown; mic-vf xtal; finely granular; poorly expressed oolite ?; chalky; poor apparent porosity; N.S.; 3280.

STARK SH 3274 (-1417)

Shale: black; carbon; many chips 3290.

LS: white to lt brown; mic-vf xtal; dense to chalky; finely granular; v-poor int gran porosity; N.S. 3300.

LS: even lt grayish-brown; mic-vf xtal; dense, blocky to platey; no visible porosity; N.S. 30".

HUSHPUCKNEY 3306 (-1449)

Shale: black; carbon; 3320.

LS: lt gray, sli mottled dk gray; mic-vf xtal; dense to chalky; scattered fine sulfides; poor apparent porosity; N.S., 3330.

LS: as above but more chalky; N.S.

Shale: green, gray;

LS: even lt brown; vf-xtal; sli chalky; tight int ool porosity; N.S.

Shale: gray, green, minor maroon;

LS: lt-md brown; vf-xtal; dense; no visible porosity; N.S.

Shale: green, maroon, mottled; marly; soft; sticky; 3380.

LS: white, lt gray; mic-xtal; v-chalky; green & maroon sh contacts;

Shale: marly as above;

LS: white to lt brown; vf-xtal; dense; hard; no visible porosity; N.S., 3390.

Shale: green, gray, maroon mottled in part; marly in part;

LS: white to v-lt gray; mic-vf xtal; dense to chalky; no visible porosity; N.S.

LS: white to lt gray; vf-xtal; dense; sli chalky; shell fragments; no visible porosity; N.S.

Shale: green, gray, maroon;

PAWNEE 3428 (-1571)

LS: white to lt gray; mic-vf xtal; chalky; granular in part; poor apparent porosity; N.S.

LS: lt brown, lt gray; mic-vf xtal; chalky; fine granular; tight int gran porosity at best; N.S.

Shale: green, gray; maroon;

FT. SCOTT 3460 (-1603)

LS: white to lt brown; mic-vf xtal; fine granular; chalky; poor int gran porosity; N.S., 3480.

LS: lt-brown; vf-xtal; dense; no visible porosity; N.S.

CHEROKEE 3480 (-1623)

Shale: gray, green

LS: lt-md grayish-brown; vf-xtal; dense to chalky in part; poor apparent porosity; N.S.

Shale: green, gray, maroon, yellow; marly; soft; sticky; 3530, 3540.

Congl: various lime, shale, chert; green, gray, yellow, maroon, purple; mostly f-c xtaline limes; soft chalk in part, N.S.

VIOLA 3534 (1677)

LS: various: white to brown, yellowish; rough; minor shale: green, yellow, maroon; N.S.

LS: as above

LS: as above w/minor white, opaq cherts;

LS: white to lt gray or brown; vf-xtal; chalky; N.S.; also minor various sh;

LS: white, yellowish; vf-xtal; fine gran in part; chalky; white, opaq chert; N.S.

LS: white, lt gray, lt brown, partly mottled yellow; mic-vf xtal; chalky; poor apparent porosity; N.S.

LS: white, lt gray, partly mottled yellowish; mic-vf xtal; chalky; scattered poor vug porosity; N.S.

LS: white, lt gray, sli yellow mottling; vf-xtal; dense; blocky; no visible porosity; N.S.

LS: white to lt brown, yellow mottled; vf-xtal; dense to chalky; no visible porosity; N.S.

LS: as above w/minor green shales;

SIMPSON 3668 (-1811)

Shale: green, grayish green, sli maroon mottling; firm; 3690.

Shale: lt green; soft; 3700.

Sandst: gray; dirty; m-c grained; mod-cem; poor int grain porosity; N.S., 3790.

Shale: grayish-green; most fissile, some soft; sandy;

ARBUCKLE 3726 (-1869)

Dol: lt brown w/sli reddish mottling; vf-xtal, lacks sucrosic texture; dense; delayed acid reaction; tight int xtal porosity; N.S. , 3740.

Dol: lt brown, reddish; f-m xtal, sucrosic; rhombic; fair-good int xtal porosity; N.S., 3750.

Dol: as above;

Dol: lt-md brown, f-m xtal, rhombic, includes oolitic chert; trc glauc; fair-good int xtal porosity; N.S., 3780.

Dol: as above;

Dol: lt-md brown, minor pink mottling; f-m xtal, sucrosic, rhombic; trc ool chert; good int xtal porosity; N.S.

Dol: as above.

ROTARY TOTAL DEPTH 3830 (-1973)