

State of West Virginia
Department of Environmental Protection - Office of Oil and Gas
Well Operator's Report of Well Work

API 47-051-01748 County Marshall District Washington
Quad Moundsville Pad Name Hart Field/Pool Name _____
Farm name Hart, John J. & Renee Well Number 2H
Operator (as registered with the OOG) Chevron Appalachia, LLC
Address 800 Mountain View Drive City Smithfield State PA Zip 15478

As Drilled location NAD 83/UTM Attach an as-drilled plat, profile view, and deviation survey
Top hole Northing _____ Easting _____
Landing Point of Curve Northing _____ Easting _____
Bottom Hole Northing _____ Easting _____

Elevation (ft) 1329' GL Type of Well New Existing Type of Report Interim Final
Permit Type Deviated Horizontal Horizontal 6A Vertical Depth Type Deep Shallow
Type of Operation Convert Deepen Drill Plug Back Redrilling Rework Stimulate
Well Type Brine Disposal CBM Gas Oil Secondary Recovery Solution Mining Storage Other _____
Type of Completion Single Multiple Fluids Produced Brine Gas NGL Oil Other _____
Drilled with Cable Rotary
Drilling Media Surface hole Air Mud Fresh Water Intermediate hole Air Mud Fresh Water Brine
Production hole Air Mud Fresh Water Brine
Mud Type(s) and Additive(s)

Date permit issued 6/16/2014 Date drilling commenced 9/30/2014 Date drilling ceased 6/10/2015
Date completion activities began _____ Date completion activities ceased _____
Verbal plugging (Y/N) Y Date permission granted 6/5/2015 Granted by Jim Nicholson

Please note: Operator is required to submit a plugging application within 5 days of verbal permission to plug
Freshwater depth(s) ft _____ Open mine(s) (Y/N) depths _____
Salt water depth(s) ft _____ Void(s) encountered (Y/N) depths _____
Coal depth(s) ft _____ Cavern(s) encountered (Y/N) depths _____
Is coal being mined in area (Y/N) _____

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JUL 09 2015
WV Department of
Environmental Protection
Reviewed by:
JTC-7/24/15
10/23/2015

API 47-051 - 01748 Farm name Hart, John J. & Renee Well number 2H

CASING STRINGS	Hole Size	Casing Size	Depth	New or Used	Grade wt/ft	Basket Depth(s)	Did cement circulate (Y/ N) * Provide details below*
Conductor	36"	30"	40'	New	X-42; 118.76#		
Surface	26"	20"	318'	New	J-55; 94#		
Coal	17 1/2"	13 3/8"	917'	New	J-55; 54.50#		
Intermediate 1	12 1/4"	9 5/8"	2219'	New	L-80; 40#		
Intermediate 2							
Intermediate 3							
Production	8 1/2"	5 1/2"	3546'	New	P-110; 20#		
Tubing							
Packer type and depth set							

Comment Details _____

CEMENT DATA	Class/Type of Cement	Number of Sacks	Slurry wt (ppg)	Yield (ft ³ /sks)	Volume (ft ³)	Cement Top (MD)	WOC (hrs)
Conductor	Bulk	60					
Surface	Class A	637	15.60	1.20			
Coal	Class A	843	15.60	1.20			
Intermediate 1		759	15.60	1.18			
Intermediate 2		52 BBL	16				
Intermediate 3							
Production							
Tubing							

Drillers TD (ft) _____ Loggers TD (ft) _____
 Deepest formation penetrated _____ Plug back to (ft) _____
 Plug back procedure _____

Kick off depth (ft) _____

Check all wireline logs run caliper density deviated/directional induction
 neutron resistivity gamma ray temperature sonic

Well cored Yes No Conventional Sidewall Were cuttings collected Yes No

DESCRIBE THE CENTRALIZER PLACEMENT USED FOR EACH CASING STRING _____

WAS WELL COMPLETED AS SHOT HOLE Yes No DETAILS _____

WAS WELL COMPLETED OPEN HOLE? Yes No DETAILS _____

WERE TRACERS USED Yes No TYPE OF TRACER(S) USED _____

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API 47- 051 - 01748

Farm name Hart, John J. & Renee

Well number _____

PRODUCING FORMATION(S)

DEPTHS

	TVD	MD
_____	_____	_____
_____	_____	_____
_____	_____	_____

Please insert additional pages as applicable.

GAS TEST Build up Drawdown Open Flow OIL TEST Flow Pump

SHUT-IN PRESSURE Surface _____ psi Bottom Hole _____ psi DURATION OF TEST _____ hrs

OPEN FLOW Gas _____ Oil _____ NGL _____ Water _____ GAS MEASURED BY
 mcfpd bpd bpd bpd bpd Estimated Orifice Pilot

LITHOLOGY/ FORMATION	TOP DEPTH IN FT NAME TVD	BOTTOM DEPTH IN FT TVD	TOP DEPTH IN FT MD	BOTTOM DEPTH IN FT MD	DESCRIBE ROCK TYPE AND RECORD QUANTITY AND TYPE OF FLUID (FRESHWATER, BRINE, OIL, GAS, H ₂ S, ETC)
	0		0		
Dunkard Group Sand					
Pittsburgh Coal	840	850	840	850	Coal (not void)
Salt Sand	1516	1699	1517	1700	SS gy-llgy,clr,trans,sbrnd,md,msph,consd,msrt,lcmt,arg; 375u gas show @ 1539'; 290u gas show @ 1700'
Big Lime	1813	1905	1815	1907	SLTS gy,mg,y,m-dkgy,ccc,rd-sbrnd,mg,fg,tcmf,SH,mg,y,dkgy,sbbiky,frm,SS,offwh,wh,clr,trans,lcmt,mg,fg
Burgoon (Big Injun)	1905	2158	1907	2160	SEE ATTACHED
Weir Sand	2298	2315	2300	2317	SS,clr,trans,wh,lg-gr-gy,cons,lcmt,mg,fg,abang-ang,sbrnd,ang,msph,use,pyr,noncalc,rfior,no cut; 177u gas show @ 2310'
Berea Sand	2505	2516	2507	2518	SS Wh,clr,trans,lg-gy,cons,lcmt,mg,fg,abang-ang,msph,use,pyr,noncalc,rfior,fast cut,frnt odr,use,pyr,w/arg SLTST
Gordon Sands	2748	2928	2750	2930	SEE ATTACHED
Speechley Sand	3413	3432	3415	3535	SEE ATTACHED

Please insert additional pages as applicable.


Drilling Contractor SEE ATTACHED
 Address _____ City _____ State _____ Zip _____

Logging Company _____
 Address _____ City _____ State _____ Zip _____

Cementing Company SEE ATTACHED
 Address _____ City _____ State _____ Zip _____

Stimulating Company _____
 Address _____ City _____ State _____ Zip _____

Please insert additional pages as applicable.

Completed by Jackie M. Scholar Telephone 724-564-3721
 Signature  Title Regulatory Compliance Team Lead Date 7/6/2015

Submittal of Hydraulic Fracturing Chemical Disclosure Information Attach copy of FRACFOCUS Registry

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API: 47-051-01748	Well Name: Hart	Well Number: 2H
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CEMENTING CONTRACTORS			
Name	Name	Name	Name
Schlumberger Technology Corp	Baker Hughes		
Address Two Robinson Plaza, Suite 200	Address 5373 West Alabama, Suite 300	Address	Address
City - State - Zip Pittsburgh, PA 15205	City - State - Zip Houston, TX 77056	City - State - Zip	City - State - Zip

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API: 47-051-01748	Well Name: Hart	Well Number: 2H
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DRILLING CONTRACTORS			
Driller	Driller	Driller	Driller
Name Rocky Mountain Drilling	Name Highlands Drilling LLC	Name Nabors Drilling USA	Name
Address 185 North Vernal Avenue, Suite 2	Address 900 Virginia Street East	Address 10100 NW 10th street	Address
City - State - Zip Vernal, UT 84078	City - State - Zip Charlestone, WV 25301	City - State - Zip Oklahoma City, IK 73127	City - State - Zip

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WR-35

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LITHOLOGY	
Lithology Formation	Describe Rock type and record quantity and type of fluid (fresh water, brine, oil, gas, H2S, Etc.
Burgoon (Big Injun)	SS:ltgy-gy,wh,clr,cons,trans,lcmt,mg-fg,sbang-ang,sbrnd,arg,msph,non calc,tr flor, no cut, no odr,w/SLTST:mgyltgy,frm-hrd,vfg,sbrnd,tcmt,non calc
Gordon Sands	Mudlogging unit lost power, then High gas shows beginning @ 2846', causing site Muster, no samples (no pwr/mustered), 15# mud kill wt
Speechley Sand	SS:ltgy-gy,wh,clr,trans,cons,lcmt,mg-fg,sbang-ang,arg,msph,wsrt,non calc,tr flor, fnt cut, strong odor,w/arg SLTST; 267u gas show @ 3460'

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51-01748

STRATAGRAPH NORTHEAST INC.
P.O. BOX 59
RENO OHIO 45773
1-800-310-1935
mgmt@strata-ne.com



OIL AND GAS WELL ANALYSIS

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

Well Name: Hart 2H Pilot	
Well Id:	
Location: Marshal Co. WV	
License Number: 47-5101748	Region:
Spud Date: 10/28/14	Drilling Completed: 11/1/14
Surface Coordinates:	
Bottom Hole Coordinates:	
Ground Elevation (ft): 1,324'	K.B. Elevation (ft): 1,339'
Logged Interval (ft): 50'	To: TD Total Depth (ft): 960'
Formation: Marcellus	
Type of Drilling Fluid: Air	

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

OPERATOR

Company: Chevron
Address:

MUDLOGGING PERSONNEL

Waylon McNutt
Thomas Walmer

GAMMA

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ABBREVIATIONS

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10/23/2015

51-01748

ROCK TYPES

- Anhy
- Bent
- Brec
- Cht
- Clyst
- Coal

- Congl
- Dol
- Gyp
- Igne
- Lmst
- Meta

- Mrlst
- Salt
- Shale
- Shshty
- Shblk
- Slstt

- Ss
- Till
- Redrock

ACCESSORIES

- FOSSIL
- Fossil

- MINERAL
- Anhy
 - Arg
 - Bent
 - Calc
 - Calcite
 - Carb

- Chtdk
- Chtlt
- Dol
- Feldspar
- Glau
- Gyp
- Pyr
- Qtz
- Salt
- Silt

- Sulphur

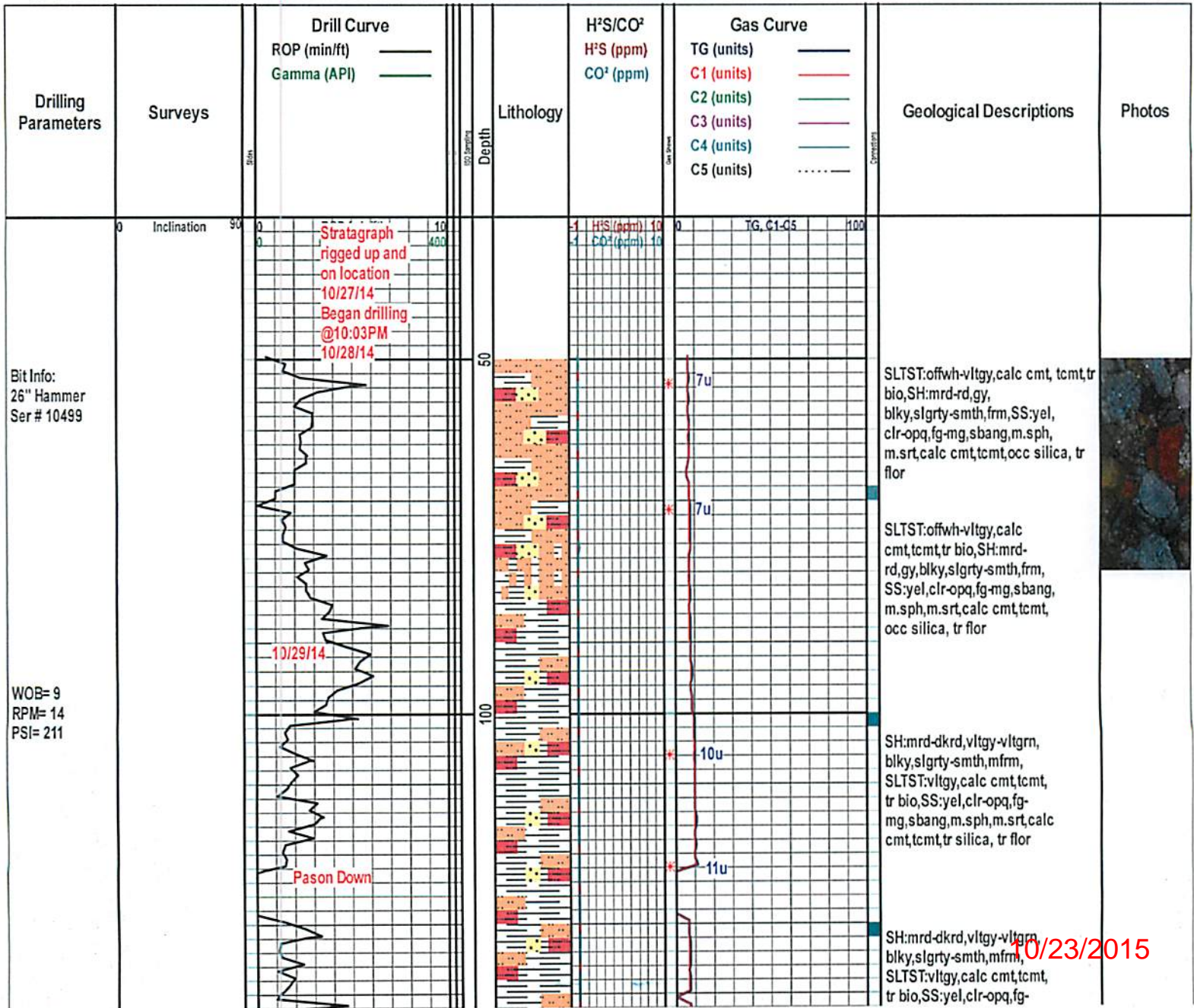
STRINGER

- Anhy
- Arg
- Bent
- Coal
- Dol
- Gyp
- Ls

- Mrst
- Slststrg
- Ssstrg

- ISO SAMPLING
- Iso jar-tube

- GAS/OIL SHOW
- Gas show
 - Oil show



10/23/2015

WOB= 11
RPM= 16
PSI= 336

51-01748

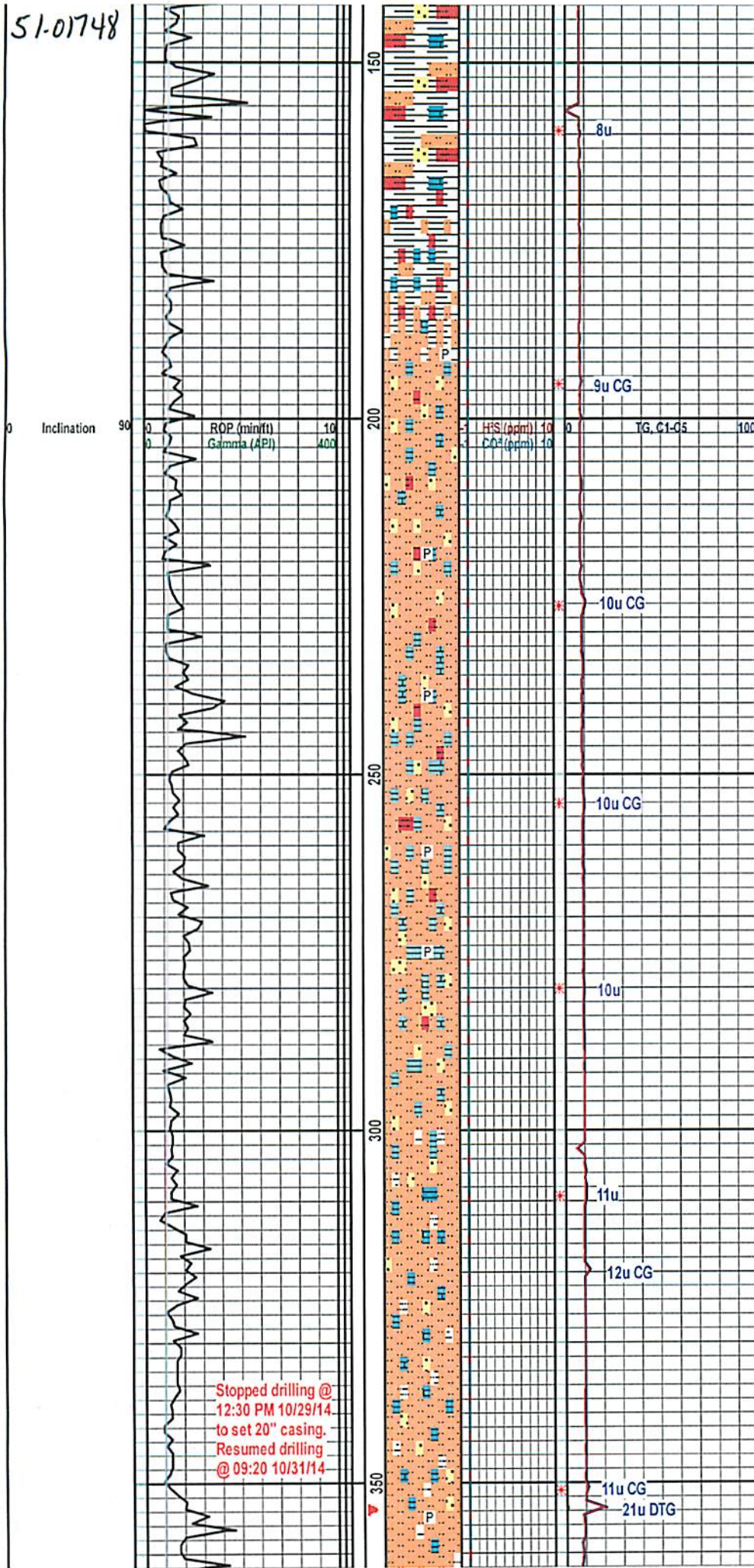
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RPM= 16
PSI= 375

WOB=10.3
RPM=20
PSI=352

WOB=10.1
RPM=18
PSI=339

WOB=10.4
RPM=22
PSI=354

Bit #2
17.5" Hammer
Ser # 214063



mg, sbang, m.sph, m.srt, calc
cmt, tcmt, tr silica, tr flor

SH: mrd-dkrd, vltgy-vltgrn,
blky, slgrty-smth, mfrm,
SLTST: vltgy, calc cmt, tcmt,
tr bio, SS: yel, clr-opq, fg-
mg, sbang, m.sph, m.srt, calc
cmt, tcmt, occ silica, occ LS:
tan-vltbrn, crpxln, dns, tr flor

SLTST: gy, ltgy, ltbrn, tr rd occ
mgy, vfgn, tcmt, tr pyr xls, w/SS:
offwh, clr, sbang-sbrnd, m-mgn,
tcmt. bio, w/LS: ltn, tn, ltbrn, dns,
crp-mcxlIn, tr flor

SLTST: gy, ltgy, ltbrn, tr rd occ
mgy, vfgn, tcmt, tr pyr xls, w/SS:
offwh, clr, sbang-sbrnd, m-mgn,
tcmt. bio, w/LS: ltn, tn, ltbrn, dns,
crp-mcxlIn, tr flor

SLTST: gy, ltgy, ltbrn, tr rd occ
mgy, vfgn, tcmt, tr pyr xls, w/SS:
offwh, clr, sbang-sbrnd, m-mgn,
tcmt. bio, w/LS: ltn, tn, ltbrn, dns,
crp-mcxlIn, tr flor

SLTST: gy, ltgy, ltbrn, tr rd, occ
mgy, vfgn, tcmt, tr pyr, LS: ltn, tn,
ltbrn, dns, crp-mcxlIn, tr SS: offwh,
clr, ltbrn, sbang, sbrnd, mgn, tcmt,
tr flor

SLTST: gy, ltgy, ltbrn, tr rd, occ
mgy, vfgn, tcmt, tr pyr, LS: ltn, tn,
ltbrn, dns, crp-mcxlIn, tr SS: offwh,
clr, ltbrn, sbang, sbrnd, mgn, tcmt,
tr flor

SLTST: gy, ltgy, ltbrn, tr rd, occ
mgy, vfgn, tcmt, tr pyr, LS: ltn, tn,
ltbrn, dns, crp-mcxlIn, tr SS: offwh,
clr, ltbrn, sbang, sbrnd, mgn, tcmt,
tr flor



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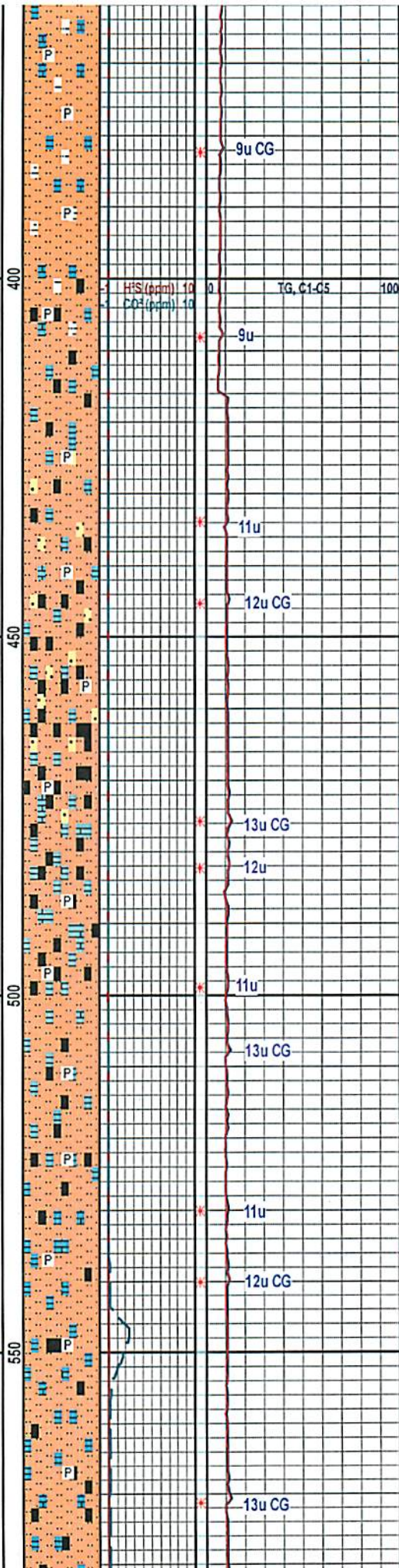
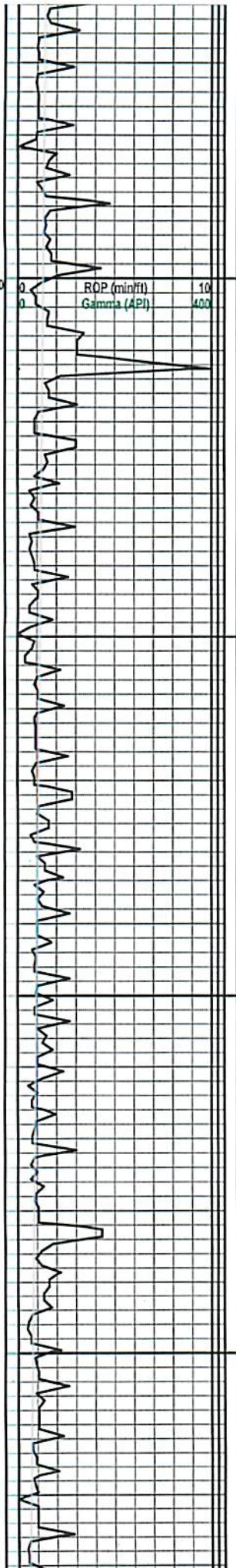
WOB=8.5
RPM=20
PSI=386

WOB=7.9
RPM=21
PSI=415

WOB=8.4
RPM=21
PSI=420

WOB=6.3
RPM=24
PSI=406

Inclination 90
ROP (min/ft) 10
Gamma (API) 400



SLTST: gy, ltgy, ltrm, tr rd, occ
mgy, vfgn, tcmt, tr pyr, LS: ltn, tn,
ltrm, dns, crp-mcxlN, tr SS: offwh,
clr, ltrm, sbang, sbmd, mgn, tcmt

SLTST: gy, ltgy, ltrm, tr rd, occ
mgy, vfgn, tcmt, tr pyr, LS: ltn, tn,
ltrm, dns, crp-mcxlN, tr coal

SLTST: gy, ltgy, ltrm, tr rd, occ
mgy, vfgn, tcmt, tr pyr, LS: ltn, tn,
ltrm, dns, crp-mcxlN, tr SS: offwh,
clr, ltrm, sbang, sbmd, mgn, tcmt,
tr coal

SLTST: gy, ltgy, mgy, vfgn, tcmt, tr
pyr, SS: offwh, clr, ltrm, sbang,
sbmd, mgn, tcmt, LS: ltn, tn,
ltrm, dns, crp-mcxlN, abnt coal

SLTST: gy, ltgy, ltrm, mgy, vfgn,
tcmt, tr pyr, LS: ltn, tn, ltrm, dns,
crp-mcxlN, SS: offwh, clr, sbang,
sbmd, mgn, tcmt, occ coal,

SLTST: gy, ltgy, ltrm, mgy, vfgn,
tcmt, tr pyr, LS: ltn, tn, ltrm, dns,
crp-mcxlN, tr coal

SLTST: gy, ltgy, ltrm, mgy, vfgn,
tcmt, tr pyr, LS: ltn, tn, ltrm, dns,
crp-mcxlN, tr coal

10/23/2015

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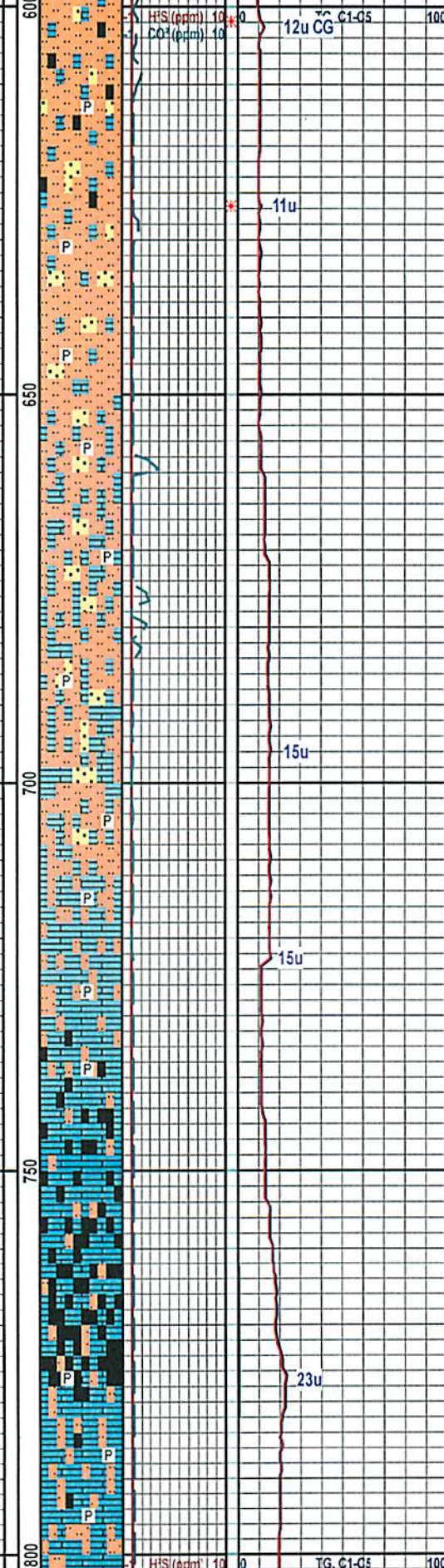
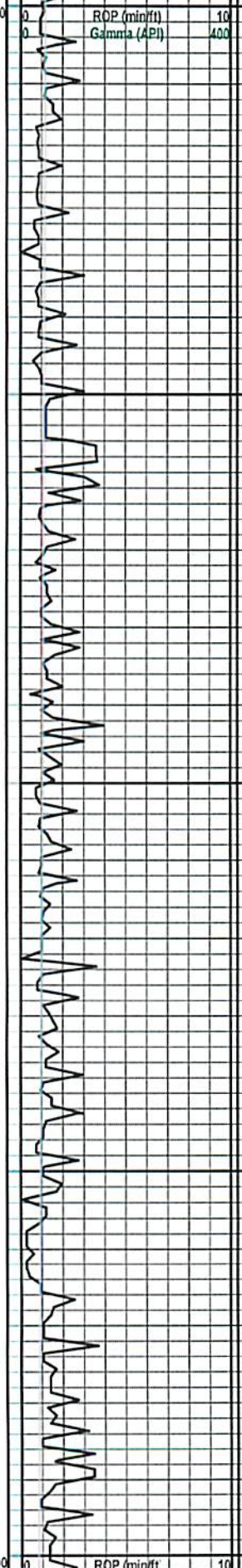
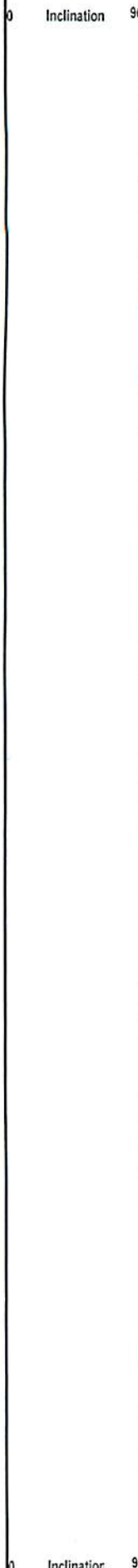
WOB=6.3
RPM=25
PSI=412

WOB=5.1
RPM=22
PSI=411

WOB= 8
RPM= 26
PSI= 406

WOB= 7
RPM= 21
PSI= 404

WOB= 8
RPM= 24



H₂S (ppm) 10
CO₂ (ppm) 10

12u CG C1-Q5

11u

15u

15u

23u

TG. C1-Q5

SLTST: gy, mgy, lbrn, mgy, vfgn, tcmt, tr pyr, LS: lttn, tn, lbrn, dns, crp-mcxlIn, SS: offwh, clr, sbang, sbrnd, mgn, tcmt, occ coal,

SLTST: gy, ltgy, lbrn, mgy, vfgn, tcmt, tr pyr, LS: lttn, tn, lbrn, dns, crp-mcxlIn, SS: offwh, clr, sbang, sbrnd, mgn, tcmt, occ coal,

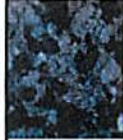
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SLTST: gy-ltgy, lbrn-mgy, sil cmt, tcmt, tr pyr, SS: offwh-clr, f-mg, sbang-sbrnd, gsph, m.s.rt, sil cmt, tcmt, LS: tn-lbrn, crp-mcxlIn, dns, tr flor

LS: tn-lbrn, crp-mcxlIn, dns, occ flor, SLTST: gy-ltgy, lbrn-mgy, sil cmt, tcmt, tr pyr

LS: tn-lbrn, crp-mcxlIn, dns, occ flor, abdt coal, tr SLTST: gy-ltgy, lbrn-mgy, sil cmt, tcmt, tr pyr

LS: tn-lbrn, crp-mcxlIn, dns, tr SLTST: gy-ltgy, lbrn-mgy, sil cmt, tcmt, tr pyr



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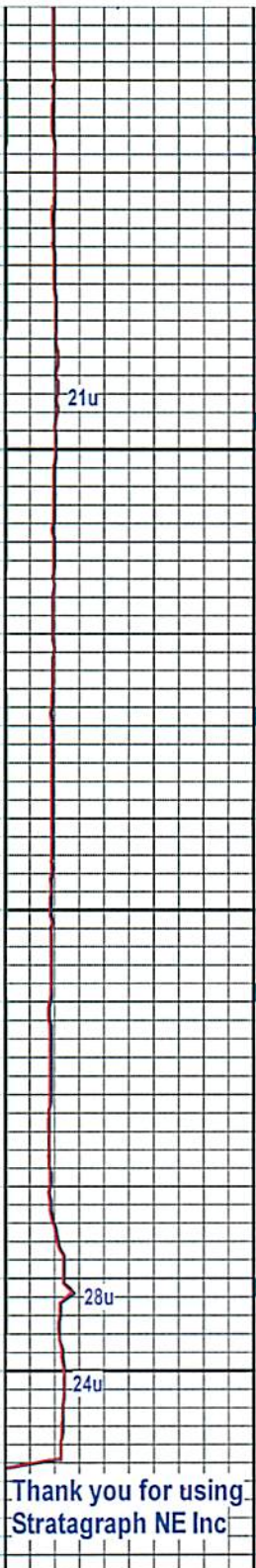
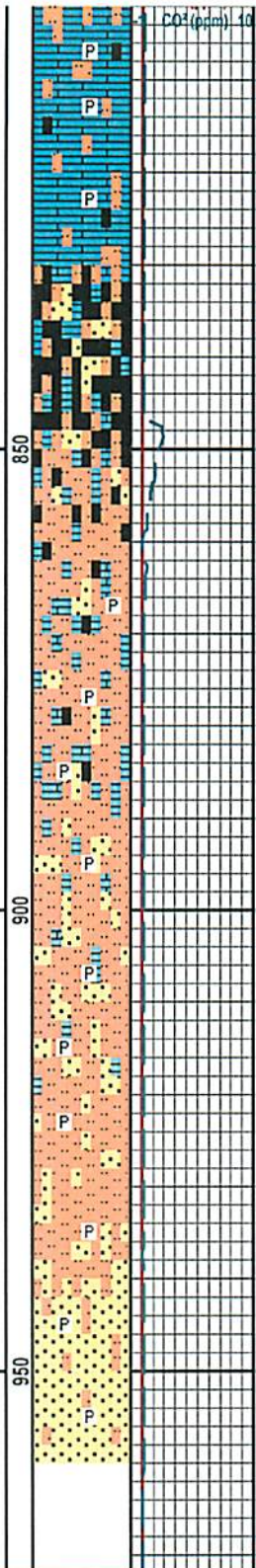
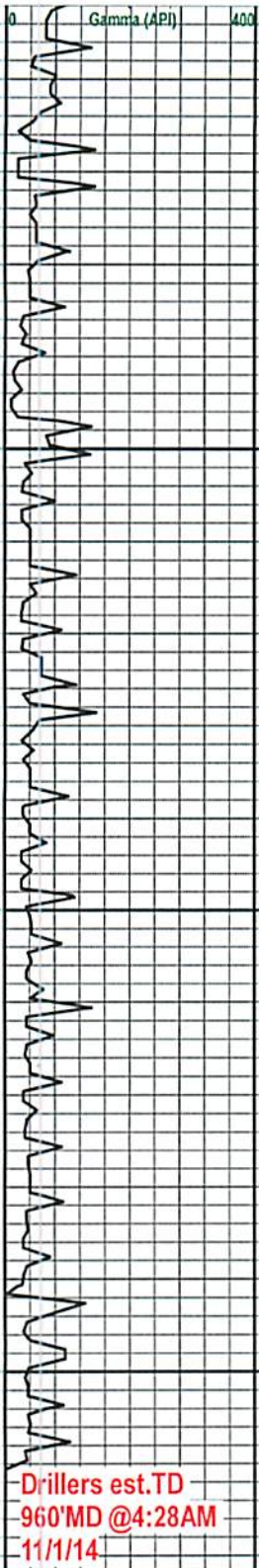
PSI= 405

51-01748

WOB= 9
RPM= 22
PSI= 394

WOB= 9
RPM= 26
PSI= 409

WOB= 9
RPM= 21
PSI= 424



LS:tn-lbrn,crp-mcxln,dns,
tr SLTST:gy-ltgy,lbrn-mgy,sil
cmt,tcmt,tr pyr,tr coal

COAL,SLTST:opq-fros,sil
cmt,tcmt,LS:offwh-
tan,crpxln,dns,tr SS

SLTST:gy-ltgy,lbrn-mgy,sil
cmt,tcmt,tr pyr,LS:tn-
lbrn,crp-mcxln,dns,tr SS, tr
Coal

SLTST:gy-ltgy,lgrn-mgy,sil
cmt,tcmt,tr pyr,SS:offwh-clr,
f-mg,sbang-sbrnd,gsph, m.srt,sil
cmt,tcmt,LS:tn-
lbrn,crp-mcxln,dns

SS:clr-fros,opq,mg-cg,
sbang-sbrnd,gsph,fwsrt, uncons,tr
SLTST:gy-ltgy,lgrn-
mgy,sil cmt,tcmt,tr pyr



Drillers est.TD
960'MD @4:28AM
11/1/14

Thank you for using
Stratagraph NE Inc

51.01748

STRATAGRAPH NORTHEAST INC.
P.O. BOX 59
RENO OHIO 45773
1-800-310-1935
mgmt@strata-ne.com



OIL AND GAS WELL ANALYSIS

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

Well Name: Hart 3H

Location: Marshall Co WV

License Number: 47-5101749

Spud Date: 12-15-14

Surface Coordinates: 39° 54' 48.865 N
80° 39' 17.502 W

Bottom Hole Coordinates:

Ground Elevation (ft): 1324'

Logged Interval (ft): 850

Formation: Marcellus

Type of Drilling Fluid: SBM

K.B. Elevation (ft): 1354'

To: TD Int. Total Depth (ft): 2200+/-

Region: Moundsville

Drilling Completed:

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

MUDLOGGING PERSONNEL

Jason Antill
Craig Cole

GAMMA

Gamma:
0-400 No Color
400-800 Lime Green
800-1600 Purple

*Note: Gamma will wrap at 400, then color
will be added to the right of ROP column.

ABBREVIATIONS

WOB - Weight on Bit
RPM - Rotation/Min.
PSI - Pressure
CO - Circulated Out
CF - Check Flow
NR - No Returns
LAT - Logged after trip

DTG - Down-time Gas
BG - Background Gas
CG - Connection Gas
TG - Trip Gas
SG - Survey Gas
TT - Trap Test
TIH - Trip In Hole
TOOH - Trip Out Of Hole

10/23/2015

51-01748

ROCK TYPES

- Anhy
- Bent
- Brec
- Cht
- Clyst
- Coal

- Congl
- Dol
- Gyp
- Igne
- Lmst
- Meta

- Mrlst
- Salt
- Shale
- Shshty
- Shblk
- Slst

- Ss
- Till
- Redrock

ACCESSORIES

FOSSIL

- Fossil

MINERAL

- Anhy
- Arg
- Bent
- Calc
- Calcite
- Carb

- Chtdk
- Chtlt
- Dol
- Feldspar
- Glau
- Gyp
- Pyr
- Qtz
- Salt
- Silt

- Sulphur

STRINGER

- Anhy
- Arg
- Bent
- Coal
- Dol
- Gyp
- Ls

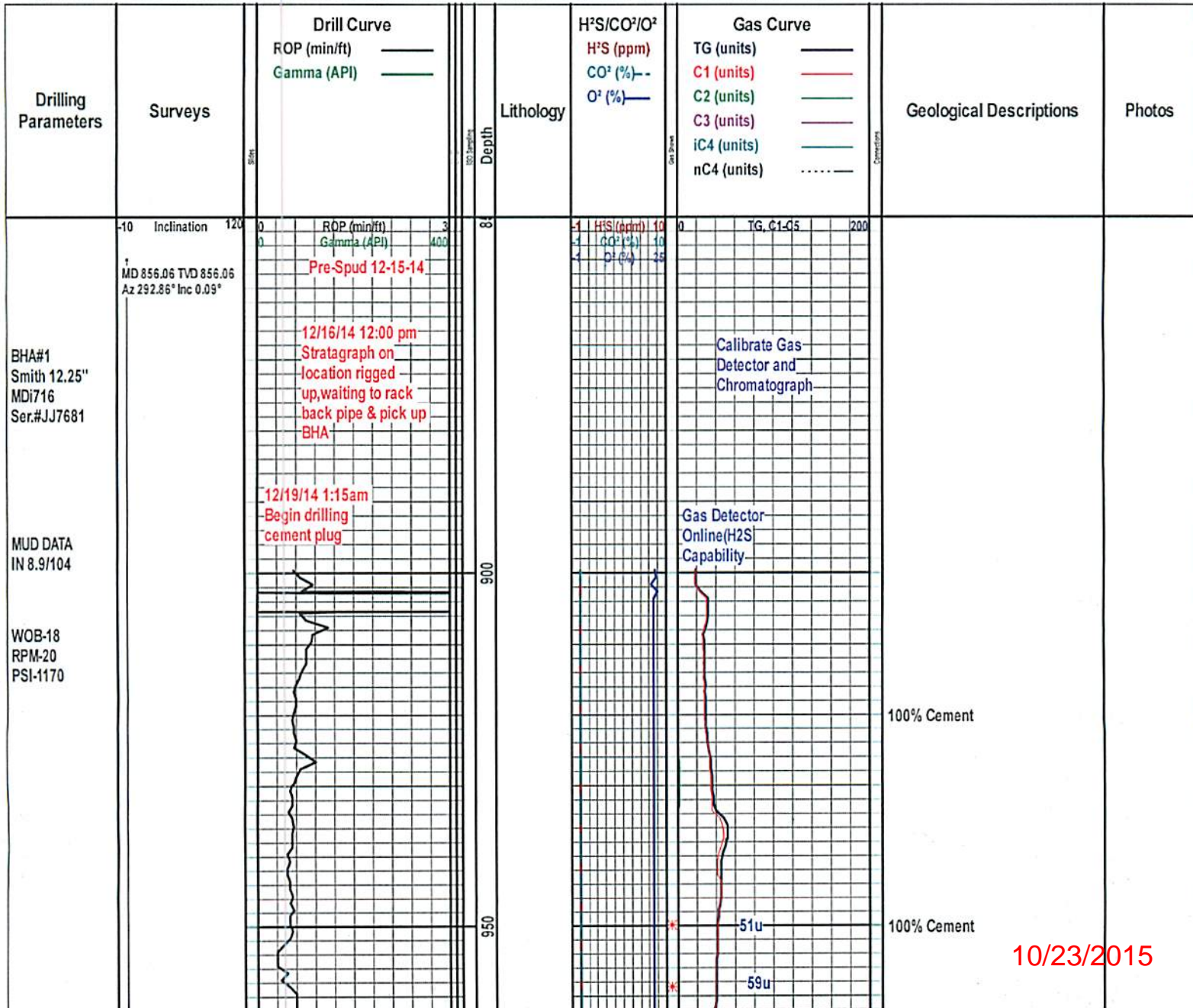
- Mrst
- Slststrg
- Ssstrg

ISO SAMPLING

- Iso jar-tube

GAS/OIL SHOW

- Gas show
- Oil show



10/23/2015

WOB-17
RPM-29
PSI-1863

51-01748

12/19/14 4:50am
FIT Test 976' MD

Inclination 120
ROP (min/ft) 3
Gamma (API) 400

WOB-35
RPM-21
PSI-1914

MD 1018 TVD 1018
Az 335.74° Inc 0.21°

MUD DATA
IN 7.9/103

WOB-34
RPM-29
PSI-2009

MD 1096 TVD 1096
Az 13.55° Inc 1.02°

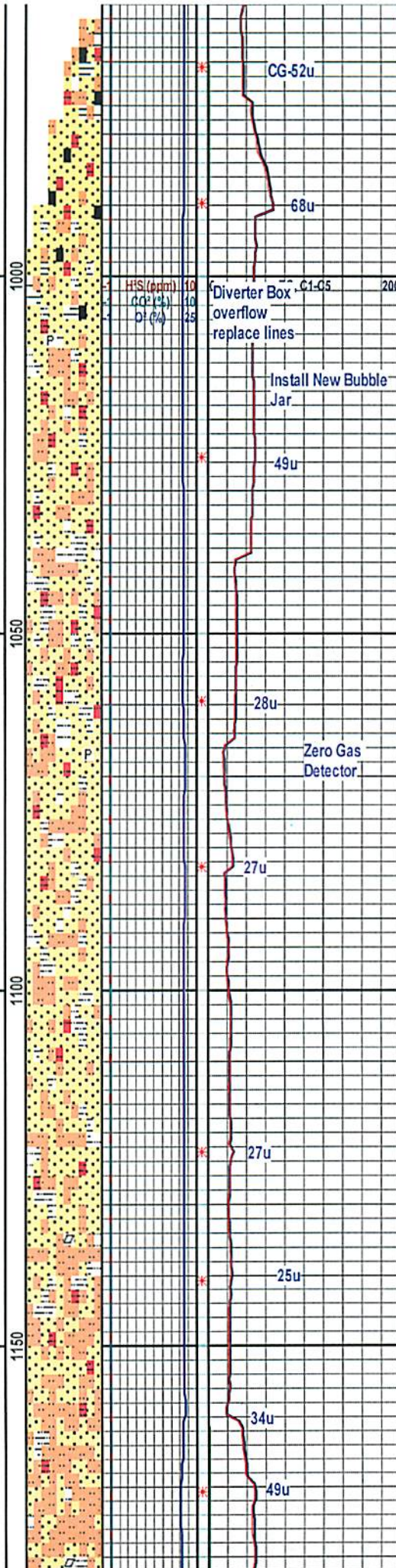
WOB-9
PSI-1836

WOB-25
RPM-30
PSI-2031

12/19/14 8:00am
Waiting for Tech for
Top Drive Repairs

12/19/14 11:45am
Resume Drilling

MUD DATA
IN 8.0/86



75% Cement 25% Formation

50% Cement 50% Formation

90% Cement 10% Formation

Begin 30' Samples

SS: v.ltgy,wh,consd,mg,sbang, sbrnd,g,sph,tcmt,wsrt,sl calc,arg,SLTST: gy-mgy,occ rd,frm,vfg,tcmt,non calc,arg,tr pyr,tr coal,tr cmnt

SS: v.ltgy,wh,consd,mg,sbang, sbrnd,g,sph,tcmt,wsrt,sl calc,arg,SLTST: gy-mgy,occ rd,frm,vfg,tcmt,non calc,arg,lse pyr,sl tr cmnt

SS: v.ltgy,wh,consd,mg,sbang, sbrnd, g,sph,tcmt,wsrt,sl calc,arg, SLTST: gy-mgy,occ rd,frm,vfg, tcmt,non calc,arg

SS: ltgy-v.ltgy,gy,off wh,clr, consd,sbang-sbrnd,mg,wsrt, tcmt,sph,sl-mod calc,arg,tr pyr,w/SLTST: gy-ltgy,occ rd, hrd,vfg,tcmt,non calc

SS: ltgy-v.ltgy,gy,off wh,clr, consd,sbang-sbrnd,mg,wsrt, tcmt,sph,sl-mod calc,arg,tr pyr,w/SLTST: gy-ltgy,occ rd, hrd,vfg,tcmt,non calc

SS: ltgy-v.ltgy,gy,off wh,clr, consd,sbang-sbrnd,mg,wsrt, tcmt,sph,sl-mod calc,arg, w/SLTST: gy-ltgy,occ rd, hrd,vfg,tcmt,tr calct xls,non calc

SLTST: gy-ltgy,occ rd, hrd,vfg,tcmt,tr calct xls,non calc w/SS: ltgy-v.ltgy,gy,off

10/23/2015

WOB-14
PSI-1871

WOB-12
RPM-35
PSI-1954

WOB-28
RPM-35
PSI-2129

WOB-30
RPM-34
PSI-2154

WOB-22
PSI-2100

WOB-25
RPM-35
PSI-2105

MUD DATA
OUT 7.9

51-01748

MD 1428 TVD 1428
Az 37.56° Inc 5.66°

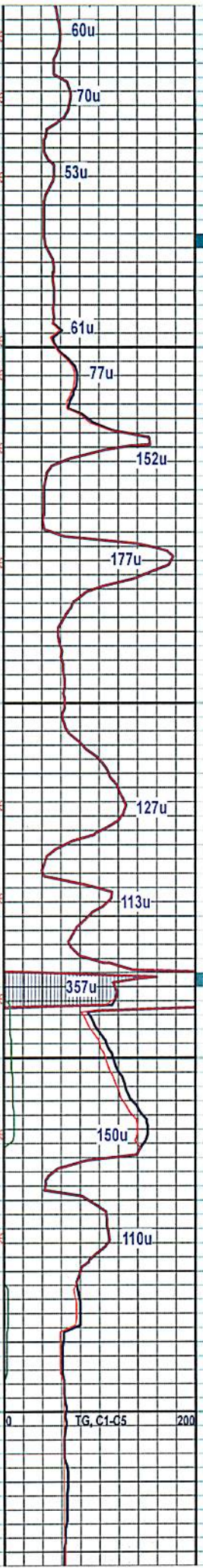
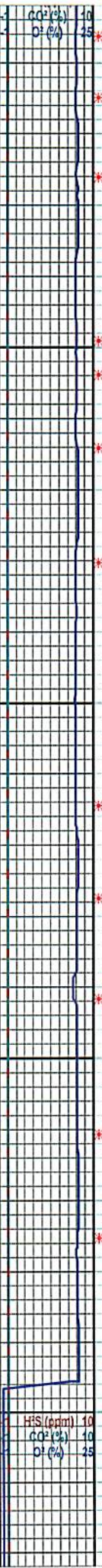
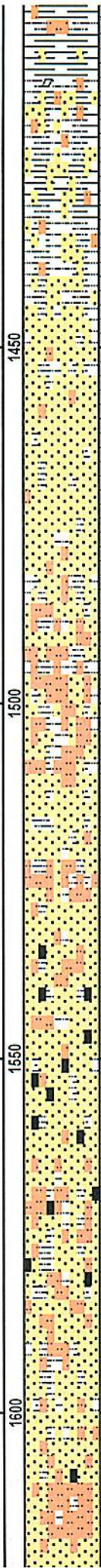
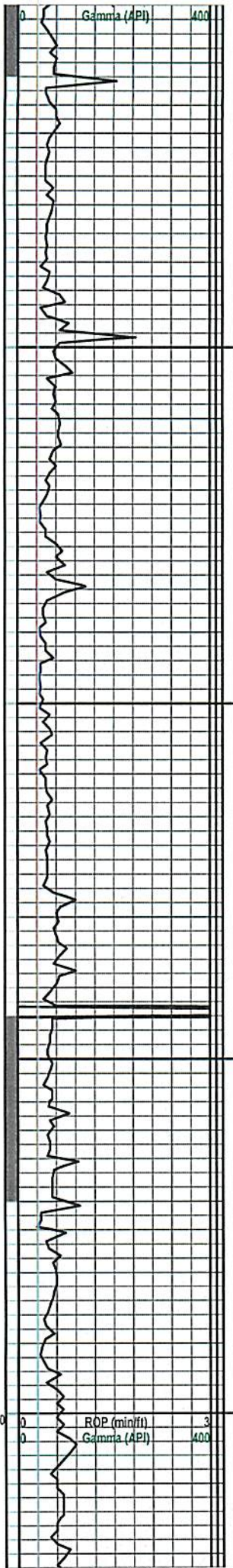
MD 1475 TVD 1475
Az 41.27° Inc 5.61°

MD 1523 TVD 1523
Az 37.43° Inc 5.41°

MD 1570 TVD 1570
Az 34.14° Inc 4.17°

Inclination 120
ROP (min/ft) 3
Gamma (API) 400

MD 1618 TVD 1618
Az 35.04° Inc 3.45°



SH:mgy,gy,gm,ltgy,v,frm,
sbbkly,non calc,tr tan bent,lse
calct,SLTST:gy-mgy,hrd,vfg,
non calc,w/SS

SS:gy-ltgy,wh,clr,trans,sbrnd
md,msph,consd,msrt,
tcmt,arg,SLTST:ltgy-
gy,mgy,sbrnd,vfg,arg,scat
flor,fmt cut

SS:gy-ltgy,wh,clr,trans,sbrnd
md,msph,consd,msrt,
tcmt,arg,SLTST:ltgy-
gy,mgy,sbrnd,vfg,arg,scat
flor,fmt cut

SLTST:mgy-gy,mgy,sbrnd,
vfg,argSS:gy-ltgy,wh,clr,trans,
sbrnd-md,msph,consd,msrt,
tcmt,arg,tr flor,mlky cut

SS:gy-ltgy,clr,trans,sbrnd
md,msph,consd,msrt,
tcmt,arg,SLTST:ltgy-
gy,mgy,sbrnd,vfg,arg,occ
coal,scat flor,fmt cut

SS:gy-ltgy,mgy,trans,sbrnd
md,msph,consd,msrt,
tcmt,arg,SLTST:ltgy-
gy,mgy,sbrnd,vfg,arg,occ
coal,scat flor,fmt cut,

SS:gy-ltgy,mgy,trans,sbrnd
md,msph,consd,msrt,
tcmt,arg,SLTST:ltgy-
gy,mgy,sbrnd,vfg,arg,occ



10/23/2015

51-01748

WOB-22
PSI-1955

MUD DATA
IN 7.8/82

MD 1664 TVD 1664
Az 17.34° Inc 2.86°

WOB-21
RPM-33
PSI-1986

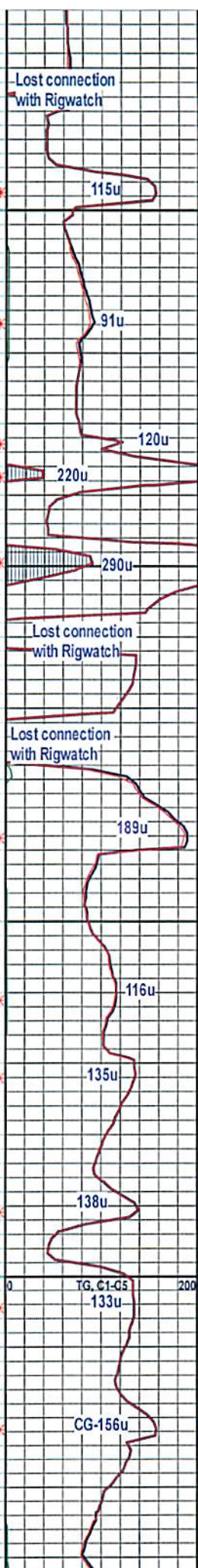
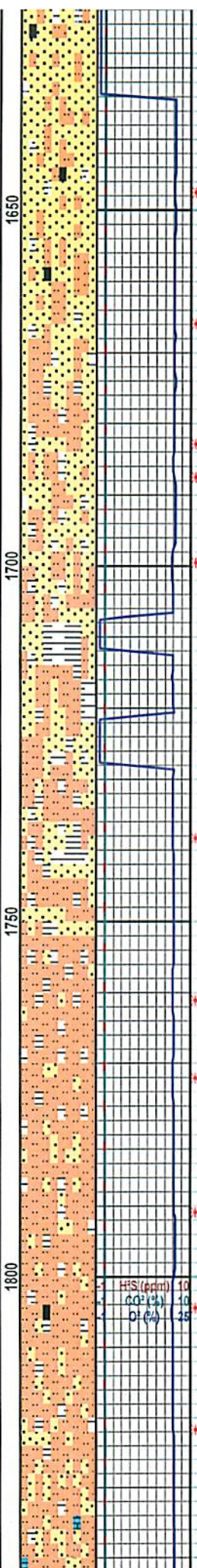
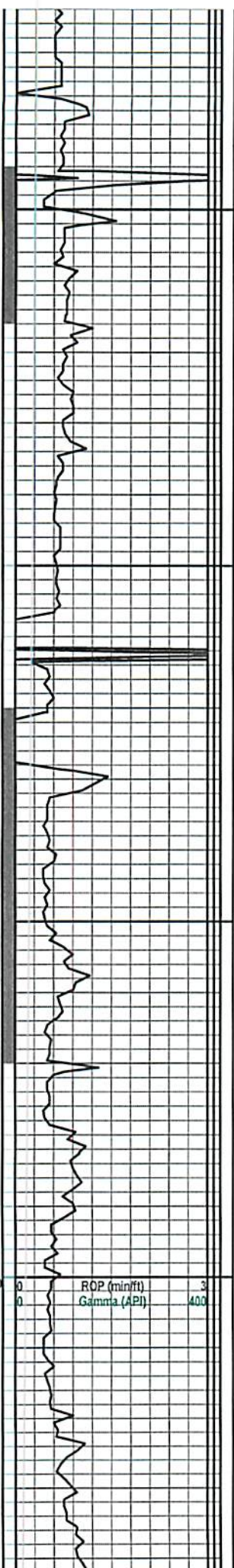
WOB-27
RPM-20
PSI-1494

WOB-17
PSI-1966

MD 1759 TVD 1759
Az 354.24° Inc 1.4°

WOB-27
RPM-20
PSI-1750

Inclination 120
ROP (min/ft) 3
Gamma (API) 400



coal, scat flor, fnt cut, w tr SH:

Lost connection
with Rigwatch

115u

SS: gy, ltgy, mgy, trans, sbrnd
rd, msph, consd, msrt,
tcmt, arg, SLTST: ltgy-
gy, mgy, sbrnd, vfg, arg, occ
coal, scat flor, fnt cut, w tr SH:

91u

220u

120u

SLTST: gy, mgy, m-dkgy, occ rd
sbrnd, mg, fg, tcmt, SH, mgy,
dkgy, sbbkly, frm, SS: offwh,
wh, clr, trans, lcmt, mg-fg,

290u

Lost connection
with Rigwatch

Lost connection
with Rigwatch

SLTST: gy, mgy, m-dkgy, occ rd
sbrnd, mg, fg, tcmt, SH, mgy,
dkgy, sbbkly, frm, SS: offwh,
wh, clr, trans, lcmt, mg-fg,

189u

SLTST: gy, mgy, m-dkgy, occ rd
sbrnd, mg, fg, tcmt, SH, mgy,
dkgy, sbbkly, frm, SS, offwh,
wh, clr, trans, lcmt, mg-fg,

116u

SLTST: gy, mgy, m-dkgy, occ rd
sbrnd, mg, fg, tcmt, SH, mgy,
dkgy, sbbkly, frm, SS, offwh,
wh, clr, trans, lcmt, mg-fg,

135u

138u

SLTST: gy, mgy, m-dkgy, occ rd
sbrnd, mg, fg, tcmt, SH, mgy,
dkgy, sbbkly, frm, SS, offwh,
wh, clr, trans, lcmt, mg-fg,

133u

CG-156u

SLTST: gy, mgy, m-dkgy, occ rd
sbrnd, mg, fg, tcmt, SH, mgy,
dkgy, sbbkly, frm, SS, offwh,
wh, clr, trans, lcmt, mg-fg,

51-01748

MD 1854 TVD 1854
Az 280.6° Inc 0.71°

WOB-32
RPM-20
PSI-1748

WOB-32
RPM-20
PSI-1655

MUD DATA
IN 7.7/65
OUT 7.8/63

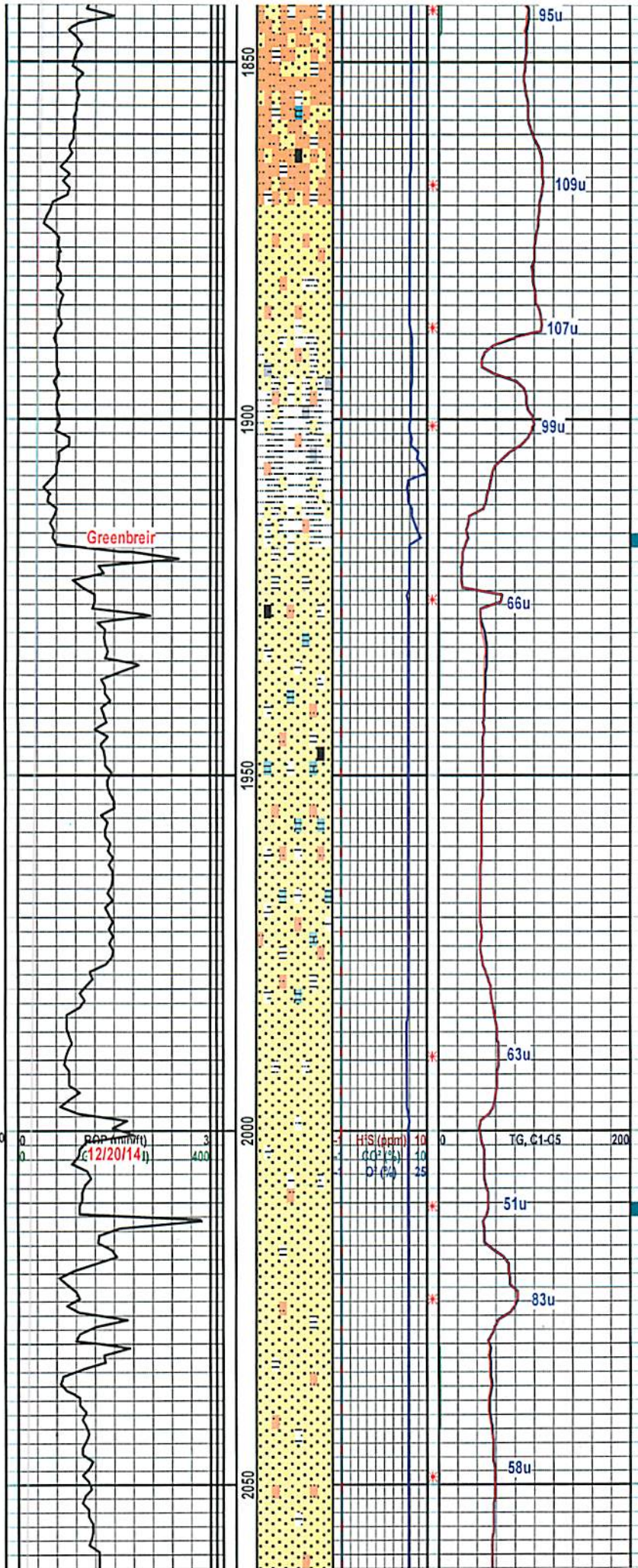
WOB-29
RPM-20
PSI-1690

WOB-29
RPM-29
PSI-2047

MD 1947 TVD 1947
Az 265.03° Inc 1.67°

Inclination 120
POP (mm/hr)
(12/20/14)

MD 2042 TVD 2042
Az 251.96° Inc 1.42°



SLTST:gy,mg,y,m-dkgy,occ rd
sbrnd,mg,fg,tcmt,SH,mg,
dkgy,sbbiky,frm,SS,offwh,
wh,clr,trans,lcmt,mg-fg,

SLTST:gy,mg,y,m-dkgy,occ rd
sbrnd,mg,fg,tcmt,SH,mg,
dkgy,sbbiky,frm,SS,offwh,
wh,clr,trans,lcmt,mg-fg

SS:off wh,clr,trans,wh,ltgy,
cons,lcmt,m-fg,ang-sbang,
srnd,g,sph,calc,arg,lmy,
tr flor,slw fnt cut,no
oder,w/SLTST:mg-y,ltgy,hrd,
tcmt,vfg,sl cal,w/arg,LS

SS:wh,clr,trans,off wh,ltgy,
cons,lcmt,mg-fg,sbang-ang,
sbrnd,arg,msph,sl calc,
abnt flor,good fst cut,no
oder,w/SLTST:mg-y,ltgy,
frm-hrd,vfg,tcmt,sbrnd,
w/LS:crm,off wh,ltgy,dns,frm,
arg,lse pyr

SS:ltgy-gy,wh,clr,cons,trans,
lcmt,mg-fg,sbang-ang,
sbrnd,arg,msph,non calc,tr
flor,no cut,no odr,w/SLTST:
mg-y,ltgy,frm-hrd,vfg,sbrnd,
tcmt,non calc

SS:wh,clr,trans,ltgy-gy,cons,
lcmt,mg-fg,sbang-ang,
arg,msph,non calc,tr flor,milky
fast cut,odr, w/SLTST:
mg-y,ltgy,frm-hrd,vfg,sbrnd,tcmt,
non calc

SS:ltgy-gy,wh,clr,cons,trans,
lcmt,mg-fg,sbang-ang,
sbrnd,arg,msph,non calc

10/23/2015

MUD DATA
IN 7.9/71
OUT 7.9/70

51-01748

WOB-31
RPM-20
PSI-1531

WOB-31
PSI-1502

MD 2136 TVD 2136
Az 214.2° Inc 0.66°

WOB-30
RPM-28
PSI-2114

MD 2186 TVD 2186
Az 213.31° Inc 0.45°

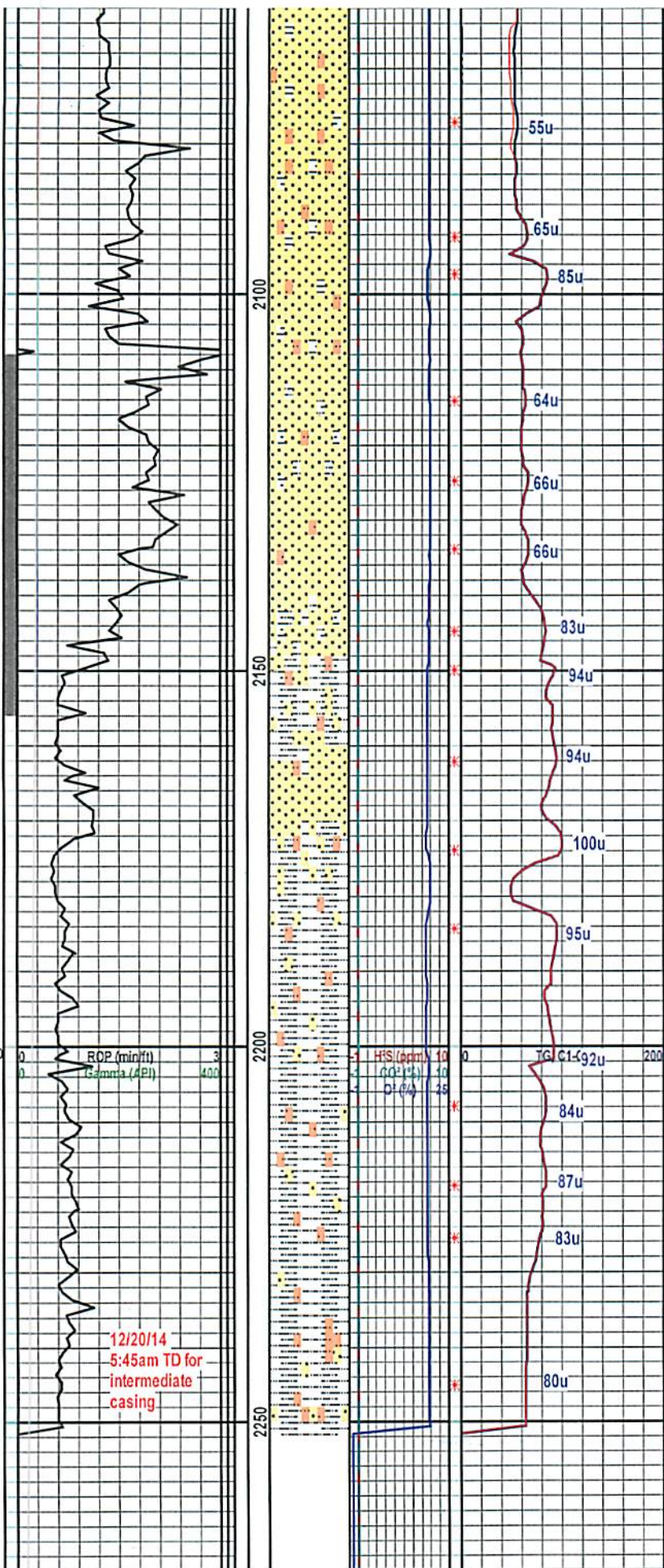
WOB-28
RPM-29
PSI-2288

Inclination 120

MUD DATA
IN 7.9/72
OUT 7.9/70

WOB-29
RPM-29
PSI-2210

MD 2251 TVD 2251
Az 213.31° Inc 0.45°



brnd, arg, msp, non calc, u
flor, no cut, no odr, w/SLTST:
mgy-ltgy, frm-hrd, vfg, sbrnd,
tcmt, non calc

SS:ltgy-gy, wh, clr, cons, trans,
lcmt, mg-fg, sbrnd-ang,
sbrnd, arg, msp, non calc, tr
flor, no cut, no odr, w/SLTST:
mgy-ltgy, frm-hrd, vfg, sbrnd,
tcmt, non calc

SS:wh, clr, trans, ltgy-gy, cons,
lcmt, mg-fg, sbrnd-ang,
arg, msp, non calc, tr flor, milky
fast cut, odr, w/SLTST:
mgy-ltgy, frm-hrd, vfg, sbrnd, tcmt,
non calc, occ calct

SLTST:ltgy-mgy, occ mgy, hrd,
vf-fg, tcmt, bio, arg, sl calc, w/
intrbdSH:ltgy-mgy, hrd, occ
grty, sbbkly-sbfiss, /w tr SS;

SLTST:ltgy-mgy, occ mgy, hrd,
vf-fg, tcmt, bio, arg, sl calc, w/
intrbdSH:ltgy-mgy, hrd, occ
grty, sbbkly-sbfiss, /w tr SS;

SLTST:ltgy-mgy, occ mgy, hrd,
vf-fg, tcmt, bio, arg, sl calc, w/
intrbdSH:ltgy-mgy, hrd, occ
grty, sbbkly-sbfiss, /w tr SS; no flor
no cut, no odor

SLTST:ltgy-mgy, occ mgy, hrd,
vf-fg, tcmt, bio, arg, sl calc, w/
intrbdSH:ltgy-mgy, hrd, occ
grty, sbbkly-sbfiss, /w tr SS; no flor
no cut, no odor



51-01748

STRATAGRAPH NORTHEAST INC.
P.O. BOX 59
RENO OHIO 45773
1-800-310-1935
mgmt@strata-ne.com



OIL AND GAS WELL ANALYSIS

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

Well Name: Hart 3H/2H

Location: Marshall Co WV

License Number: 47-5101749

Spud Date: 12-15-14

Surface Coordinates: 39° 54' 48.865 N
80° 39' 17.502 W

Bottom Hole Coordinates:

Ground Elevation (ft): 1324'

Logged Interval (ft): 850

Formation: Marcellus

Type of Drilling Fluid: SBM

K.B. Elevation (ft): 1354'

To: TD Int. Total Depth (ft): 3600+/-

Region: Moundsville

Drilling Completed:

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

MUDLOGGING PERSONNEL

Jason Antill
Craig Cole

GAMMA

Gamma:
0-400 No Color
400-800 Lime Green
800-1600 Purple

*Note: Gamma will wrap at 400, then color will be added to the right of ROP column.

ABBREVIATIONS

WOB Weight on Bit
RPM - Rotation/Min.
PSI - Pressure
CO - Circulated Out
CF - Check Flow
NR - No Returns
LAT - Logged after trip

DTG - Down-time Gas
BG - Background Gas
CG - Connection Gas
TG - Trip Gas
SG - Survey Gas
TT - Trap Test
TIH - Trip In Hole
TOOH - Trip Out Of Hole

10/23/2015

WOB-17
RPM-29
PSI-1863

51-01748

12/19/14 4:50am
FIT Test 976' MD

Inclination 120
ROP (min/ft) 3
Gamma (API) 400

WOB-35
RPM-21
PSI-1914

MD 1018 TVD 1018
Az 335.74° Inc 0.21°

MUD DATA
IN 7.9/103

WOB-34
RPM-29
PSI-2009

MD 1096 TVD 1096
Az 13.55° Inc 1.02°

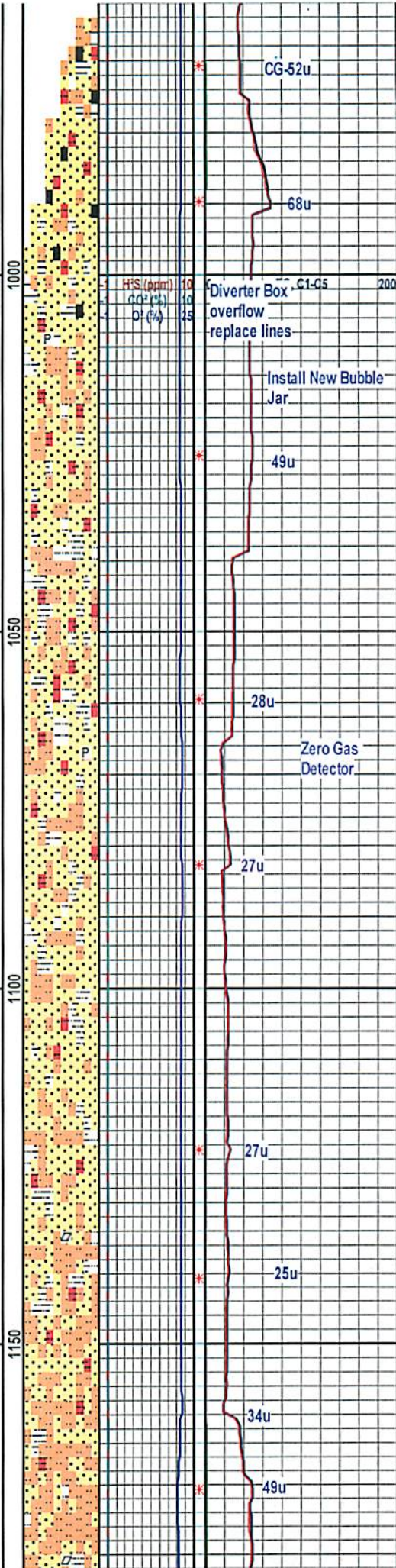
WOB-9
PSI-1836

WOB-25
RPM-30
PSI-2031

12/19/14 8:00am
Waiting for Tech for
Top Drive Repairs

12/19/14 11:45am
Resume Drilling

MUD DATA
IN 8.0/86



75% Cement 25% Formation

50% Cement 50% Formation

90% Cement 10% Formation

Begin 30' Samples

SS:v.ltgy,wh,consd,mg,sbang,
sbrnd,g.sph,tcmt,wsrt,sl
calc,arg,SLTST:gy-mgy,occ
rd,frm,vfg,tcmt,non calc,arg,tr
pyr,tr coal,tr cmnt

SS:v.ltgy,wh,consd,mg,sbang,
sbrnd,g.sph,tcmt,wsrt,sl
calc,arg,SLTST:gy-mgy,occ
rd,frm,vfg,tcmt,non calc,arg,lse
pyr,sl tr cmnt

SS:v.ltgy,wh,consd,mg,sbang,sbrnd,
g.sph,tcmt,wsrt,sl calc,arg,
SLTST:gy-mgy,occ rd,frm,vfg,
tcmt,non calc,arg

SS:ltgy-v.ltgy,gy,off wh,clr,
consd,sbang-sbrnd,mg,wsrt,
tcmt,sph,sl-mod calc,arg,tr
pyr,w/SLTST:gy-ltgy,occ rd,
hrd,vfg,tcmt,non calc

SS:ltgy-v.ltgy,gy,off wh,clr,
consd,sbang-sbrnd,mg,wsrt,
tcmt,sph,sl-mod calc,arg,tr
pyr,w/SLTST:gy-ltgy,occ rd,
hrd,vfg,tcmt,non calc

SS:ltgy-v.ltgy,gy,off wh,clr,
consd,sbang-sbrnd,mg,wsrt,
tcmt,sph,sl-mod calc,arg,
w/SLTST:gy-ltgy,occ rd,
hrd,vfg,tcmt,tr calct xls,non calc

SLTST:gy-ltgy,occ rd,
hrd,vfg,tcmt,tr calct xls,non
calc w/SS:ltgy-v.ltgy,gy,off



10/23/2015

WOB-14
PSI-1871

WOB-12
RPM-35
PSI-1954

WOB-28
RPM-35
PSI-2129

WOB-30
RPM-34
PSI-2154

WOB-22
PSI-2100

WOB-25
RPM-35
PSI-2105

MUD DATA
OUT 7.9

MD 1428 TVD 1428
Az 37.56° Inc 5.66°

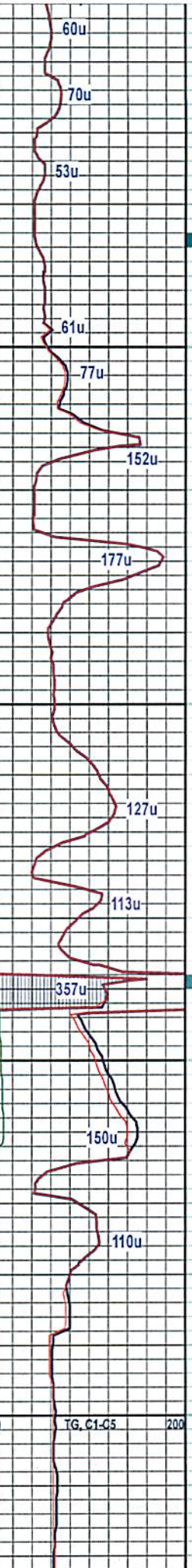
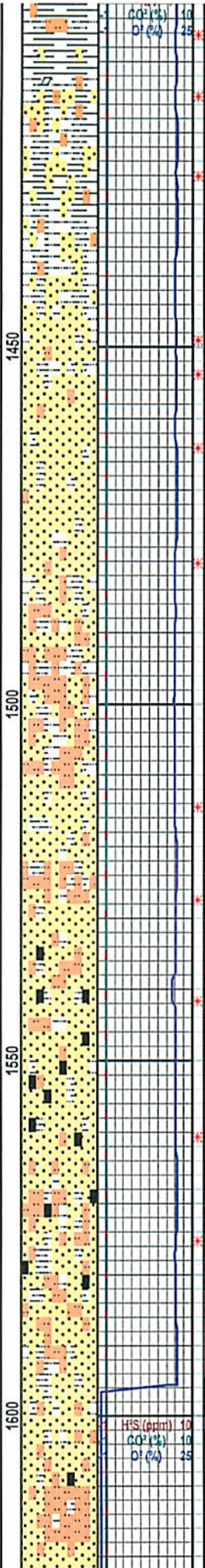
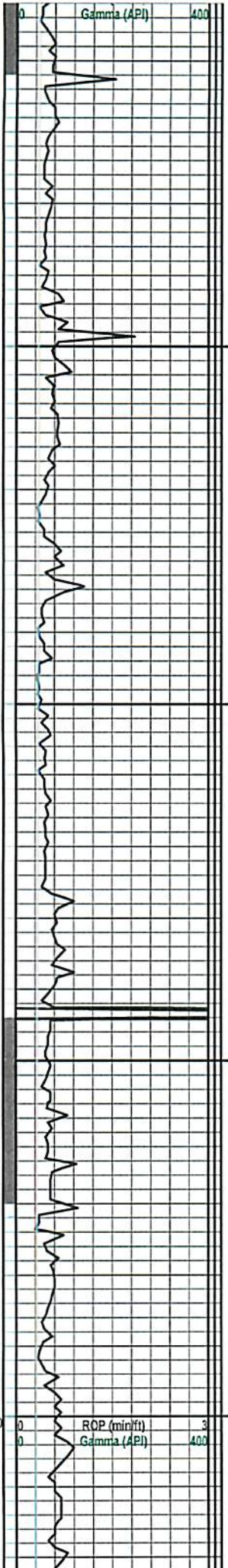
MD 1475 TVD 1475
Az 41.27° Inc 5.61°

MD 1523 TVD 1523
Az 37.43° Inc 5.41°

MD 1570 TVD 1570
Az 34.14° Inc 4.17°

Inclination 120

MD 1618 TVD 1618
Az 35.02° Inc 3.45°



SH:mgy,gy,gr,ltgy,v,frm,
sbbky,non calc,tr tan bent,lse
calc,LTST:gy-mgy,hrd,vfg,
non calc,w/SS

SS:gy-ltgy,wh,clr,trans,sbrnd
rd,msph,cond,msrt,
tcmt,arg,LTST:ltgy-
gy,mgy,sbrnd,vfg,arg,scat
flor,fmt cut

SS:gy-ltgy,wh,clr,trans,sbrnd
rd,msph,cond,msrt,
tcmt,arg,LTST:ltgy-
gy,mgy,sbrnd,vfg,arg,scat
flor,fmt cut

SLTST:mgy-gy,mgy,sbrnd,
vfg,argSS:gy-ltgy,wh,clr,trans,
sbrnd-md,msph,cond,msrt,
tcmt,arg,tr flor,mlky cut

SS:gy-ltgy,clr,trans,sbrnd
rd,msph,cond,msrt,
tcmt,arg,LTST:ltgy-
gy,mgy,sbrnd,vfg,arg,occ
coal,scat flor,fmt cut

SS:gy-ltgy,mgy,trans,sbrnd
rd,msph,cond,msrt,
tcmt,arg,LTST:ltgy-
gy,mgy,sbrnd,vfg,arg,occ
coal,scat flor,fmt cut

SS:gy-ltgy,mgy,trans,sbrnd
rd,msph,cond,msrt,
tcmt,arg,LTST:ltgy-
gy,mgy,sbrnd,vfg,arg,occ

10/23/2015

51-01748

WOB-22
PSI-1955

MUD DATA
IN 7.8/82

MD 1664 TVD 1664
Az 17.34° Inc 2.86°

WOB-21
RPM-33
PSI-1986

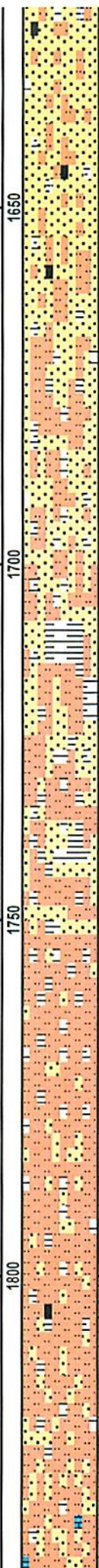
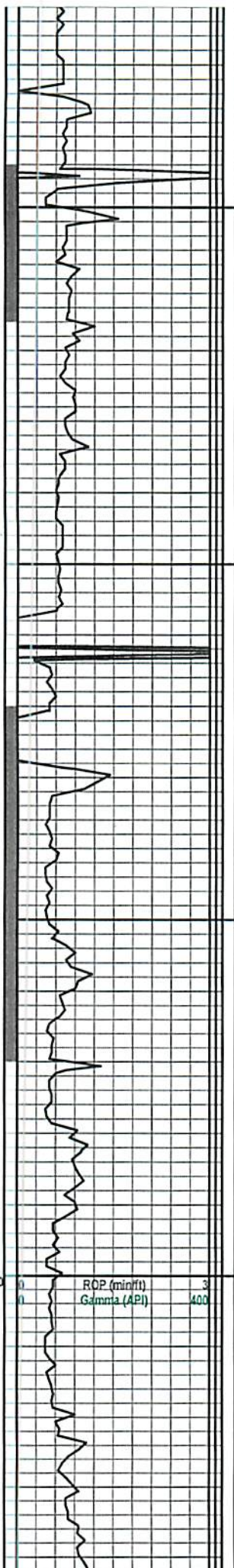
WOB-27
RPM-20
PSI-1494

WOB-17
PSI-1966

MD 1759 TVD 1759
Az 354.24° Inc 1.4°

WOB-27
RPM-20
PSI-1750

Inclination 120
ROP (min/ft) 3
Gamma (API) 400



coal, scat flor, fnt cut, w tr SH:
SS: gy, ltgy, mgy, trans, sbrnd md, msph, consd, msrt, tcmt, arg, SLTST: ltgy, gy, mgy, sbrnd, vfg, arg, occ coal, scat flor, fnt cut, w tr SH:
SLTST: gy, mgy, m-dkgy, occ rd sbrnd, mg, fg, tcmt, SH, mgy, dkgy, sbbky, frm, SS: offwh, wh, clr, trans, lcmt, mg, fg,
SLTST: gy, mgy, m-dkgy, occ rd sbrnd, mg, fg, tcmt, SH, mgy, dkgy, sbbky, frm, SS: offwh, wh, clr, trans, lcmt, mg, fg,
SLTST: gy, mgy, m-dkgy, occ rd sbrnd, mg, fg, tcmt, SH, mgy, dkgy, sbbky, frm, SS: offwh, wh, clr, trans, lcmt, mg, fg,
SLTST: gy, mgy, m-dkgy, occ rd sbrnd, mg, fg, tcmt, SH, mgy, dkgy, sbbky, frm, SS: offwh, wh, clr, trans, lcmt, mg, fg,
SLTST: gy, mgy, m-dkgy, occ rd sbrnd, mg, fg, tcmt, SH, mgy, dkgy, sbbky, frm, SS: offwh, wh, clr, trans, lcmt, mg, fg,
SLTST: gy, mgy, m-dkgy, occ rd sbrnd, mg, fg, tcmt, SH, mgy, dkgy, sbbky, frm, SS: offwh, wh, clr, trans, lcmt, mg, fg,
SLTST: gy, mgy, m-dkgy, occ rd sbrnd, mg, fg, tcmt, SH, mgy, dkgy, sbbky, frm, SS: offwh, wh, clr, trans, lcmt, mg, fg,



10/23/2015

51-01748

MD 1854 TVD 1854
Az 280.6° Inc 0.71°

WOB-32
RPM-20
PSI-1748

WOB-32
RPM-20
PSI-1655

MUD DATA
IN 7.7/65
OUT 7.8/63

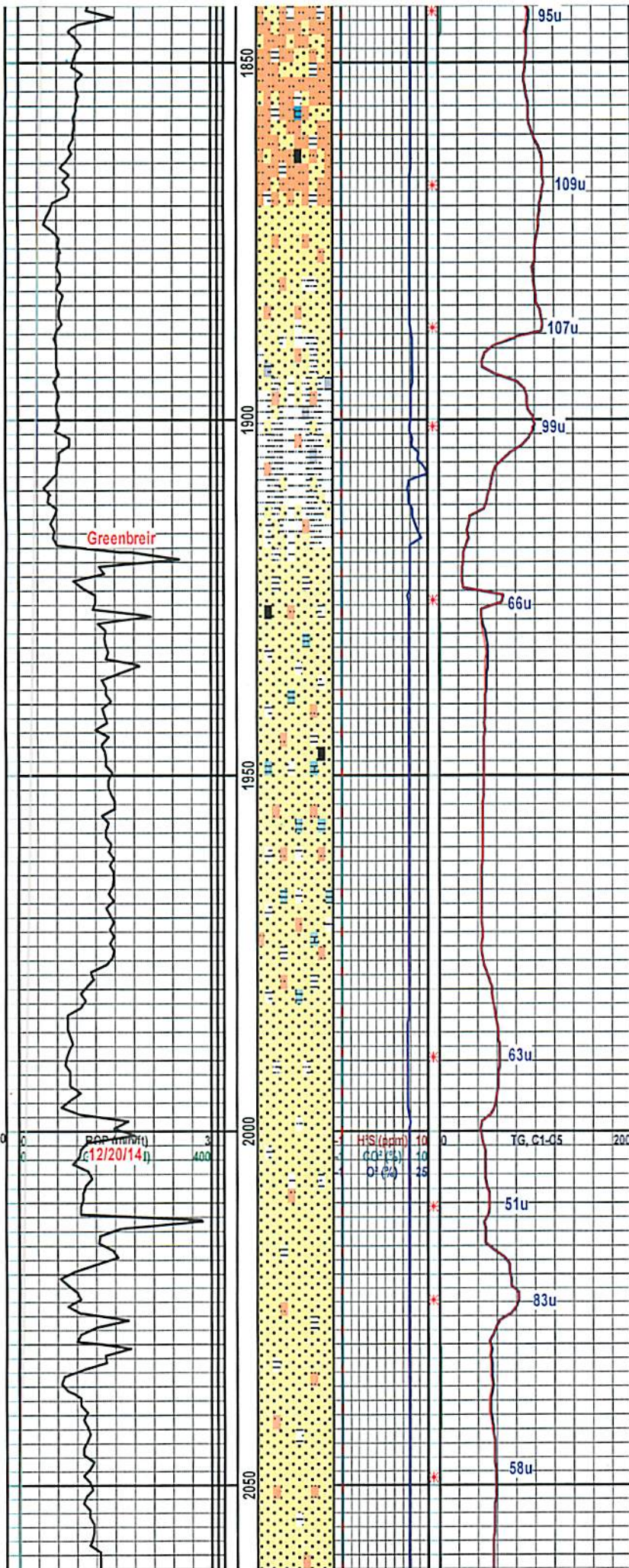
WOB-29
RPM-20
PSI-1690

WOB-29
RPM-29
PSI-2047

MD 1947 TVD 1947
Az 265.03° Inc 1.67°

Inclination 120
ROP (m/hr) (12/20/14)
DOP (%)

MD 2042 TVD 2042
Az 251.96° Inc 1.42°



SLTST:gy,mg,y,m-dkgy,occ rd
sbrnd,mg,fg,tcmt,SH,mg,y,
dkgy,sbbkly,frm,SS,offwh,
wh,clr,trans,lcmt,mg-fg,

SLTST:gy,mg,y,m-dkgy,occ rd
sbrnd,mg,fg,tcmt,SH,mg,y,
dkgy,sbbkly,frm,SS,off wh,
wh,clr,trans,lcmt,mg-fg

SS:off wh,clr,trans,wh,ltyg,
cons,lcmt,mg-fg,ang-sbang,
srnd,g.sph,calc,arg,lmy,
tr flor,slw fnt cut,no
oder,w/SLTST:mg-y,ltyg,hrd,
tcmt,vfg,sl cal,w/arg,LS

SS:wh,clr,trans,off wh,ltyg,
cons,lcmt,mg-fg,sbang-ang,
sbrnd,arg,msph,sl calc,
abnt flor,good fst cut,no
oder,w/SLTST:mg-y,ltyg,
frm-hrd,vfg,tcmt,sbrnd,
w/LS:crm,off wh,ltyg,dns,frm,
arg,lse pyr

SS:ltyg-gy,wh,clr,cons,trans,
lcmt,mg-fg,sbang-ang,
sbrnd,arg,msph,non calc,tr
flor,no cut,no odr,w/SLTST:
mg-y,ltyg,frm-hrd,vfg,sbrnd,
tcmt,non calc

SS:wh,clr,trans,ltyg-gy,cons,
lcmt,mg-fg,sbang-ang,
arg,msph,non calc,tr flor,milky
fast cut,odr, w/SLTST:
mg-y,ltyg,frm-hrd,vfg,sbrnd,tcmt,
non calc

SS:ltyg-gy,wh,clr,cons,trans,
lcmt,mg-fg,sbang-ang,
sbrnd,arg,msph,non calc tr

10/23/2015

MUD DATA
IN 7.971
OUT 7.970

51-01748

WOB-31
RPM-20
PSI-1531

WOB-31
PSI-1502

MD 2136 TVD 2136
Az 214.2° Inc 0.66°

WOB-30
RPM-28
PSI-2114

MD 2186 TVD 2186
Az 213.31° Inc 0.45°

WOB-28
RPM-29
PSI-2288

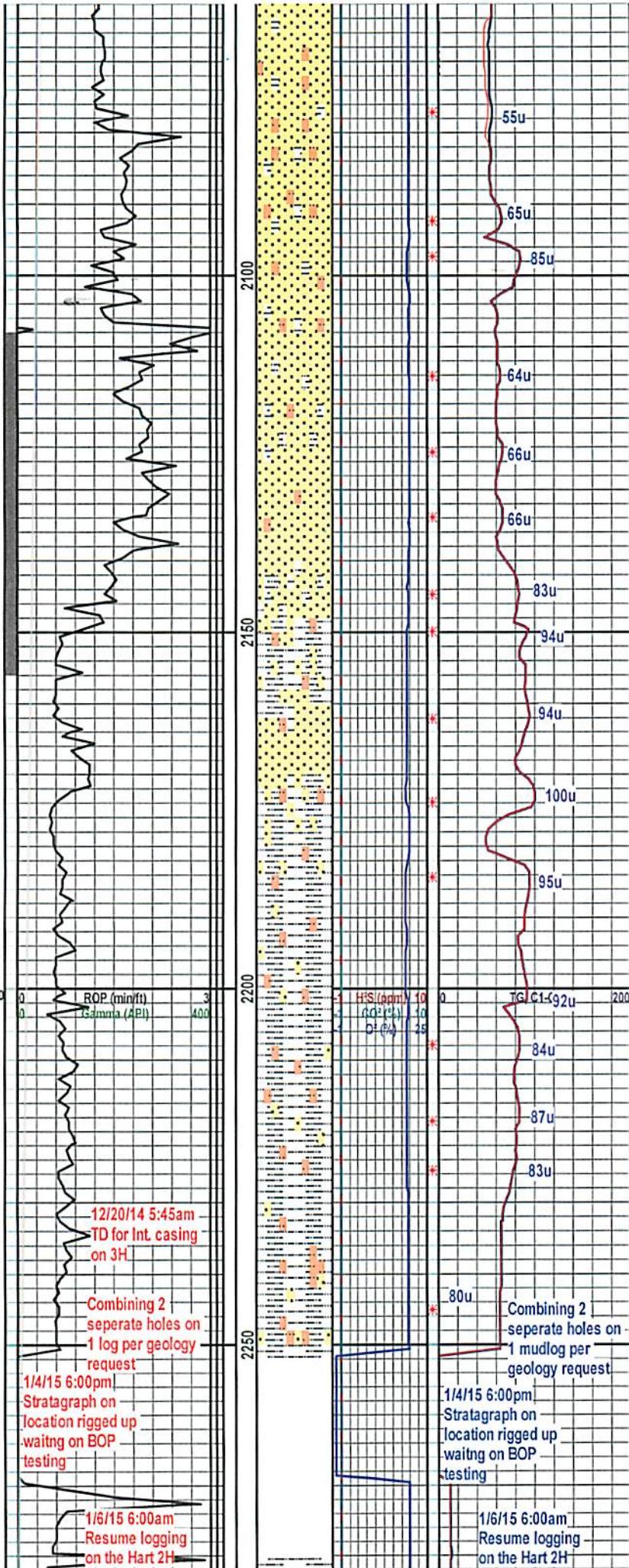
Inclination 120

MUD DATA
IN 7.972
OUT 7.970

WOB-29
RPM-29
PSI-2210

MD 2251 TVD 2251
Az 213.31° Inc 0.45°

Hart 2H BHA#1
Baker 8.5"
TD606X



sbnd, arg, msph, non calc, u
flor, no cut, no odr, w/SLTST:
mgy-ltgy, frm-hrd, vfg, sbnd,
tcmt, non calc

SS:ltgy-gy, wh, clr, cons, trans,
lcmt, mg-fg, sbang-ang,
sbnd, arg, msph, non calc, tr
flor, no cut, no odr, w/SLTST:
mgy-ltgy, frm-hrd, vfg, sbnd,
tcmt, non calc

SS:wh, clr, trans, ltgy-gy, cons,
lcmt, mg-fg, sbang-ang,
arg, msph, non calc, tr flor, milky
fast cut, odr, w/SLTST:
mgy-ltgy, frm-hrd, vfg, sbnd, tcmt,
non calc, occ calct

SLTST:ltgy-mgy, occ mgy, hrd,
vf-fg, tcmt, bio, arg, sl calc, w/
intrbdSH:ltgy-mgy, hrd, occ
grty, sbblky-sbfiss, /w tr SS;

SLTST:ltgy-mgy, occ mgy, hrd,
vf-fg, tcmt, bio, arg, sl calc, w/
intrbdSH:ltgy-mgy, hrd, occ
grty, sbblky-sbfiss, /w tr SS;

SLTST:ltgy-mgy, occ mgy, hrd,
vf-fg, tcmt, bio, arg, sl calc, w/
intrbdSH:ltgy-mgy, hrd, occ
grty, sbblky-sbfiss, /w tr SS; no flor
no cut, no odor

SLTST:ltgy-mgy, occ mgy, hrd,
vf-fg, tcmt, bio, arg, sl calc, w/
intrbdSH:ltgy-mgy, hrd, occ
grty, sbblky-sbfiss, /w tr SS; no flor
no cut, no odor

Hart 2H Begins

Cement

10/23/2015



51-01748

MUD DATA
OUT 8.2/212

MD 2296 TVD 2296
Az 154.69° Inc 0.69°

WOB-22
RPM-20
PSI-2225

WOB-30
RPM-20
PSI-2305

MD 2391 TVD 2391
Az 112.79° Inc 0.55°

Inclination 120

RQP (min/ft) 3
Gamma (API) 400

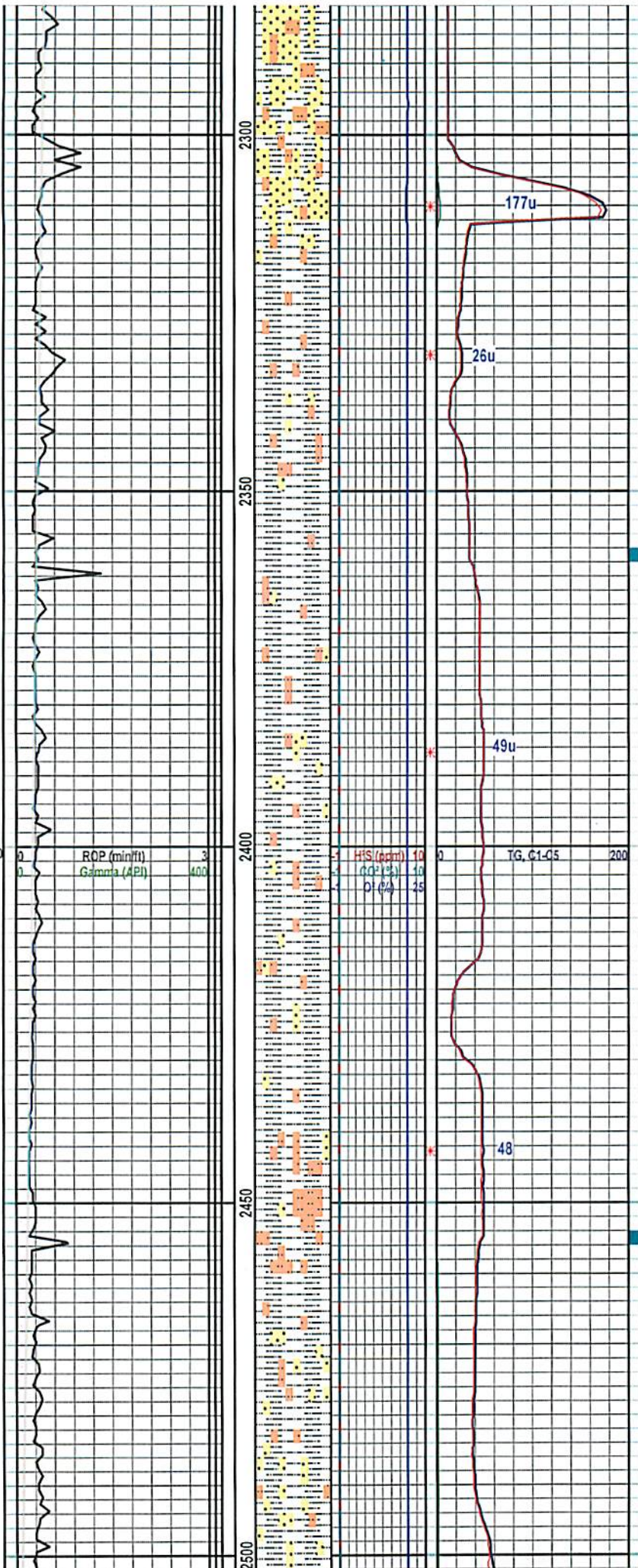
HIS (ppm) 10
ROP (%) 10
DI (%) 35

TG, C1-C5 200

WOB-22
RPM-19
PSI-2270

MD 2486 TVD 2486
Az 59.15° Inc 0.55°

WOB-26
RPM-20
PSI-2257



SS:clr,trans,wh,ltgy-gy,cons,
lcmt,mg-fg,sbang-ang,
sbrnd,arg,msph,lse pyr,non
calc,trflor,no cut SLTST:ltgy-
mgy,occ mgy,hrd,vf-fg,tcmt,
bio,arg,sl calc,w/intrbdSH

SLTST:ltgy-mgy,occ mgy,hrd,
vf-fg,tcmt,bio,arg,sl calc,w/
intrbdSH:ltgy-mgy,hrd,occ
grty,sbblky-sbfiss,/w tr SS;

SLTST:ltgy-mgy,occ mgy,hrd,
vf-fg,tcmt,bio,arg,sl calc,w/
intrbdSH:ltgy-mgy,hrd,occ
grty,sbblky-sbfiss,/w tr SS;

SLTST:ltgy-mgy,occ mgy,hrd,
vfg,tcmt,bio,arg,sl calc,w/
intrbdSH:ltgy-gy,hrd,occ
grty,slty,sbblky-sbfiss,aren,
non calc

SLTST:ltgy-mgy,occ mgy,hrd,
vfg,tcmt,bio,arg,sl calc,w/
intrbdSH:ltgy-gy,grn,hrd,occ
grty,slty,sbblky-sbfiss,aren,non
calc

SLTST:ltgy-gy,occ mgy,hrd,
vfg,tcmt,bio,arg,sl calc,w/
intrbdSH:ltgy-gy,grn,hrd,occ
grty,slty,sbblky-sbfiss,aren,
non calc

SLTST:ltgy-gy,occ mgy,hrd,
vfg,tcmt,arg,sl calc,w/
intrbdSH:ltgy-gy,mgy,frm,occ
grty,slty,sbblky-sbfiss,aren,non
calc



51-01748

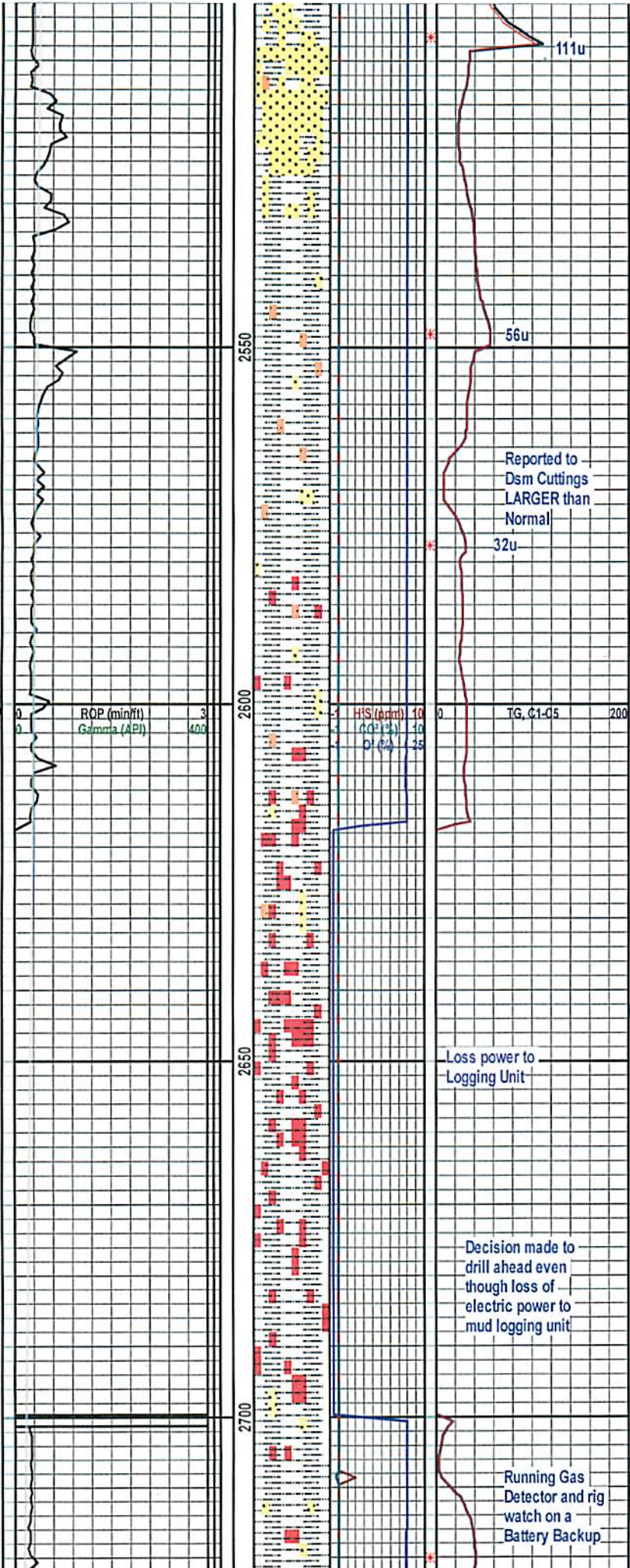
WOB-20
RPM-20
PSI-2133

WOB-25
RPM-20
PSI-2349

MD 2580 TVD 2580
Az 12.68° Inc 0.71°

Inclination 120

MD 2675 TVD 2675
Az 344.51° Inc 0.67°



SS:wh,clr,trans,lty-gy,cons,
lcm,mg-fg,sbang-ang,arg,
msph,non calc,tr flor,exl fast
cut,fmt odr,lse pyr,w/arg SLTST

Cuttings Larger

SLTST:lty-gy,occ mgy,hrd,
vfg,tcmt,arg,sl calc,w/
intrbdSH:lty-gy,mgy,frm,occ
grty,slty,sbblky-sbfiss,aren,
non calc,occ SS

SLTST:lty-mgy,occ mgy,hrd,
vf-fg,tcmt,bio,arg,sl calc,w/
intrbdSH:lty-mgy,hrd,occ
grty,sbblky-sbfiss,/w tr SS

SLTST:lty-mgy,occ mgy,rd,
hrd,vf-fg,tcmt,arg,sl calc,w/
intrbdSH:lty-mgy,hrd,occ
grty,sbblky-sbfiss,/w tr SS

SLTST:rd,ltrd,gy-mgy,occ
mgy,hrd,vfg,tcmt,arg,sl
calc,w/intrbd SH:rd-ltrd,ltygy,
frm,grty,slty,sbblky-sbfiss,
aren,non calc

SLTST:rd,ltrd,gy-mgy,occ
mgy,hrd,vfg,tcmt,arg,sl
calc,w/intrbd SH:rd-ltrd,ltygy,
frm,grty,slty,sbblky-sbfiss,
aren,non calc

SLTST:rd,ltrd,gy-mgy,occ
mgy,hrd,vfg,tcmt,arg,sl
calc,w/intrbd SH:rd-ltrd,ltygy,
frm,grty,slty,sbblky-sbfiss,
aren,non calc,

SLTST:lty-mgy,occ rd,hrd,
vfg,tcmt,arg,sl calc,w/



Reported to
Dsm Cuttings
LARGER than
Normal

Loss power to
Logging Unit

Decision made to
drill ahead even
though loss of
electric power to
mud logging unit

Running Gas
Detector and rig
watch on a
Battery Backup

10/23/2015

51-01748

WOB-27
RPM-20
PSI-2374

MUD DATA
OUT 8.1/101

WOB-20
RPM-20
PSI-2255

WOB-20
RPM-20
PSI-2255

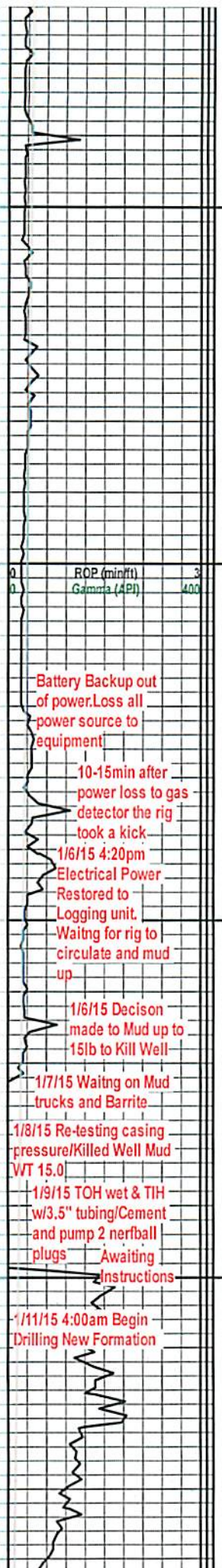
WOB-25
RPM-25
PSI-3221

MUD DATA
IN 14.9

MD 2770 TVD 2770
Az 315.97° Inc 1°

MD 2865 TVD 2865
Az 305° Inc 1.11°

Inclination 120



Battery Backup out of power. Loss all power source to equipment

10-15min after power loss to gas detector the rig took a kick

1/6/15 4:20pm Electrical Power Restored to Logging unit. Waiting for rig to circulate and mud up

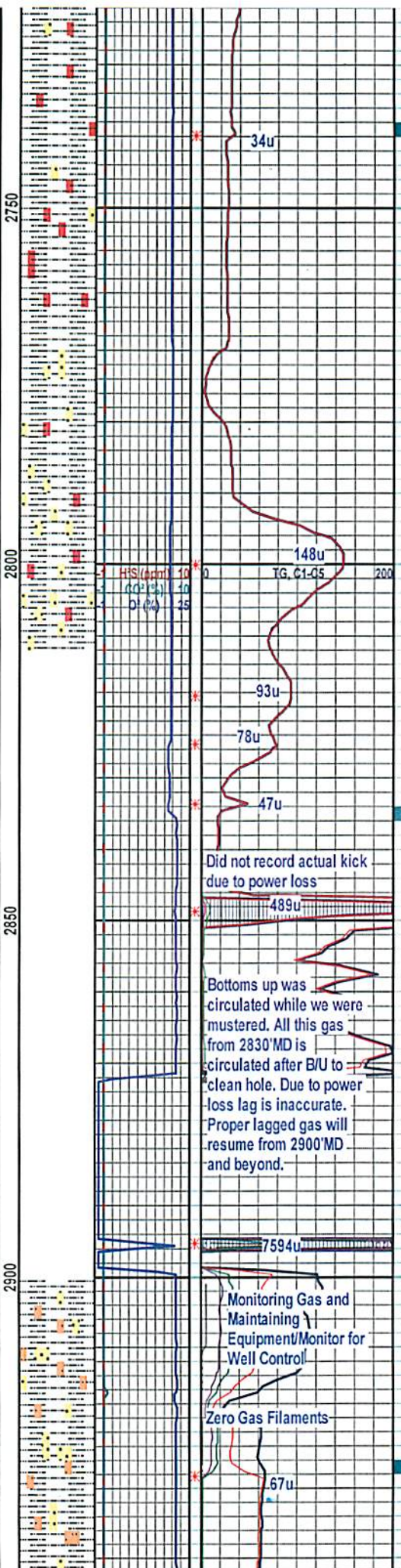
1/6/15 Decision made to Mud up to 15lb to Kill Well

1/7/15 Waiting on Mud trucks and Barrite

1/8/15 Re-testing casing pressure/Killed Well Mud WT 15.0

1/9/15 TOH wet & TIH w/3.5" tubing/Cement and pump 2 nerfball plugs Awaiting Instructions

1/11/15 4:00am Begin Drilling New Formation



Monitoring Gas and Maintaining Equipment/Monitor for Well Control

Zero Gas Filaments

intrbdSH:ltgy-gy,rd,frm,occ grty,slty,sbblky-sbfiss,aren, non calc,occ SS

SLTST:ltgy-mgy,occ rd,hrd, vfg,tcmt,arg,sl calc,w/ intrbdSH:ltgy-gy,rd,frm,occ grty,slty,sbblky-sbfiss,aren, non calc,occ SS

SLTST:ltgy-mgy,occ rd,hrd, vfg,tcmt,arg,sl calc,w/ intrbdSH:ltgy-gy,rd,frm,occ grty,slty,sbblky-sbfiss,aren, non calc,w/SS

SLTST:ltgy-mgy,occ rd,hrd, vfg,tcmt,arg,sl calc,w/ intrbdSH:ltgy-gy,rd,frm,occ grty,slty,sbblky-sbfiss,aren, non calc,w/SS

No Sample @ Mustered Area

No Sample @ Mustered Area

No Sample @ Mustered Area

Resume Samples @ 2900' MD

SLTST:ltgy-mgy,occ rd,hrd, vfg,tcmt,arg,sl calc,w/ intrbdSH:ltgy-gy,rd,frm,occ grty,slty,sbblky-sbfiss,aren, non calc,w/SS, lw tr Cement

SLTST:ltgy-mgy,occ rd,hrd, vfg,tcmt,arg,sl calc,w/ intrbdSH:ltgy-gy,rd,frm,occ grty,slty,sbblky-sbfiss,aren, non calc,w/SS, lw tr Cement

10/23/2015

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WOB-25
RPM-33
PSI-2993

MD 2960 TVD 2960
Az 299.74° Inc 1.36°

WOB-7
RPM-35
PSI-2433

MUD DATA
IN 15.0/161
OUT 14.6

WOB-17
RPM-35
PSI-2763

MD 3055 TVD 3055
Az 294.87° Inc 1.31°

MUD DATA
IN 15.0
OUT 15.1

WOB-19
RPM-35
PSI-2654

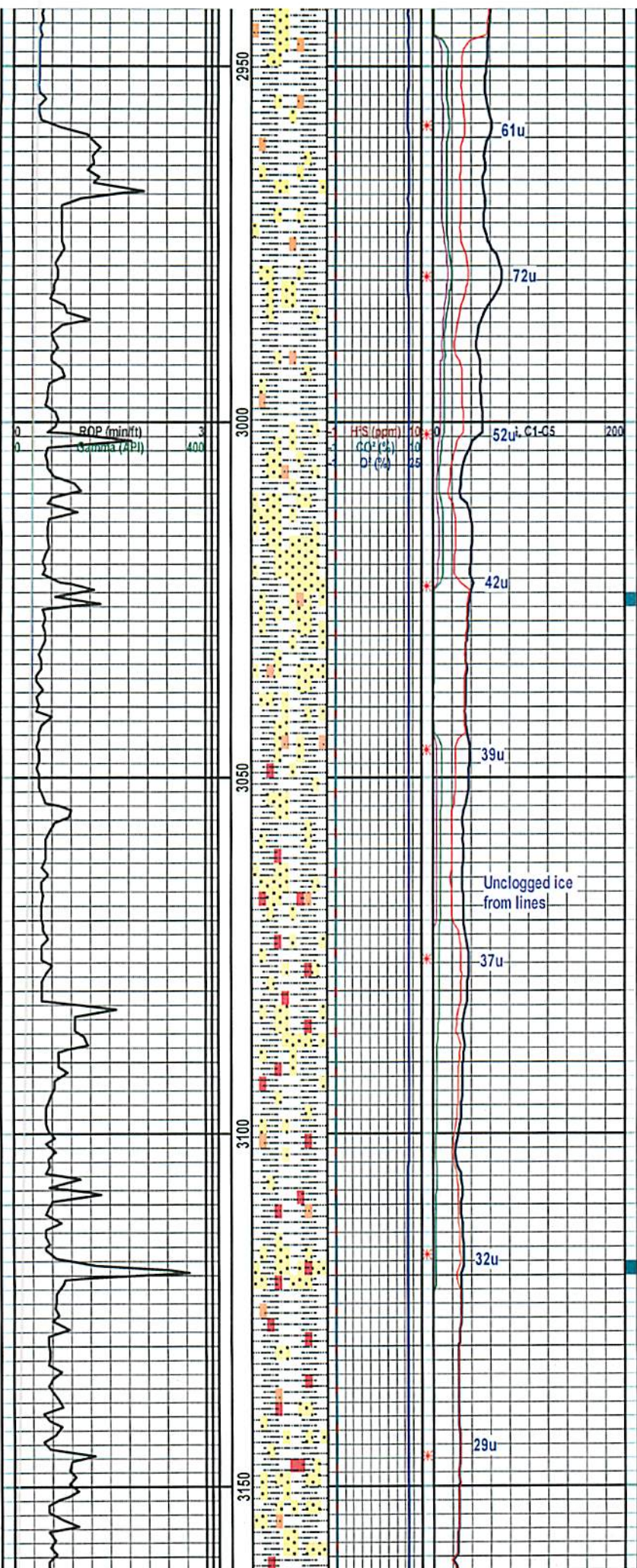
MUD DATA
IN 15.0
OUT 15.1

MD 3149 TVD 3149
Az 306.55° Inc 1.01°

Inclination 120

ROP (min/ft) 3
Gamma (API) 400

H₂S (ppm) 10
CO₂ (%) 10
DI (%) 25



SLTST:ltgy-gy,occ v.ltgy,hrd,
vfg,tcmt,bio,arg,sl calc,w/
intrbdSH:ltgy-gy,hrd,occ
gry,slty,sbblky-sbfiss,aren, non
calc,/w tr SS

SLTST:ltgy-gy,occ v.ltgy,hrd,
vfg,tcmt,bio,arg,sl calc,w/
intrbd SS:ltgy-gy,mgy,cons,
cmt,mg,sbang-ang,no calc, fnt
odor,tr flor

SS:ltgy-gy,mgy,occ ofwh,cons,
lcmt,mg-fg,sbang-ang,arg,
msph,non calc,tr flor,mod odor,no
cut,w/arg SLTST

SS:ltgy-gy,mgy,occ ofwh,cons,
lcmt,mg-fg,sbang-ang,arg,
msph,non calc,tr flor,mod odor,no
cut,w/arg SLTST

SLTST:ltgy-gy,occ v.ltgy,rd,
hrd,vfg,tcmt,arg,sl calc,w/
intrbd SS:ltgy-gy,clr,wh,tr
rd,cons,cmt,mg,sbang-ang,no
calc, fnt odor,no flor

SLTST:ltgy-gy,occ v.ltgy,rd,
hrd,vfg,tcmt,arg,sl calc,w/
intrbd SS:ltgy-gy,clr,wh,tr
rd,cons,cmt,mg,sbang-ang,no
calc

SS:ltgy-gy,mgy,occ ofwh,rd,
cons,lcmt,mg-fg,sbang-
ang,arg,msph,non calc,no flor,no
odor,no cut,w/arg SLTST



10/23/2015

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WOB-28
RPM-34
PSI-2910

Inclination 120

ROP (min/ft) 3
Gamma (API) 400

WOB-25
RPM-35
PSI-2993

MUD DATA
IN 15.1
OUT 15.1

MD 3244 TVD 3244
Az 305.36° Inc 0.74°

WOB-29
RPM-34
PSI-3045

MUD DATA
OUT 15.0

WOB-24
RPM-27
PSI-3337

MD 3338 TVD 3338
Az 297.74° Inc 0.67°

MUD DATA
OUT 15.0

3200
3250
3300
3350

HIS (ppm) 10
CO₂ (%) 10
DI (%) 25

Repositioned
Agitator in divertor
box

Lines Partially
restricted by Ice
and moisture

Repositioned
Agitator in divertor
box

TG, C1-C5 200

81u

77u

47u

61u

58u

63u

51u

SLTST:ltgy-gy,occ v.ltgy,rd,
hrd,vfg,tcmt,arg,sl calc,w/
inbrd SS:ltgy-gy,clr,wh,tr
rd,cons,cmt,mg,sbang-ang,no
calc

SS:ltgy-gy,mg,occ ofwh,tr
rd,cons,lcmt,mg-fg,sbang-
ang,arg,msph,mod calc,no
flor,mod odor,no cut,w/arg
SLTST,lse/embd calct

SLTST:ltgy-gy,occ v.ltgy,rd,
hrd,vfg,tcmt,arg,sl calc,w/
inbrd SS:ltgy-gy,clr,wh,tr
rd,cons,lcmt,mg,sbang-ang,no
calc

SS:ltgy-gy,mg,occ ofwh,tr
rd,cons,lcmt,mg-fg,sbang-
ang,arg,msph,mod calc,no flor,fnt
odor,no cut,w/arg SLTST,lse/embd
calct

SS:ltgy-gy,mg,occ ofwh,tr
rd,cons,lcmt,mg-fg,sbang-
ang,arg,msph,mod calc,no flor,fnt
odor,no cut,w/arg SLTST,lse/embd
calct

SS:ltgy-gy,mg,occ ofwh,tr
rd,cons,lcmt,mg-fg,sbang-
ang,arg,msph,mod calc,no flor,fnt
odor,no cut,w/arg SLTST,lse/embd
calct

SS:ltgy-gy,mg,occ ofwh,tr
rd,cons,lcmt,mg-fg,sbang-
ang,arg,msph,mod calc,no flor,fnt
odor,no cut,w/arg SLTST,lse/embd
calct

SLTST:ltgy-gy,occ v.ltgy,rd,
hrd,vfg,tcmt,arg,sl calc,w/
inbrd SS:ltgy-gy,clr,wh,tr

10/23/2015

WOB-25
RPM-26
PSI-3360

51-01748

Inclination 120

WOB-27
RPM-26
PSI-3150

MD 3433 TVD 3433
Az 268.85° Inc 0.78°

MUD DATA
OUT 15.0

WOB-28
RPM-25
PSI-2863

MUD DATA
OUT 15.0

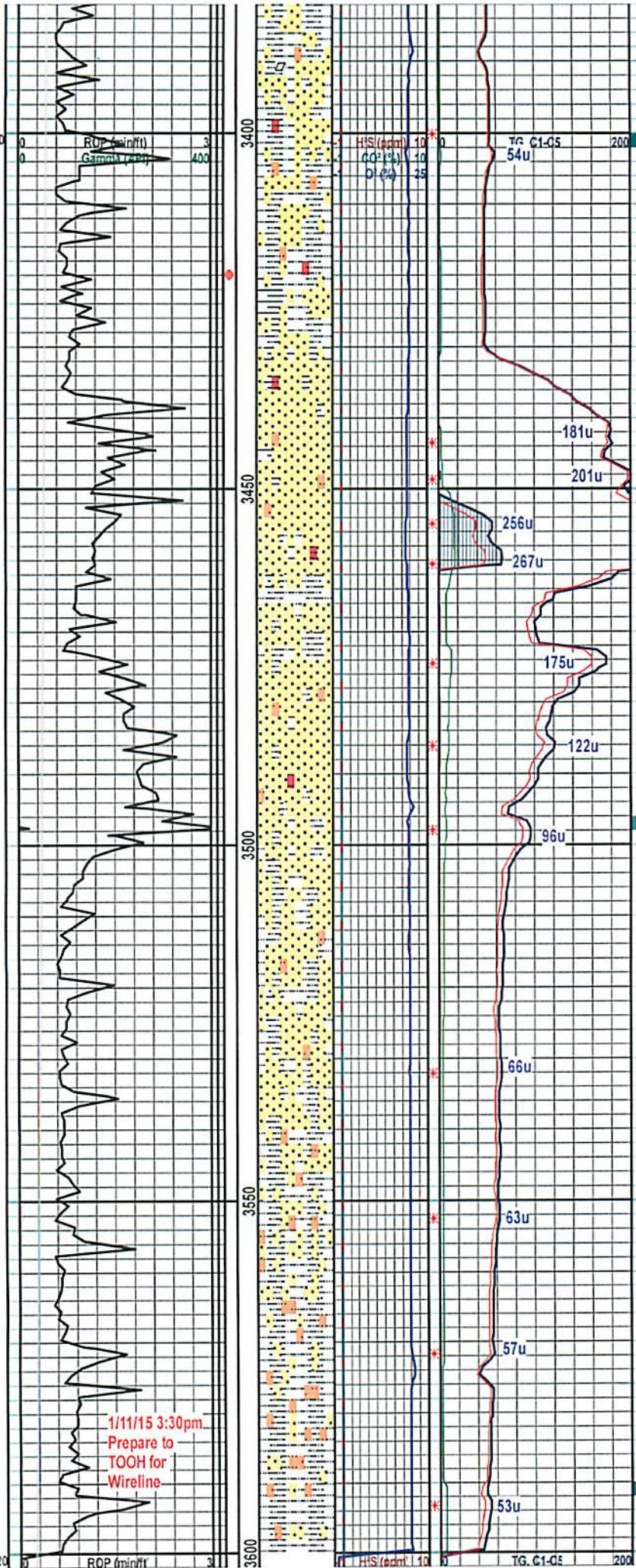
WOB-32
RPM-39
PSI-3145

MD 3527 TVD 3527
Az 272.12° Inc 1.01°

MUD DATA
OUT 15.0

WOB-33
RPM-39
PSI-2804

MUD DATA
OUT 15.0



rd,cons,lcmt,mg,sbang-ang,sl
calc,occ fnt odor

SLTST:ltgy-gy,occ v.ltgy,rd,
hrd,vfg,tcmt,arg,sl calc,w/
intrbd SS:ltgy-gy,clr,wh,tr
rd,cons,lcmt,mg,sbang-ang,sl
calc,occ fnt odor

SS:ltgy-gy,wh,clr,trans,cons,
lcmt,mg-fg,sbang-ang,arg,
msph,wsrt,non calc,tr flor,fnt
cut,strong odor,wlarg SLTST

SS:ltgy-gy,wh,clr,trans,cons,
lcmt,mg-fg,sbang-ang,arg,
msph,wsrt,non calc,tr flor, fnt
cut,strong odor,wlarg SLTST,occ
sl tr rd

SS:ltgy-gy,wh,clr,trans,cons,
lcmt,mg-fg,sbang-ang,arg,
msph,wsrt,non calc,tr flor,no
cut,mod odor,wlarg SLTST

SS:ltgy-gy,wh,clr,trans,cons,
lcmt,mg-fg,sbang-ang,arg,
msph,wsrt,non calc,tr flor,no
cut,mod odor,wlarg SLTST

SLTST:ltgy-gy,occ v.ltgy,rd,
hrd,vfg,tcmt,arg,sl calc,w/
SS:ltgy-gy,clr,wh,cons,lcmt,
mg,sbang-ang,sl calc,occ fnt odor

SLTST:ltgy-gy,occ v.ltgy,rd,
hrd,vfg,tcmt,arg,sl calc,w/
SS:ltgy-gy,clr,wh,cons,lcmt,
mg,sbang-ang,sl calc,occ fnt odor



10/23/2015

51-01748

0	Gamma (API)	400
	1/11/15 3:30 pm	
	Drillers Est TD	
	@ 3600' MD	

50

CG (%)	10
D (%)	25
Thank You for Using Stratagraph NE Inc.	