



# Empirica

Scale: 5" / 100'  
Measured Depth Log

**Well Name** DT Forbes c7-5-6

**Location** Sec.5-T05N-R65W

**State** Colorado

**Country** USA

**County** Weld

**Rig Number** Patterson UTI 346

**API Number** 05-123-41028-00

**Field** Wattenberg

**Geographic Region** DJ Basin

**Spud Date** 10/23/2015

**Surface Coordinates** Lat: 40 26' 6.000 N  
Long: 104 41' 1.464 W

**Bottom Hole Coordinates** NA

**Ground Elevation** 4,640'

**K.B. Elevation** 4,664.5'

**Logged Interval** 7,580' To TBD

**Total Depth** TBD

**Formation** Codell

**Type of Drilling Fluid** Oil based - invert

## Operator

**Company** Extraction Oil & Gas

**Address** 1888 Sherman St., Suite 200  
Denver, CO 80203

## Geologist

**Name** Vivian Spiess / Jared Rouse

**Company** Extraction Oil & Gas

**Address** 1888 Sherman St., Suite 200  
Denver, CO 80203



## Other

**Equipment** ML-113

**Comments** Start: 10-23-15

**TD:** TBD


## Services Provided


2-man Logging  
On Site Geosteering


**Logger Names** Dominic Pitre / Nicholas Wa


**Address** Empirica, LLC.  
6360 W Sam Houston Pkwy  
Suite 100  
Houston, TX 77041


Zone Color Coding


 Oil


 Note


 Error


 Condensate

 Core

 Water

 Gas

 Pressure

 Seal

Rock Types

 UNKNOWN

 ANHYDRITE

 GYPSUM

 SALT

 SIDERITE or LIMONITE

 LIMESTONE

 DOLOMITE

 CHERT

 COAL

 MARLSTONE

 CLAYSTONE

 SHALE

 SHALE GRAY

 SHALE COLORED

 SILTSTONE

 SANDSTONE

 CONGLOMERATE

 BRECCIA

 TILL

 BENTONITE


 TUFF


 IGNEOUS


 METAMORPHIC


 CEMENT


Accessories


 FOSSIL


 GASTROPOD


 OOLITE


 OSTRACOD


 PELECYPOD


 PELLET


 PISOLITE


 PLANT REMAINS


 CORAL


 CEPHALOPOD


 BRYOZOA


 CRINOID


 ECHINOID


 FISH


 FORAMINIFERA


 ARGILLACEOUS


 ARGILLITE GRAIN


 BENTONITE


 BITUMINOUS SUBSTANCE


 BRECCIA FRAGMENTS


 CALCAREOUS


 CARBONACEOUS FLAKES


 CHERT


 COAL - THIN BEDS


 DOLOMITIC


 FELDSPAR


 FERRUGINOUS PELLET


 FERRUGINOUS


 GLAUCONITE


 GYPSIFEROUS


 HEAVY MINERAL


 KAOLIN


 MARLSTONE


 MINERAL CRYSTALS


 NODULES


 PHOSPHATE PELLETS


 PYRITE


 SALT CAST


 SANDY


 SILICEOUS


 SILTY


 TUFFACEOUS


 ANHYDRITE STRINGER


 BENTONITE STRINGER


 COAL STRINGER


 DOLOMITE STRINGER


 GYPSUM STRINGER


 LIMESTONE STRINGER

 MARLSTONE (CALC) STRG


 MARLSTONE (DOL) STRG


 SANDSTONE STRINGER


 SHALE STRINGER


 SILTSTONE STRINGER


Other Sym


 ORGANIC


 PINPOINT


 DEAD

 VUGGY


 EVEN


 QUESTIONABLE


 SPOTTED STAINING


 FORM

 GAS SHOW

 MINDEPTH

 NORMAL FA

 OIL SHOW

 OVERTURN

Engineering


 CASING

 REVERSE F

Porosity

 CONNECTION (LEFT)


 SIDEWALL C


 EARTHY

 CONNECTION (RIGHT)


 SIDEWALL C

 FENESTRAL

 CONNECTION GAS

 SLIDE


 FRACTURE


 CORE - LOST


 SURVEY

 INTERCRYSTALLINE

 CORE - RECOVERED


 TRIP GAS

 INTEROOLITIC

 DST INTERVAL

 WIRELINE T

 MOLDIC

 FAULT

 WIRELINE T

# Labels

SECTION TOP      L LITHOGRAPHIC

## Rounding

**MX** MICROXLN

DEPTH      **A** ANGULAR      **MS** MUDSTONE

CULT      **R** ROUNDED      **PS** PACKSTONE

**B** SUBANG      **WS** WACKESTONE

SED STRATA      **N** SUBRND

## Sorting

CULT

## Textures

PORE (LEFT)      **M** MODERATE

PORE (RIGHT) **BS** BOUNDSTONE      **P** POOR

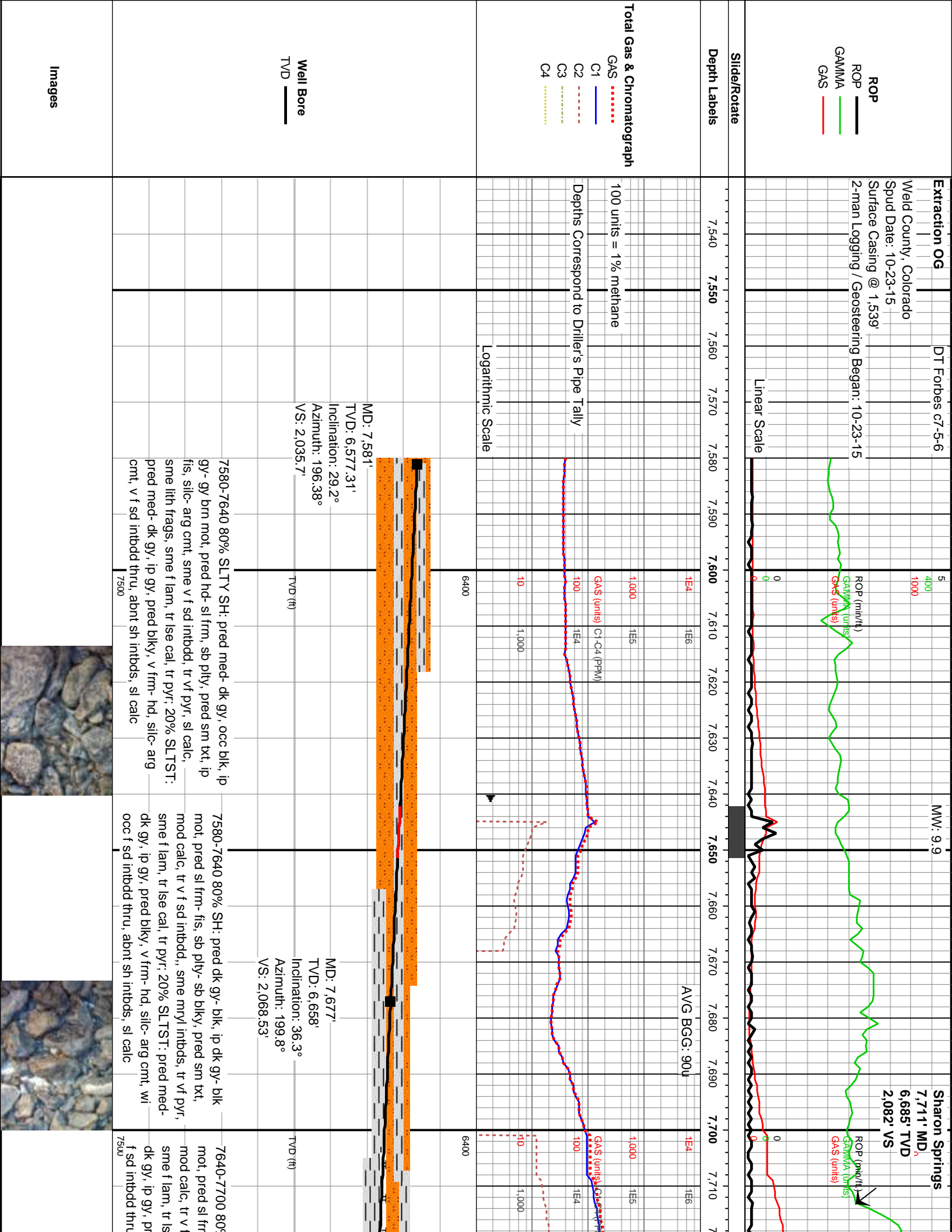
**C** CHALKY      **W** WELL

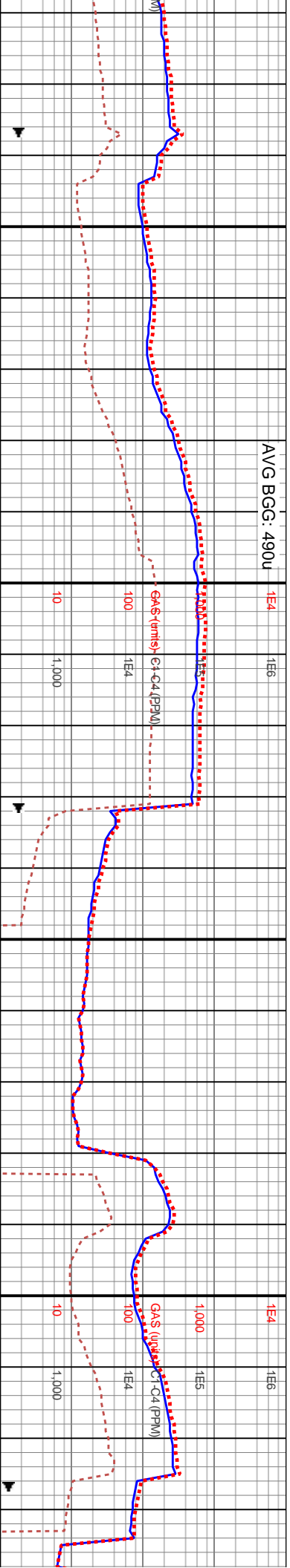
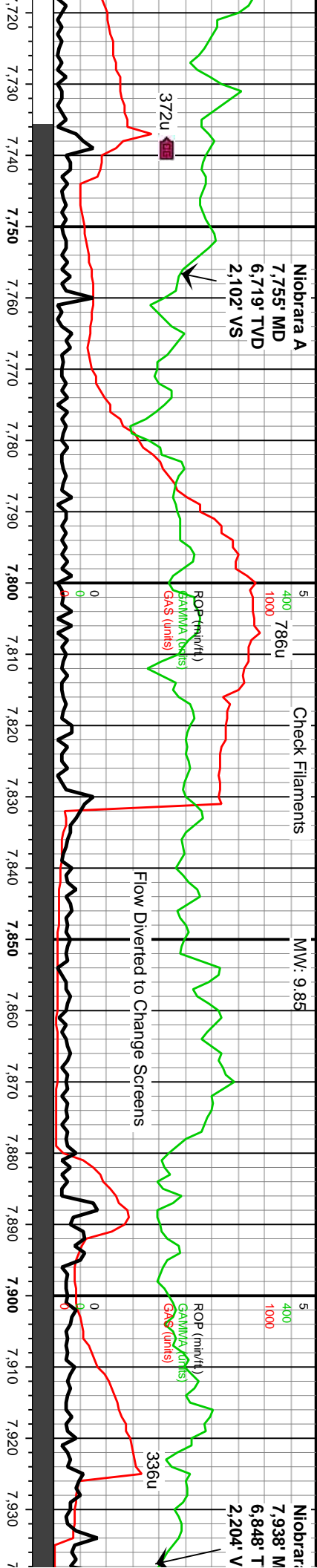
**CX** CRYPTOXLN

**E** EARTHY

TESTED - LEFT      **FX** FINELYXLN

TESTED - RT      **GS** GRAINSTONE





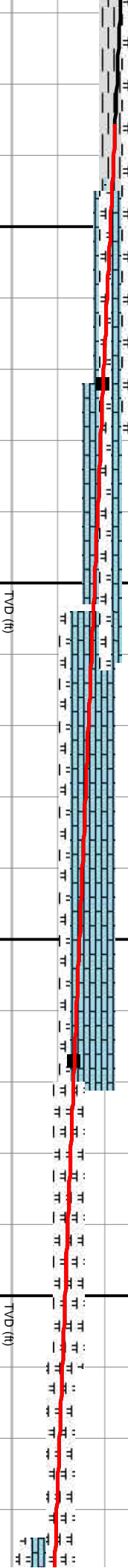
MD: 7,772'  
TVD: 6,732'  
Inclination: 41.38°  
Azimuth: 205.39°  
VS: 2,109.68'

WOB: 46Klbs  
Rotary: 0RPM  
Strokes: 239SPM  
Pump Rate: 688GPM

MD: 7,867'  
TVD: 6,800.31'  
Inclination: 46.69°  
Azimuth: 212.01°  
VS: 2,160.08'

NW @ 7,880'

6400



% SH: pred dk gy- blk, ip dk gy- blk  
n- fis, sb ply- sb blk, pred sm txt,  
sd intbdd,, sme myl intbds, tr vf pyr,  
e cal, tr pyr; 20% SLTST: pred med-  
ed blk, v frm- hd, silc- arg cmt, wi occ  
4, abnt sh intbds, sl calc

7760-7820 70% CHK: pred gy- med gy, lt gy- offwht mot, frm- hd, pred blk- sb blk, rthy- chky txt, arg thru, tr pyr, occ cal incl; 30% intbdd MRLST: dk gy- blk, sb ply- fis, pred frm- sft, rthy- sm txt, intbdd- lam wi chk

7500

7820-7880 70% CHK: pred gy- med gy, lt gy- offwht mot, frm- hd, pred blk- sb blk, rthy- chky txt, arg thru, tr pyr, occ cal incl; 30% intbdd MRLST: dk gy- blk, sb ply- fis, pred frm- sft, rthy- sm txt, intbdd- lam wi chk

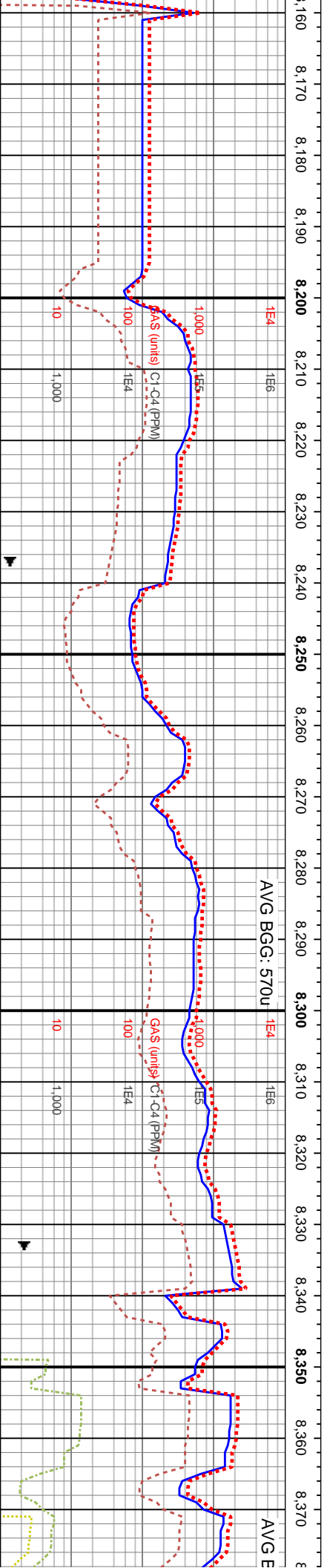
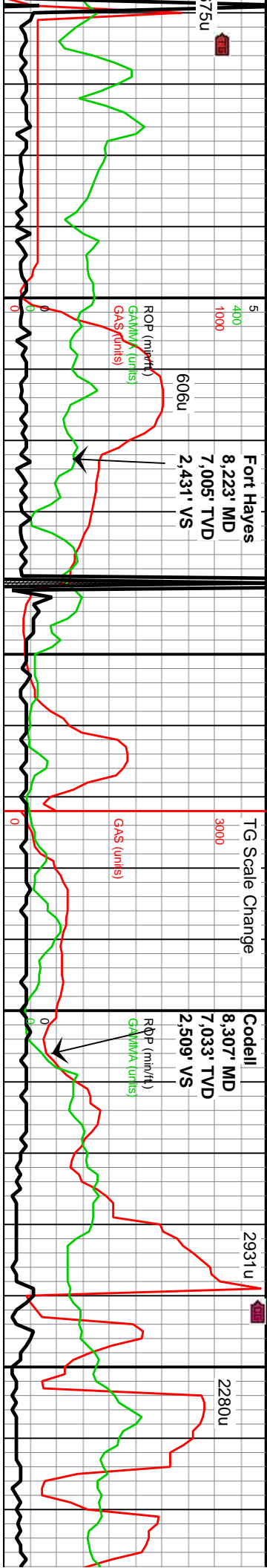
7500

7880-7940 80% CHK: lt gy- gy, occ dk gy, med frm- frm  
l- mod fis sb ang- sb blk cigs, stly- chky tex, occ mly  
incl & occ mist intbds, tr bent, tr vf pyr, hi calc wi cin  
HCL rxn, wi 20% MRLST: gy- dk gy, med frm- frm, mod  
fis sb rd- sb blk cigs, tr vf pyr, mod calc wi quick brn  
HCL rxn

7500



a B		MW 9.9																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
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WOB: 39Klbs  
Rotary: 0RPM  
Strokes: 156SPM  
Pump Rate: 448GPM

DP @ 8,200'

MD: 8,177'  
TVD: 6,985.04'  
Inclination: 62.32°  
Azimuth: 247.24°  
VS: 2,389.63'

MD: 8,272'  
TVD: 7,022.53'  
Inclination: 71.31°  
Azimuth: 259.42°  
VS: 2,476.38'

MD: 8,367'  
TVD: 7,044.83'  
Inclination: 81.57°  
Azimuth: 269.59°  
VS: 2,565.08'

gy, occ gy-dk gy  
od fis sb rd-sb  
x, occ mfly incl &  
ee chk wi u f-c  
bln HCL rxn, MRLST  
gs, tr vf pyr, mod

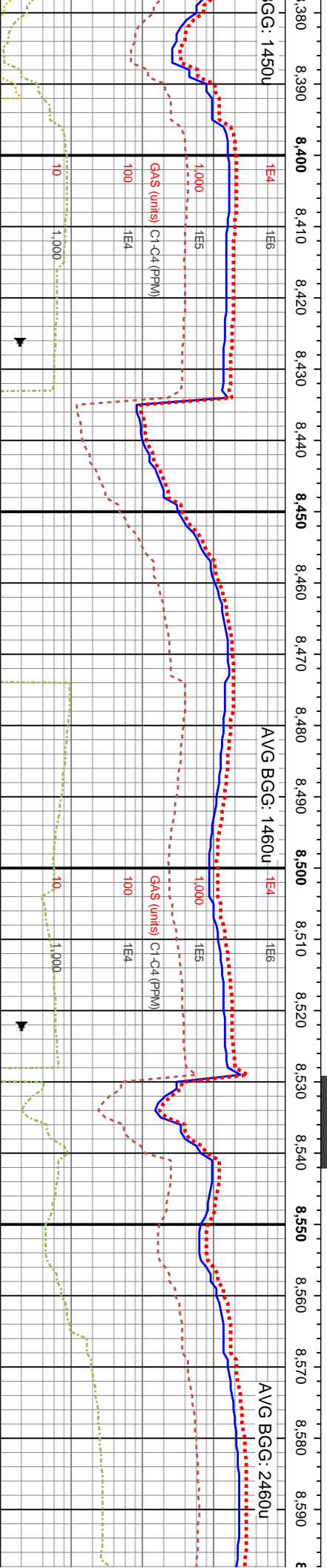
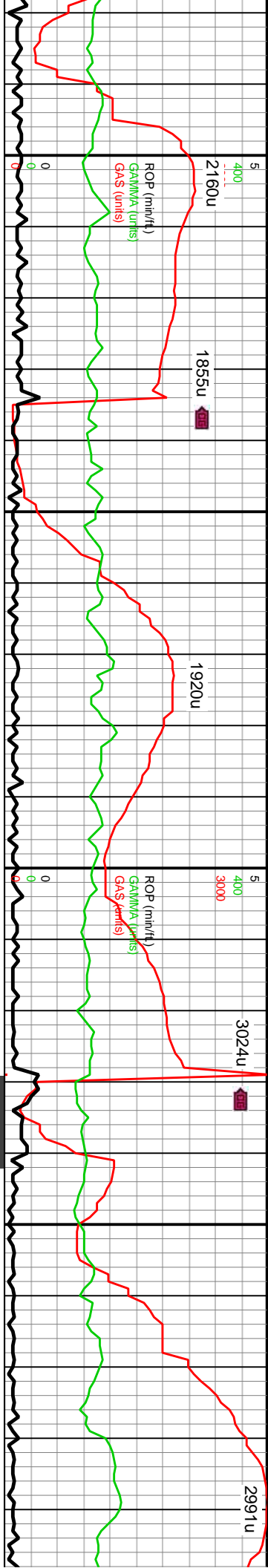
8180-8240 70% MRLST: pred med gy- gy, ip gy-  
brn- lt brn mot, pred hcl, pred blk, v arg, hi intbdd  
chk- slt, tr euhed cal, tr vf pyr: 30% LS: wht- offwht  
wi brn mot, pred frm, blk- sb blk, mudst intbdd wi  
f carb grs

8240-8300 80% LS: wht- offwht wi brn mot, pred  
frm, blk- sb blk, mudst intbdd wi f carb grs, 80%  
SD: pred gy- gy brn trnsi, ip offwht- tn, sme sl trnsi,  
sb blk, pred v f- occ f grd sd clus, sb rnd- ang grs,  
sme uncon grs, arg cnt, sme calc cnt, mod calc,  
sme lse sil- arg cnt, sme pyr

8300-8360 SD: pred gy- gy brn trnsi, ip  
offwht- tn, sme sl trnsi, sb blk, pred v f-  
occ f grd sd clus, sb rnd- ang grs, sme  
uncon grs, arg- sil cnt, sl calc, sme lse  
sil- arg cnt, sme pyr

8360-  
offwht  
f grd s  
grs, al  
cnt, s





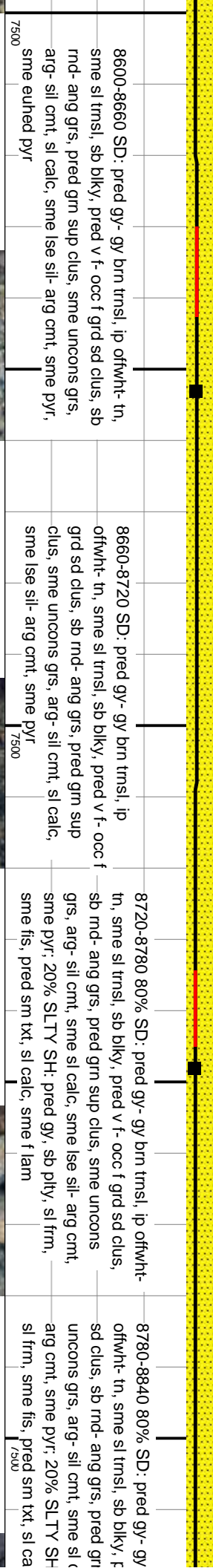
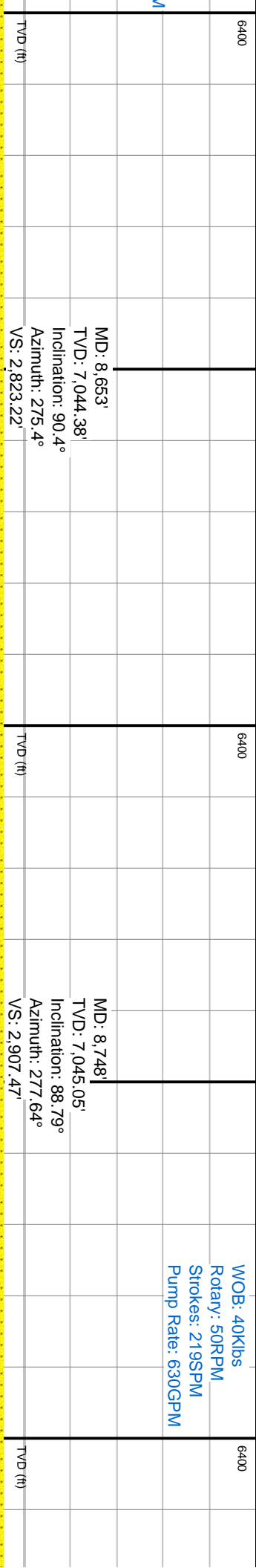
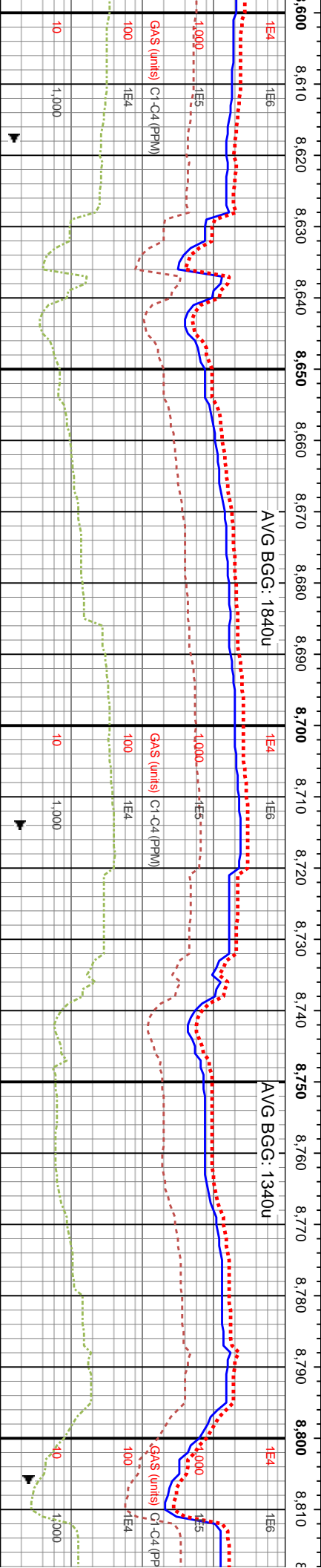
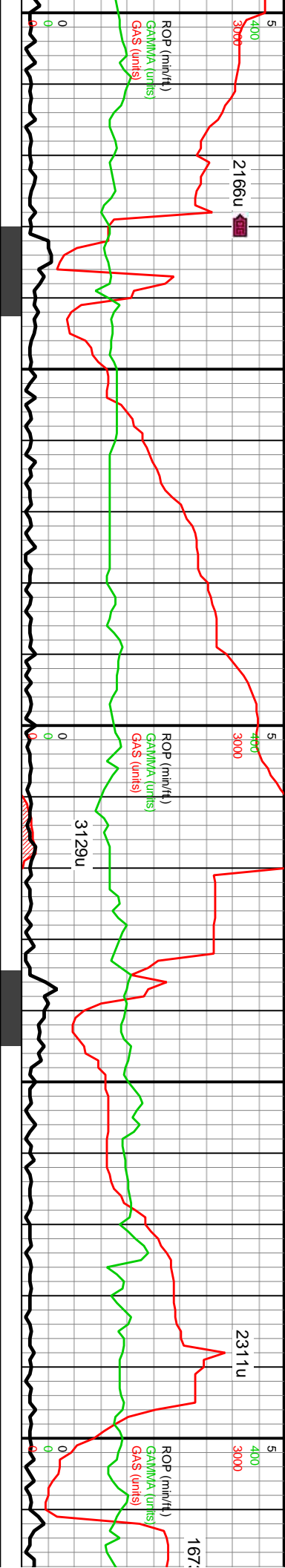
WOB: 38Klbs  
Rotary: 35RPM  
Strokes: 219SPM  
Pump Rate: 631GPM

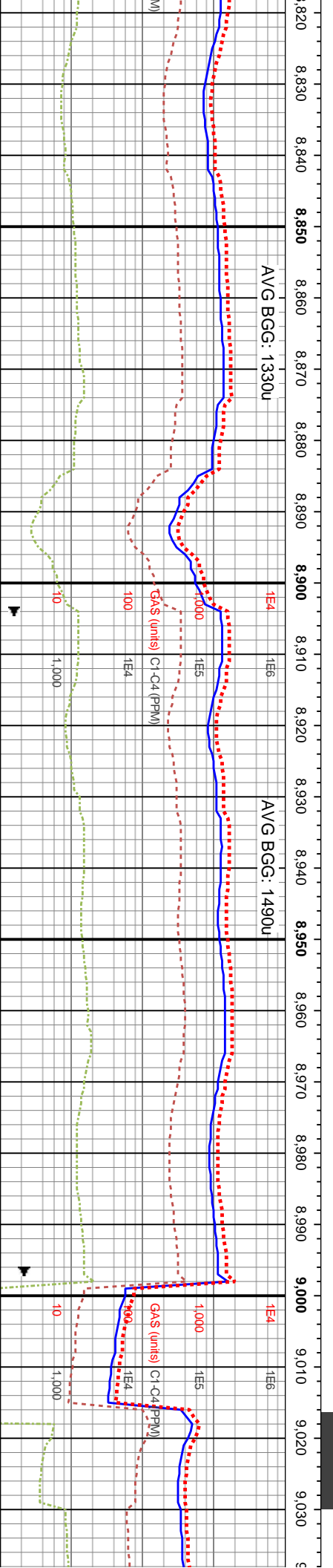
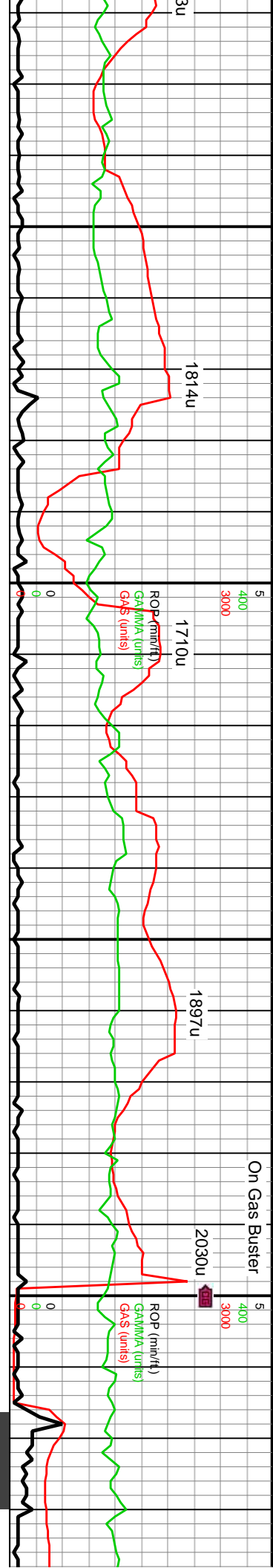
[illegible]

83420 SD: pred gy- gy brn tmsl, ip	8420-8480 SD: pred gy- gy brn tmsl, ip	8480-8540 SD: pred gy- gy brn tmsl, ip	8540-8600 SD: pred gy- gy brn tmsl, ip
in, sme sl tmsl, sb blkly, pred v f- occ	offwhit- in, sme sl tmsl, sb blkly, pred v f- occ f	in, sme sl tmsl, sb blkly, pred v f- occ f	in, sme sl tmsl, sb blkly, pred v f- occ f
grd sd clus, sb rnd- ang grs, sme uncons	grd sd clus, sb rnd- ang grs, sme uncons	clus, sb md- ang grs, pred grm sup clus, sme	clus, sb md- ang grs, pred grm sup clus, sme
g- sill cmt, sl calc, sme lse sill- ang	grs, arg- sill cmt, sl calc, sme lse sill- ang cmt,	uncons grs, arg- sill cmt, sl calc, sme lse sill- arg	uncons grs, arg- sill cmt, sl calc, sme lse sill- arg
sme pyr	sme pyr	cmt, sme pyr, sme euhed pyr	arg cmt, sme pyr, sme euhed pyr









MD: 8,843'  
TVD: 7,046.5'  
Inclination: 89.46°  
Azimuth: 277.31°  
VS: 2,990.96'

MD: 8,939'  
TVD: 7,046.64'  
Inclination: 90.37°  
Azimuth: 278.58°  
VS: 3,074.97'

MD: 9,033'  
TVD: 7,046.14'  
Inclination: 90°  
Azimuth: 276°  
VS: 3,157.49'

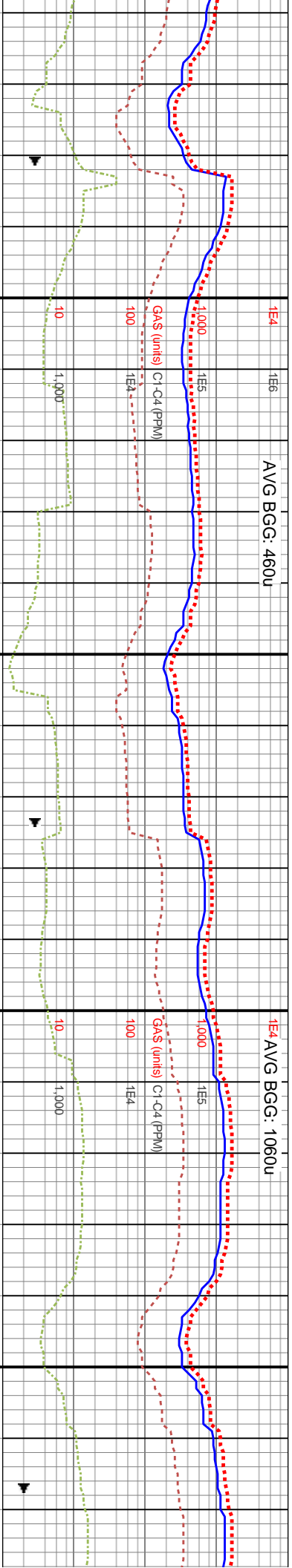
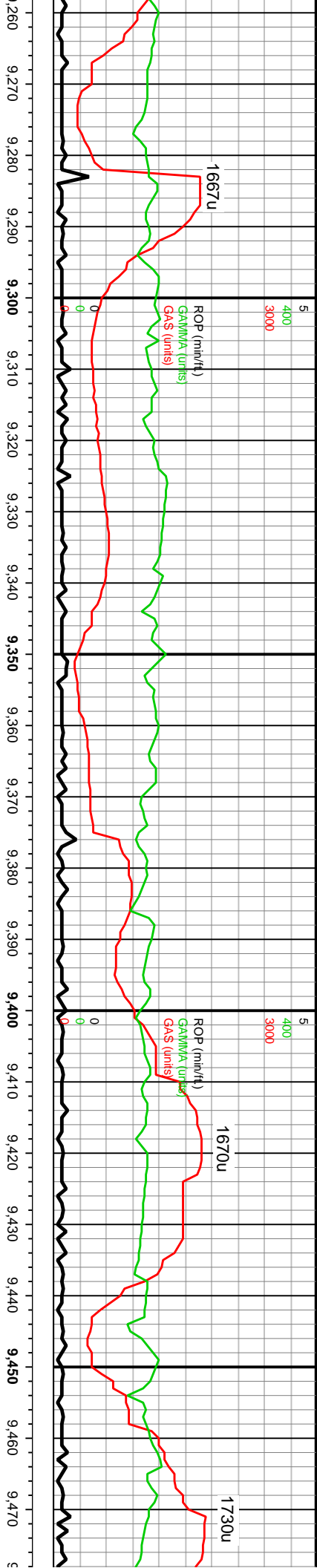
WOB: 20Klbs  
Rotary: 40RPM  
Strokes: 220SPM  
Pump Rate: 631GPM

brn trnsi, ip	8840-8900 80% SD: pred gy- gy brn trnsi, ip offwhi-	8900-8960 80% SD: pred gy- gy brn, sme gy-	8960-9020 80% SD: pred gy- gy brn, sme gy-	9020-9080
pred v f- occ f grd	tn, sme sl trnsi, sb blk, pred v f- occ f grd sd clus,	amb trnsi, ip offwhi- tn, sme sl trnsi, sb blk, frm-	amb trnsi, ip offwhi- tn, sme sl trnsi, sb blk, frm-	amb trnsi, ip
n sup clus, sme	sb rnd- ang grs, pred grn sup clus, sme uncons	hd, pred v f- occ f grd sd clus, sb rnd- ang grs,	hd, pred v f- occ f grd sd clus, sb rnd- ang grs,	pred v f- occ f grd
calc, sme lse sil-	grs, arg- sil cnt, sme sl calc, sme lse sil- arg cnt,	pred grn sup clus, sme uncons grs, arg- sil cnt,	grs, pred grn sup clus, sme uncons grs, arg-	pred grn su
i: pred gy, sb ply,	sme pyr: 20% SLTY SH: pred gy, sb ply, sl frm,	sme sl calc, sme lse sil- arg cnt, sme pyr: 20%	sil cnt, sme sl calc, sme lse sil- arg cnt, sme	sme sl calc
ic, sme f lam	sme fis, pred sm txt, sl calc, sme f lam	SLTY SH: pred gy, sb ply, sl frm, sme fis, pred	pyr: 20% SLTY SH: pred gy, sb ply, sl frm,	SLTY SH:
		sm txt, sl calc, sme f lam	sme fis, pred sm txt, sl calc, sme f lam	sm txt, sl c









MD: 9,316'  
TVD: 7,050.24'  
Inclination: 89.23°  
Azimuth: 272.59°  
TVD (VS: 3,414.27'

WOB: 44Klbs  
Rotary: 40RPM  
Strokes: 210SPM  
Pump Rate: 602GPM

MD: 9,410'  
TVD: 7,050.73'  
Inclination: 90.17°  
Azimuth: 271.42°  
VS: 3,500.79'

9260-9320 SD: pred gy- gy brn, sme gy- amb  
tnsl, ip offwht- tn, sme sl tnsl, sb blkly, frm-  
hd, pred v f- slt, occ f grd sd clus, sb rnd- ang  
grs, pred grn sup clus, sme uncongs grs, arg-  
sil cnt, sme sl calc, sme lse sil- arg cnt,  
sme pyr

9320-9380 SD: pred gy- gy brn, sme gy- amb  
tnsl, ip offwht- tn, sme sl tnsl, sb blkly, frm- hd,  
pred v f- slt, occ f grd sd clus, sb rnd- ang grs,  
pred grn sup clus, sme uncongs grs, arg- sil cnt,  
sme sl calc, sme lse sil- arg cnt, sme pyr

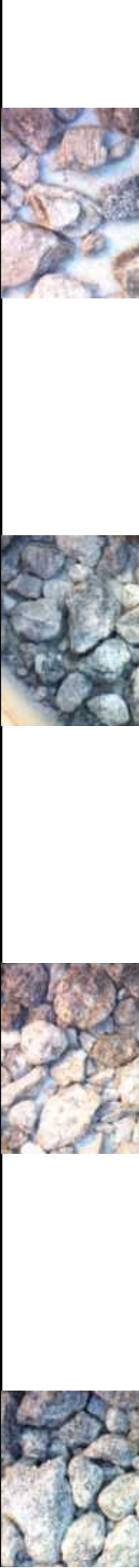
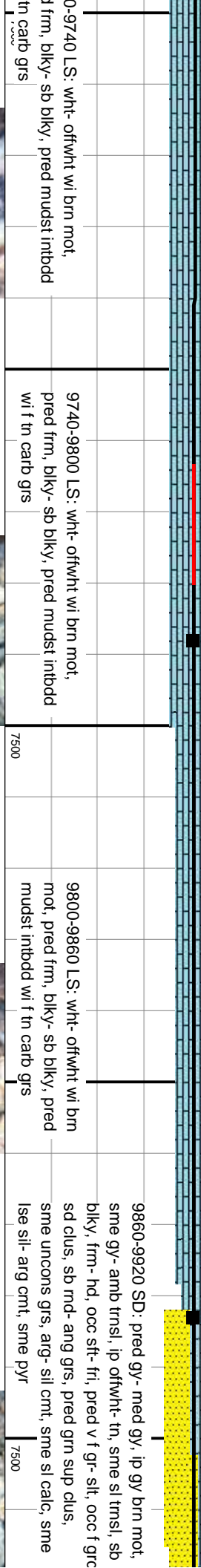
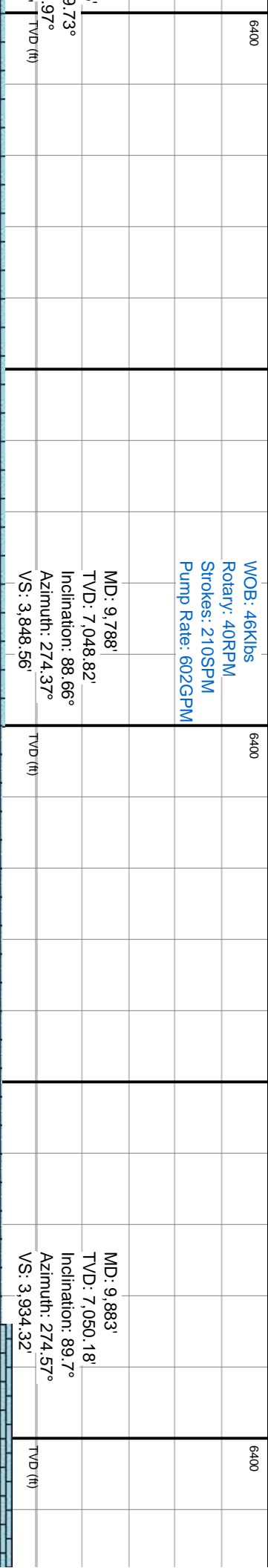
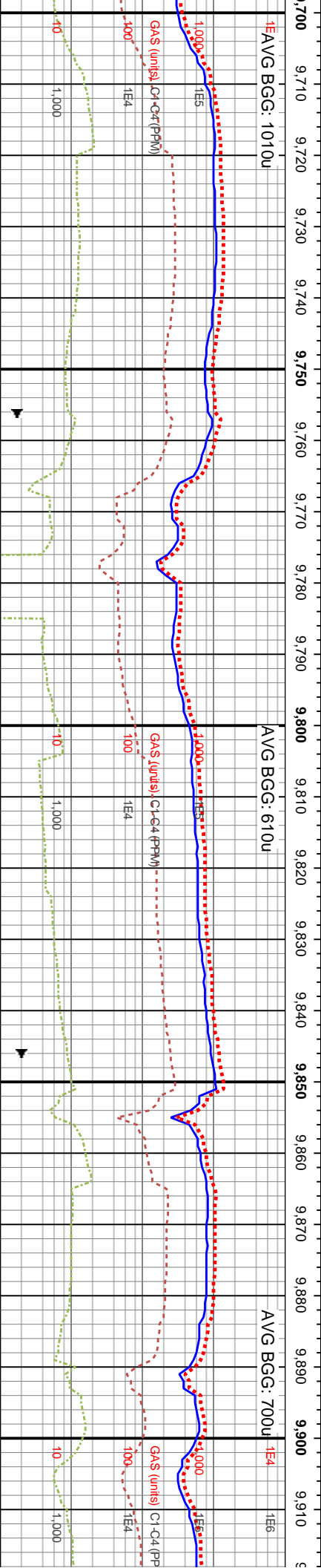
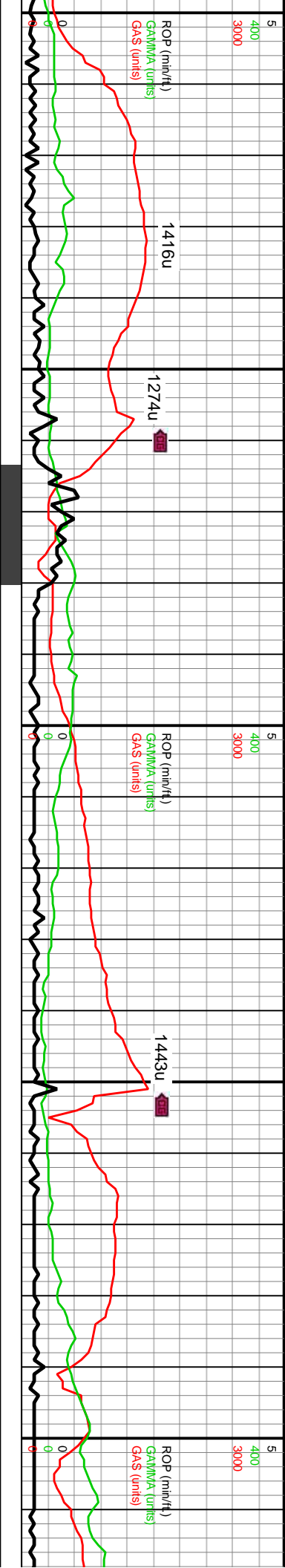
9380-9440 SD: pred gy- gy brn, sme gy-  
amb tnsl, ip offwht- tn, sme sl tnsl, sb blkly,  
frm- hd, pred v f- slt, occ f grd sd clus, sb  
rnd- ang grs, pred grn sup clus, sme  
uncongs grs, arg- sil cnt, sme sl calc, sme  
lse sil- arg cnt, sme pyr

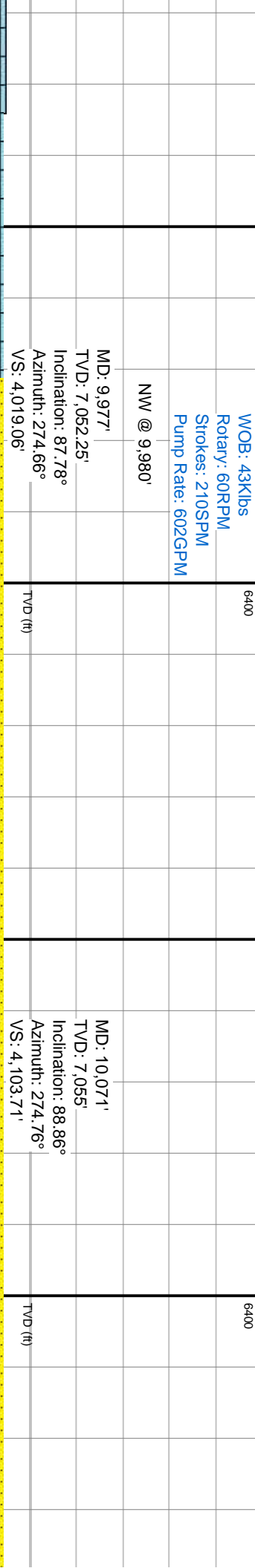
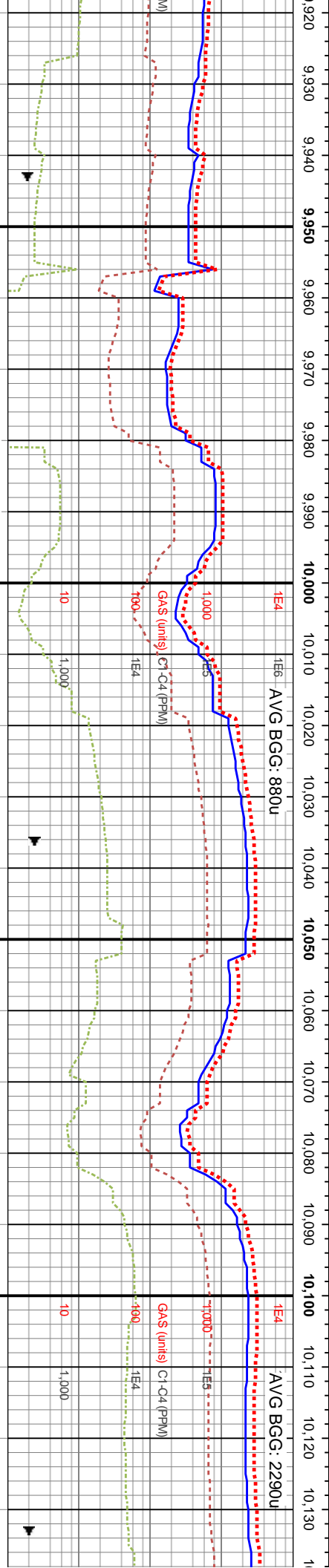
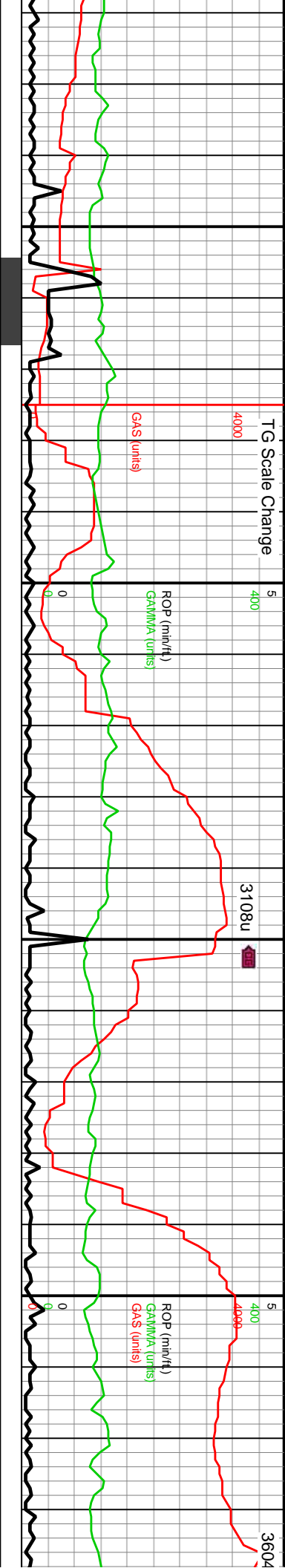
9440-9500 SD: pred gy- gy brn  
tnsl, ip offwht- tn, sme sl tnsl,  
pred v f- slt, occ f grd sd clus, s  
pred grn sup clus, sme uncongs  
sme sl calc, sme lse sil- arg cr





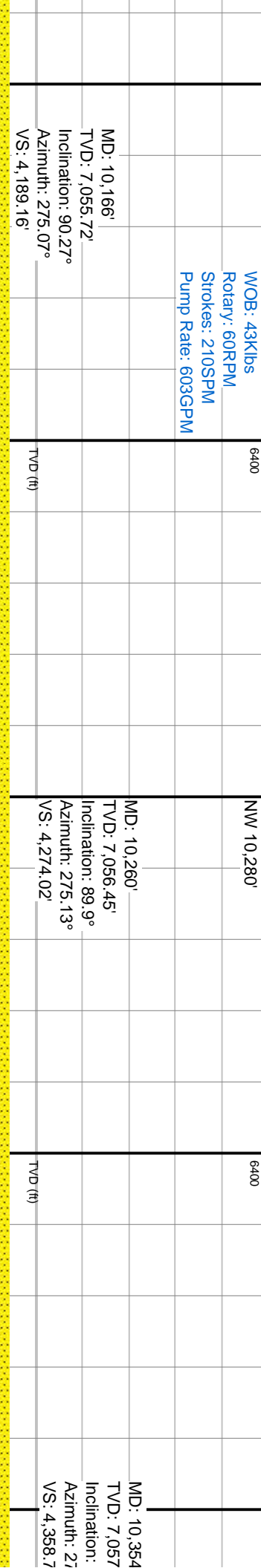
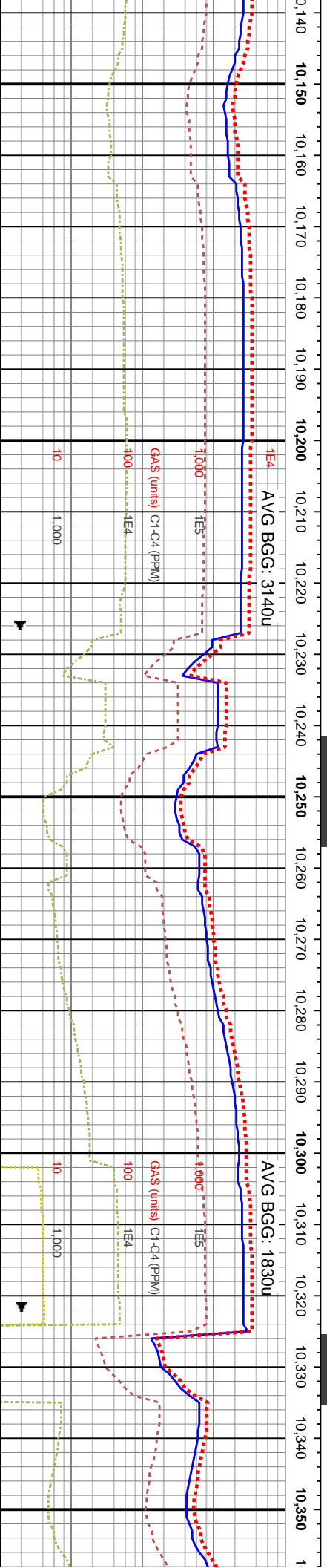
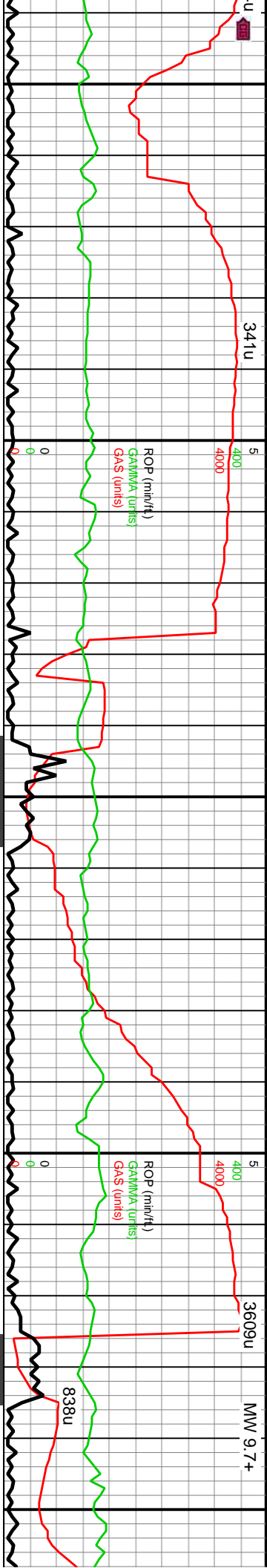






9920-9980 SD: pred gy- med gy, ip gy brn mot, sme gy- amb trmsl, ip offwh- tn, sme sl trmsl, sb blkly, frm- hd, occ sft- fri, pred v f gy- slt, occ f grd sd clus, sb md- ang grs, pred grn sup clus, sme uncons grs, arg- sil cnt, sme sl calc, sme lse sil- arg cnt, sme pyr	9980-10040 SS: intbdd off wh- v lt gy- lt tn- bf, mod srtld, vf- u f sb rd- rd grs, sb rd- rd frm- crunchy sil fri gr sup cls cons wi silc & calc cnt, rr dk gy slst strg, pred mod calc	7500
10040-10100 SS: off wh- v lt gy- v lt tn- bf, rr dk bm, rr dk gy slst strg ip, pred mod srtld sb rd- rd sil fri gr sup cls cons wi silc & calc cnt, vf- u f sb rd- rd grs, pred mod calc	10100-10160 SS: off wh- v lt gy- v lt tn- bf, rr dk bm, rr dk gy slst strg ip, pred mod srtld sb rd- rd sil fri gr sup cls cons wi silc & calc cnt, vf- u f sb rd- rd- calc	7500



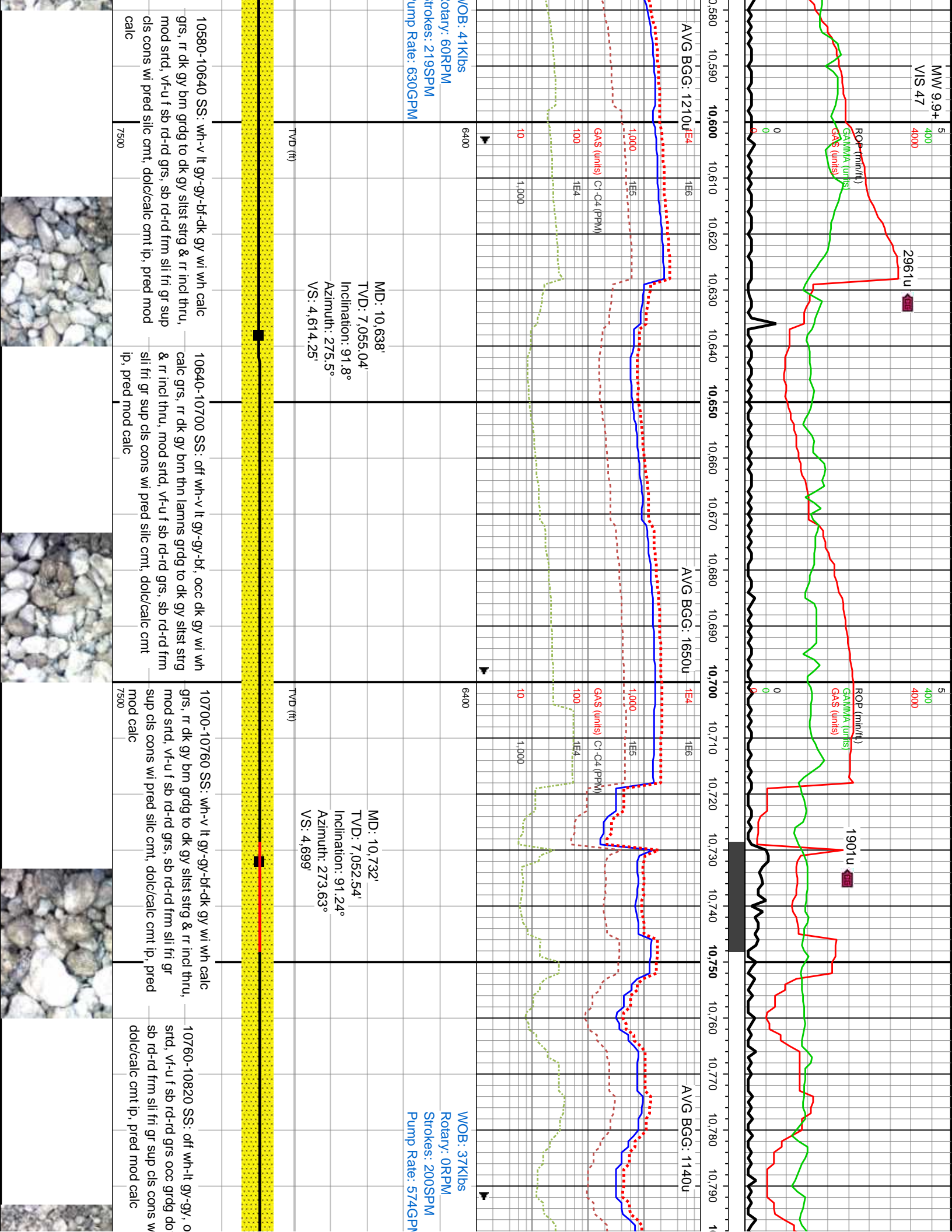


10160-10220 SS: intbdd off wh-v lt gy-lt in-bf, mod srt, vf-u f sb rd-rd grs, sb rd-rd frm-crunchy sil fri gr sup cls cons wi silc & calc cnt, rr dk gy slst strg, pred mod calc	7500
10220-10280 SS: wh-v lt gy-gy-bf, rr dk gy brn grdg to dk gy slst, mod srt, vf-u f sb rd-rd grs, sb rd-rd frm sil fri gr sup cls cons wi silc & calc cnt, rr dk gy slst strg & rr incl thru, pred mod calc	7500
10280-10340 SS: wh-v lt gy-gy-br-dk gy wi wh calc grs, rr dk gy brn grdg to dk gy slst strg & rr incl thru, mod srt, vf-u f sb rd-rd grs, sb rd-rd frm sil fri gr sup cls cons wi pred silc cnt, dolc/calc cnt ip, pred mod calc	7500
10340-10400 SS: calc grs, rr dk gy & rr incl thru, mod srt, vf-u f sb rd-rd grs, sb rd-rd frm sil fri gr sup cls cons wi pred mod calc	7500

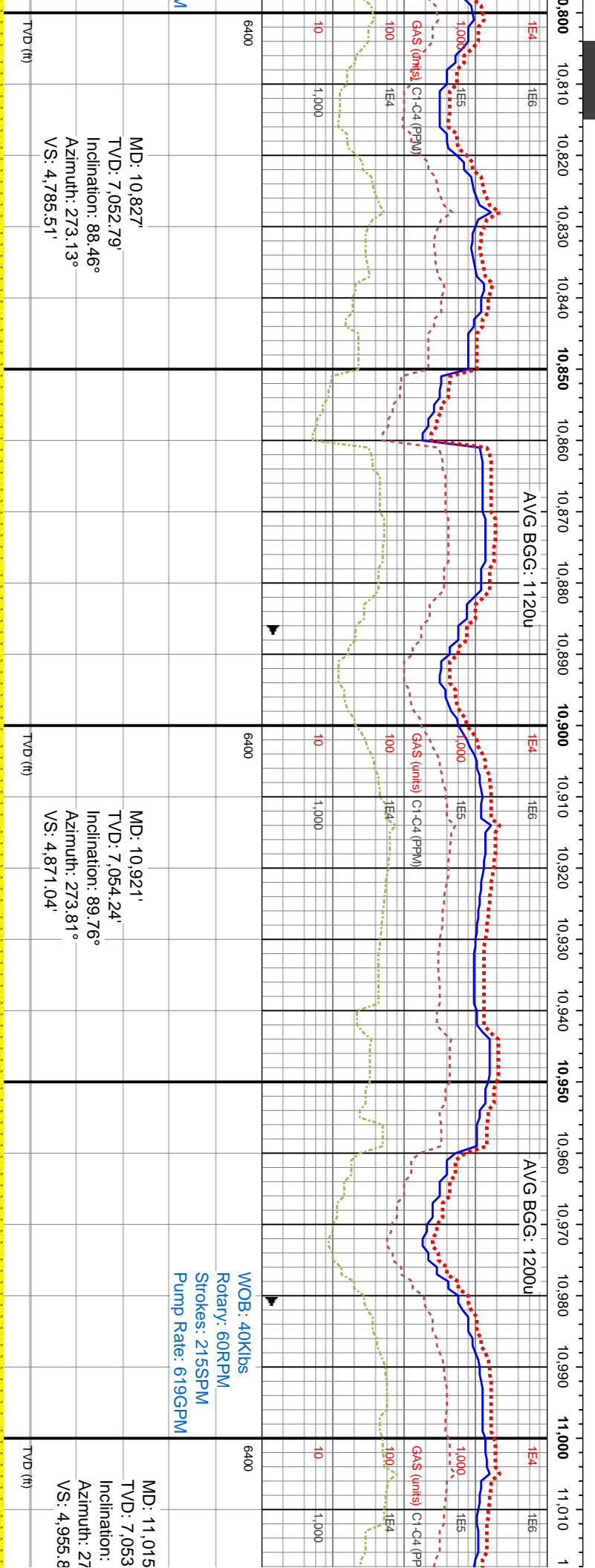
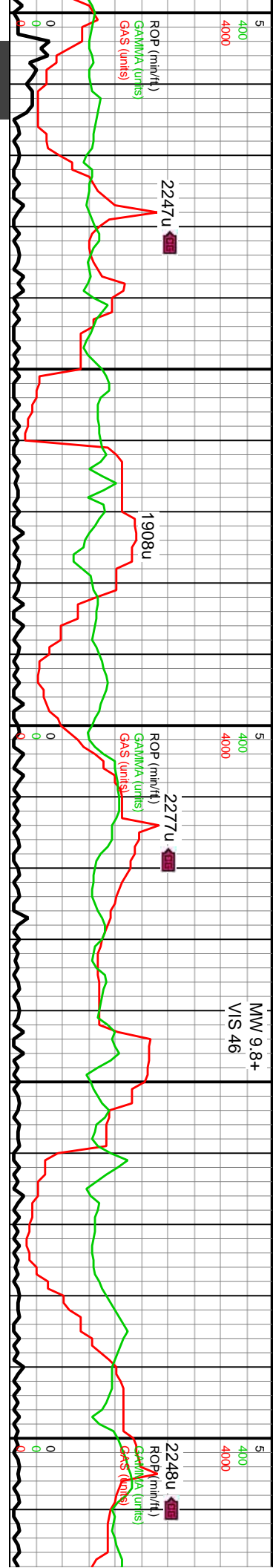






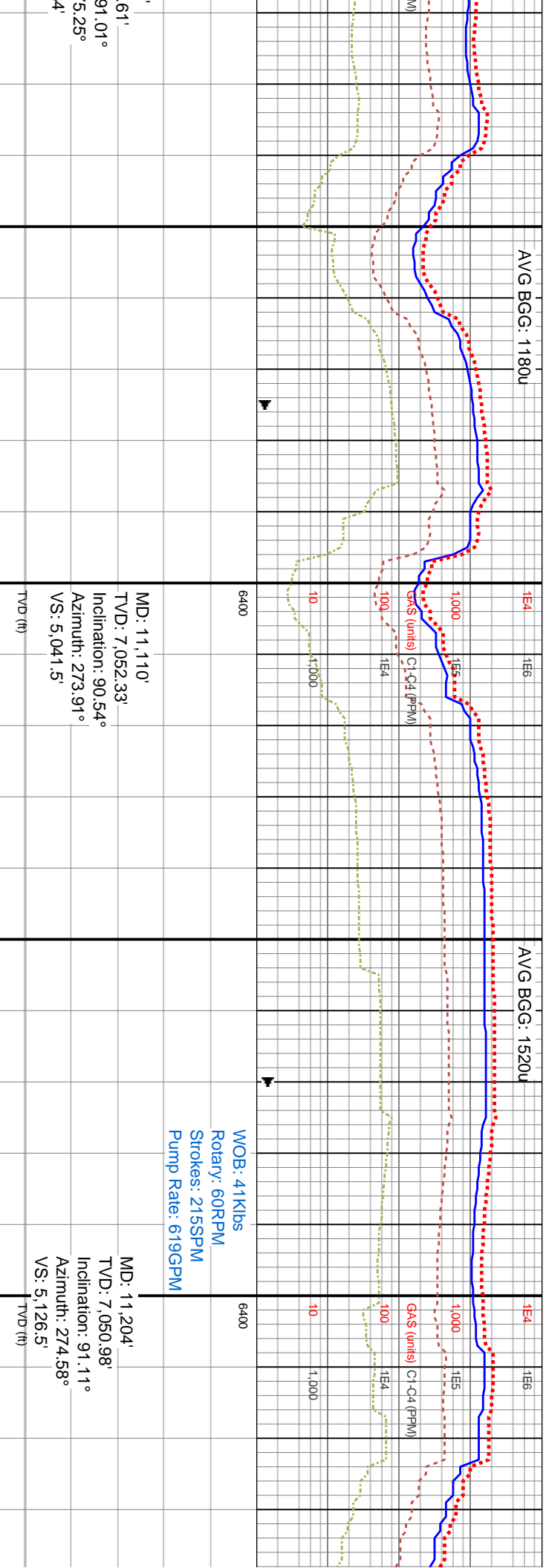
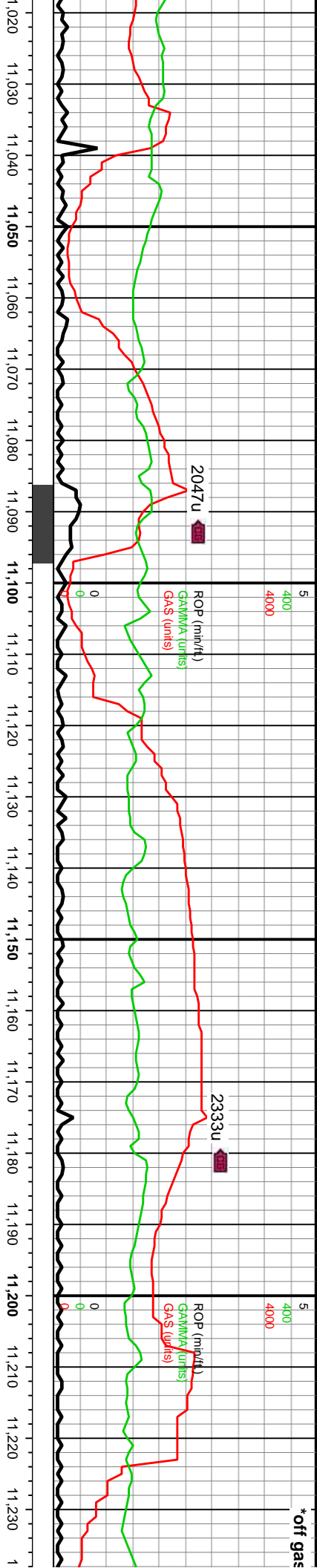










6400	MD: 10.827 TVD: 7,052.79' Inclination: 88.46° Azimuth: 273.13° VS: 4,785.51'	10820-10880 SS: off wh-v lt gy-gy-bf-dk gy wi wh calcic grs grdg down to silst, mod srt, vf-u f sb rd-rd grs, sb rd-rd frm sli fri gr sup cls cons wi pred silic cnt, dolc/calc cnt ip, pred mod calc
6400	MD: 10.921 TVD: 7,054.24' Inclination: 89.76° Azimuth: 273.81° VS: 4,871.04'	10880-10940 SS: off wh-v lt gy-gy-bf-dk gy wi wh calcic grs, rr dk gy brn grdg to dk gy silst stfg & rr incl thru, mod srt, vf-u f sb rd-rd grs, sb rd-rd frm sli fri gr sup cls cons wi pred silic cnt, dolc/calc cnt ip, pred mod calc
6400	MD: 11.015 TVD: 7,053 Inclination: 27 Azimuth: 27 VS: 4,955.8	10940-11000 SS: off wh-v lt gy-gy-bf-dk gy grdg down to silst, mod srt vf-u f sb rd-rd grs grdg down to silt, sb rd-rd frm sli fri gr sup cls cons wi pred silic cnt, com dolc/calc cnt stfg, occ wh calc sd gr incl, pred mod calc

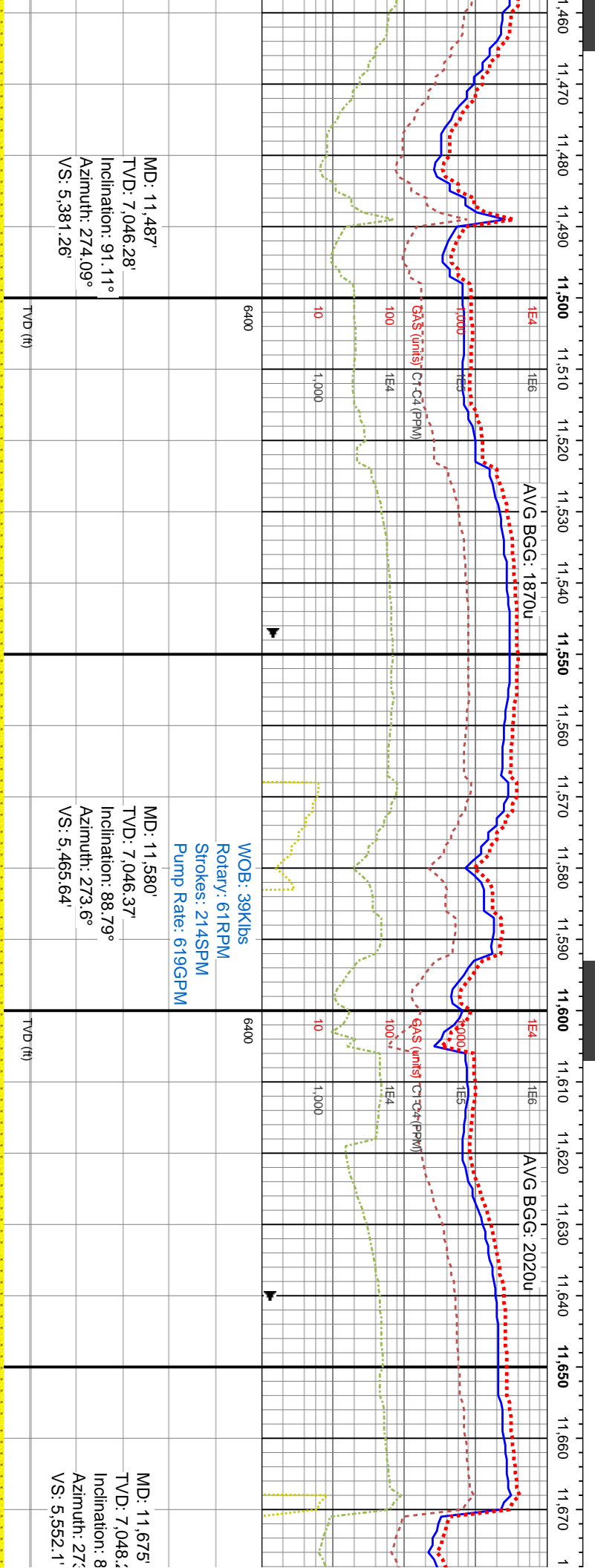
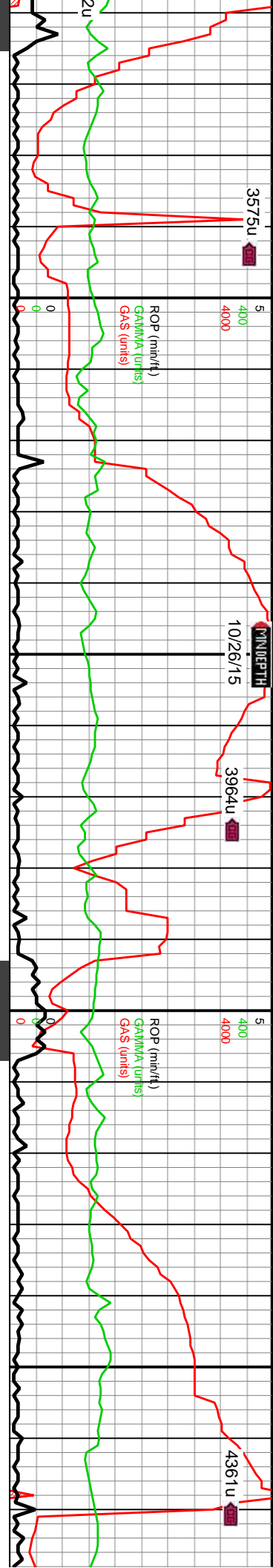




3. off wh-v lt gy-gy-bf-dk gy, rr dk gy y silst strg & med-c silst incl thru, sb rd-rd grs, sb rd-rd frm sil fri gr sup silic cmt, dolc/calc cmt ip, pred mod	11060-11120 SS: off wh-v lt gy-gy-bf-dk gy, rr dk gy brn grdg to dk gy silst strg & med-c silst incl thru, mod strd, vf-u f sb rd-rd grs, sb rd-rd frm sil fri gr sup cls cons wi pred silic cmt, occ-com dolc/calc cmt strg ip, pred mod calc	11120-11180 SS: pred trnsi gy brn-dk gy cls, occ v lt gy clus, mod strd, vf-u f sb rd-rd grs, sb rd-rd frm sil fri gr sup cls cons wi pred silic cmt, occ-com dolc/calc cmt strg ip, pred mod calc, wi incr SLTST: v dk gy-blk, sm-sl sdy tex, non calc	11180-11240 SS (85%): pred trnsi gy brn-dk gy cls, occ v lt gy clus, mod strd, vf-u f sb rd-rd grs, sb rd-rd frm sil fri gr sup cls cons wi pred silic cmt, occ-com dolc/calc cmt strg ip, pred mod calc, wi 15% SLTST: v dk gy-blk, sm-sl sdy tex, non calc
			

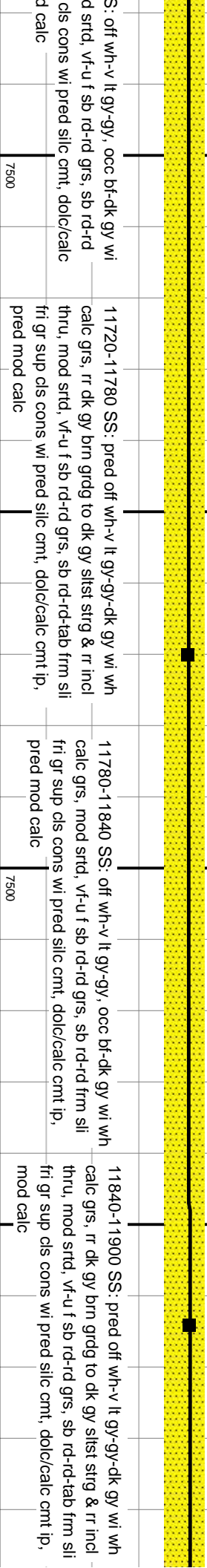
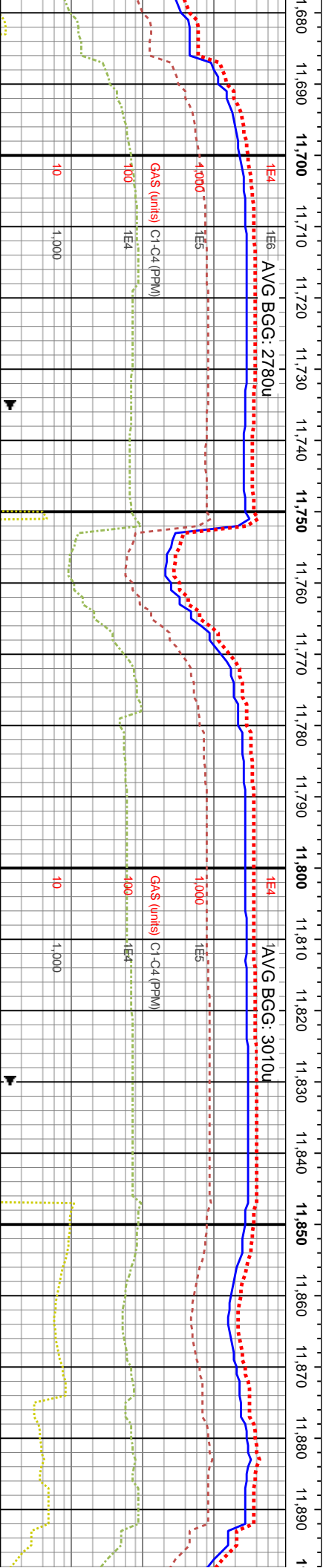
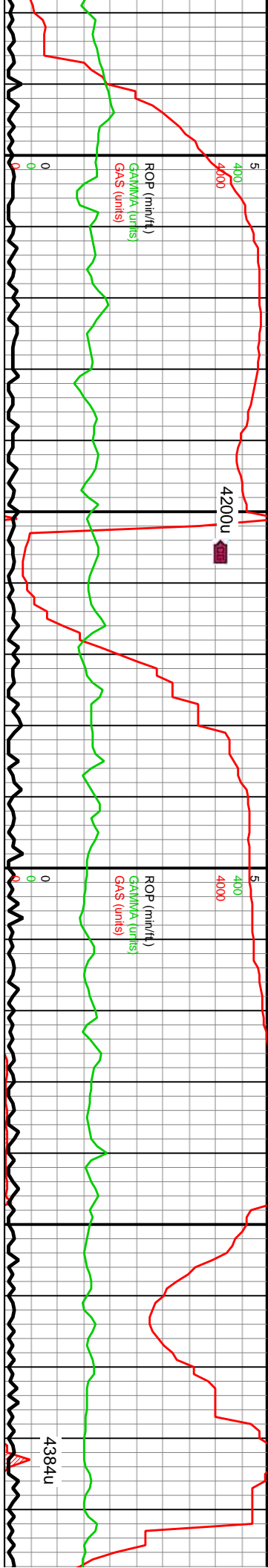




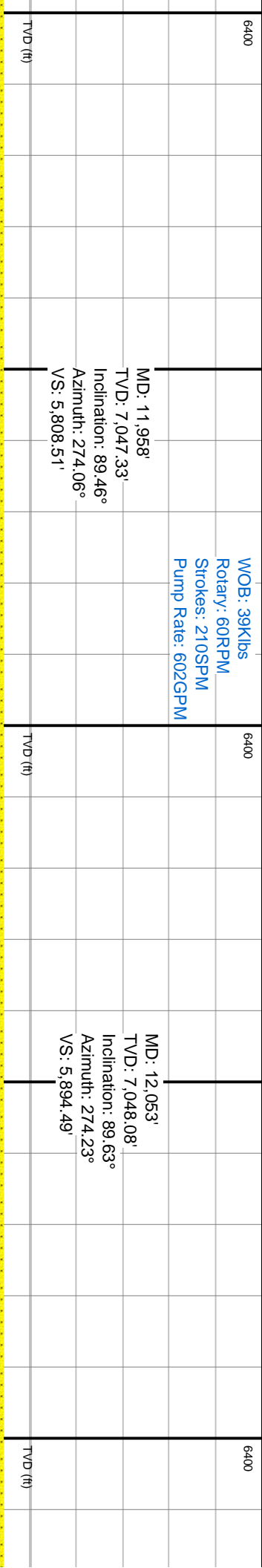
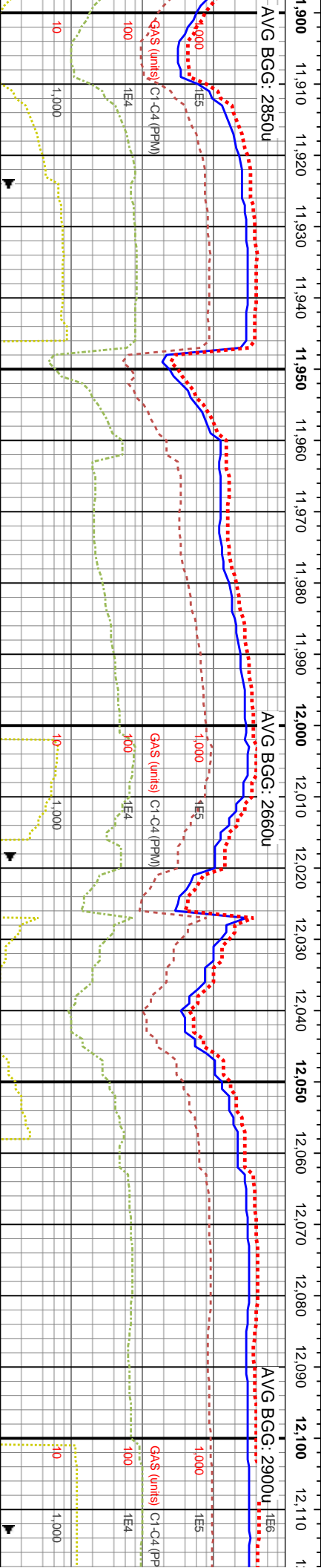
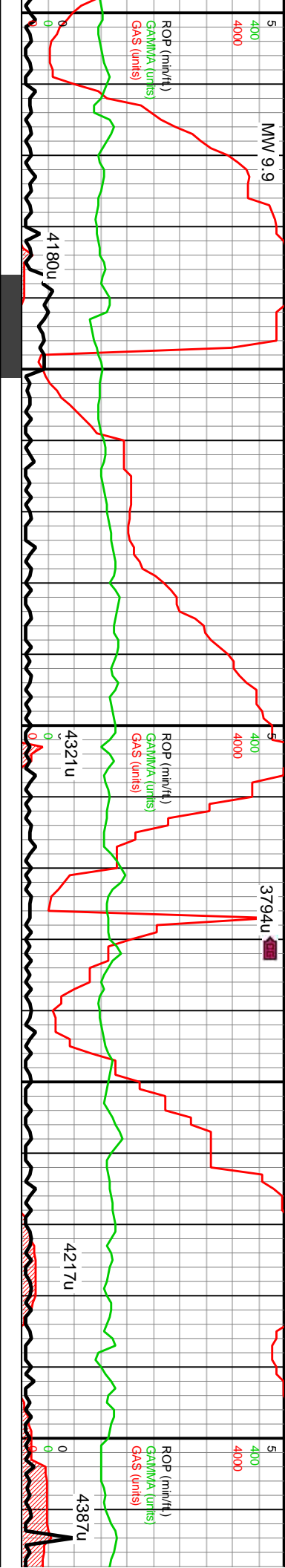


11480-11540 SS (85%): pred dk gy, com gy-gy brn-off wh, p-mod strd vf-u f sb rd-rd grs grdg down to slt, sb rd-rd frm sli fri gr sup cls cons wi pred silc cnt, occ-com dolc/calc cnt strg lp, pred mod calc, wi 15% SLTST: v dk gy-blk, sm-v sdy tex, grdg to SS, tr pyr strg, non calc	11540-11660 SS (80%): pred dk gy grdg down to sltst, com gy-gy brn-off wh, p-mod strd vf-u f sb rd-rd grs, sb rd-rd frm sli fri gr sup cls cons wi pred silc cnt, occ-com dolc/calc cnt strg lp, tr pyr, pred mod calc, grdg down to SLTST (20%): v dk gy-blk, sm-v sdy tex, grdg to SS, tr pyr strg, non calc	11660-11720 S wh calc grs, mo frm sli fri gr sup cnt ip, pred mo
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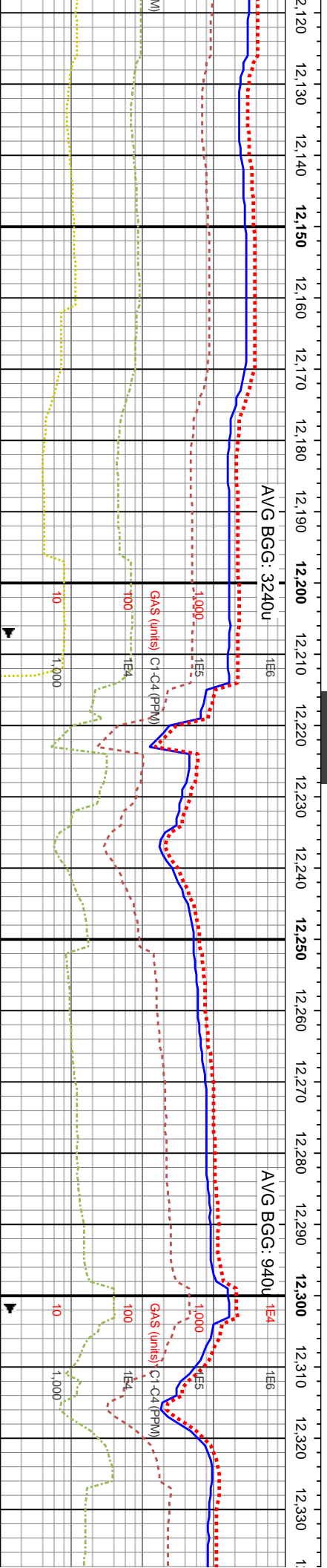
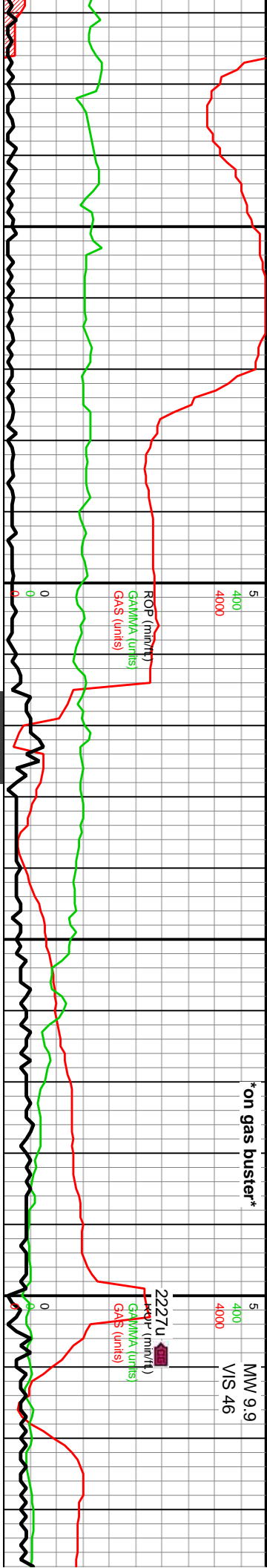






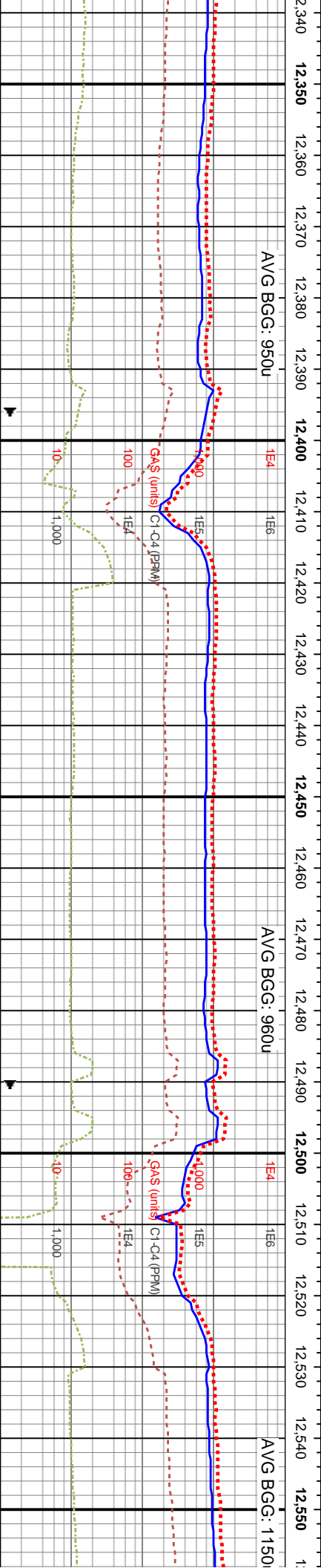
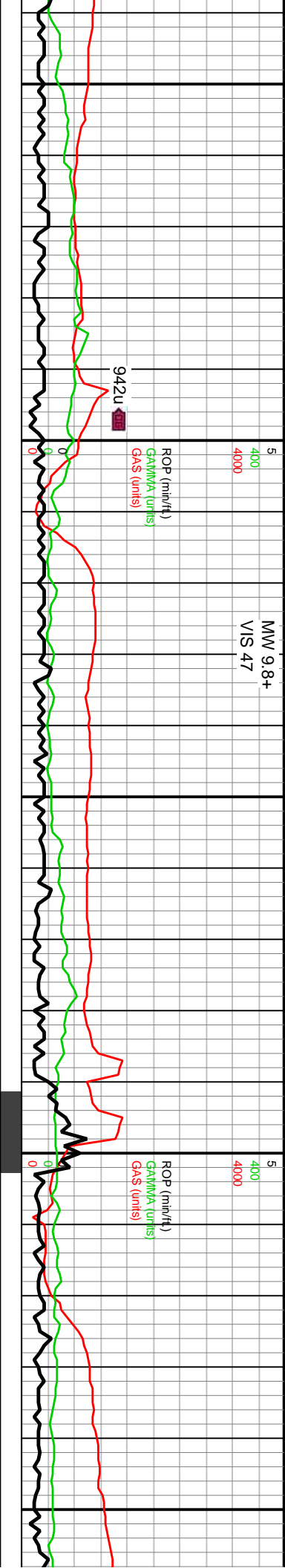
11900-11960 SS: off wh-v lt gy-gy, occ bf-dk gy wi wh calc grs, mod strd, vf-u f sb rd-rd grs, sb rd-rd frm sil fri gr sup cls cons wi pred silc cnt, dolc/calc cnt ip, pred mod calc	11960-12020 SS: pred off wh-v lt gy-gy-dk gy, mod strd, vf-u f sb rd-rd grs, sb rd-rd-1ab frm sil fri gr sup cls cons wi pred silc cnt, dolc/calc cnt ip, mod calc	12020-12080 SS: pred off wh-v lt gy, occ gy, tr dk gy, mod strd, vf-u f sb rd-rd grs, sb ang-sb rd frm sil fri gr sup cls cons wi pred silc cnt, dolc/calc cnt ip, mod calc	12080-12140 SS: pred off wh-v lt gy-dk gy brn, mod strd, vf-u f sb rd-rd frm sil fri gr sup cls cons wi pred dolc/calc cnt ip, mod calc
7500	7500	7500	7500



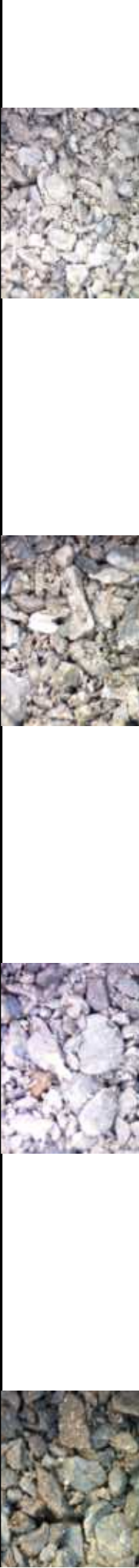


MD: 12,147' TVD: 7,048.19' Inclination: 90.24° Azimuth: 273.97° VS: 5,979.6'		WOB: 39Klbs Rotary: 60RPM Strokes: 209SPM Pump Rate: 602GPM		MD: 12,242' TVD: 7,048.72' Inclination: 89.13° Azimuth: 273.26° VS: 6,065.96'	
12140-12200 SS: pred off wh-v lt gy, occ gy, tr dk gy, mod strd, vf-u f sb rd-rd grs, sb ang-sb rd frm sil fri gr sup cls cons wi pred silc cmt, dolc/calc cmt ip, mod calc		12200-12260 SS: pred off wh-v lt gy, occ gy, tr dk gy-dk gy brn, mod strd, vf-u f sb rd-rd grs, sb ang-sb rd frm sil fri gr sup cls cons wi pred silc cmt, dolc/calc cmt ip, mod calc		12260-12320 LS: gy-gy wi brn hue, v frm-hd, crpxln mudst, wxy lstr, sb rd-pty ctgs, tr vf pyr, tr dk gy slst, hi calc	
12320-12380 L				12320-12380 L	
y, occ gy, tr dk grs, sb ang-sb silc cmt, mod calc		gy brn, mod strd, vf-u f sb rd-rd grs, sb ang-sb rd frm sil fri gr sup cls cons wi pred silc cmt, dolc/calc cmt ip, mod calc		crpxln mudst, wxy lstr, sb rd-pty ctgs, tr vf pyr, tr dk gy slst, hi calc	
				ctgs, crpxln mudst, wxy lstr, sb rd-pty ctgs, tr vf pyr, tr dk gy slst, hi calc	

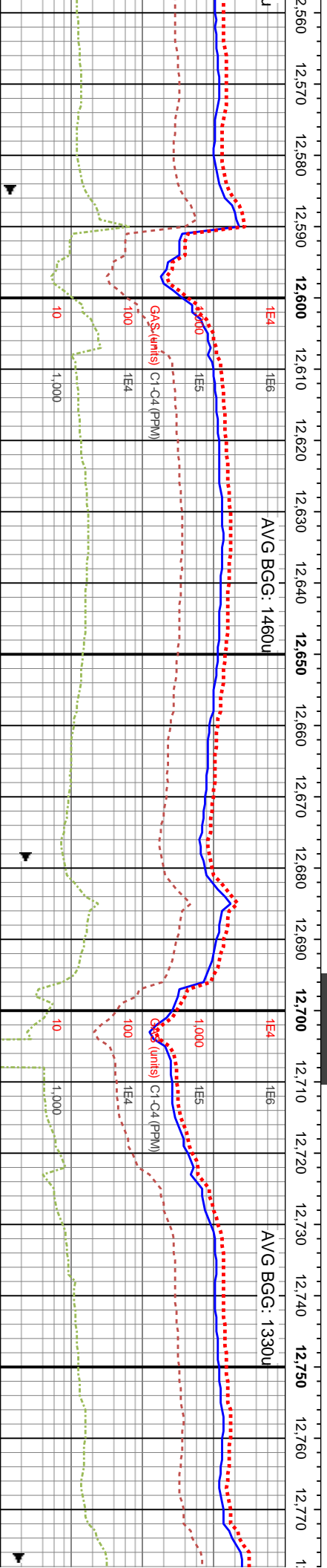
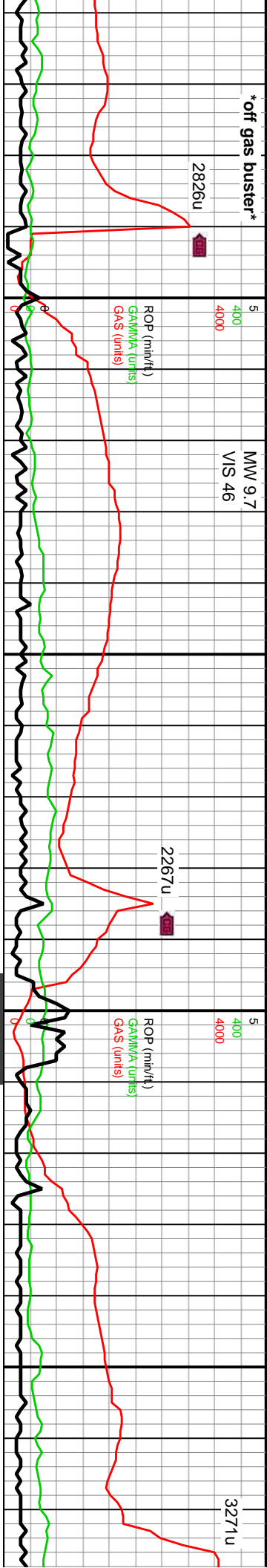




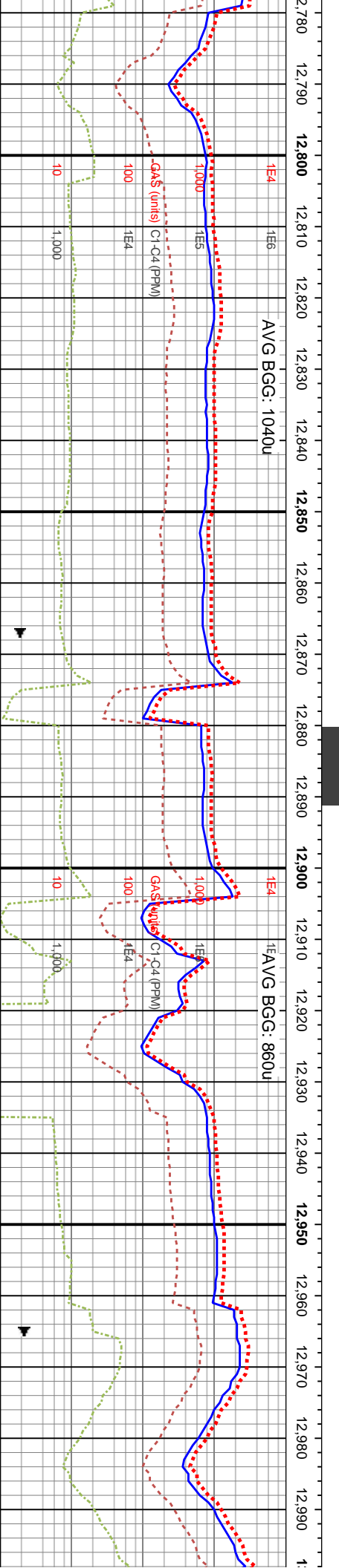
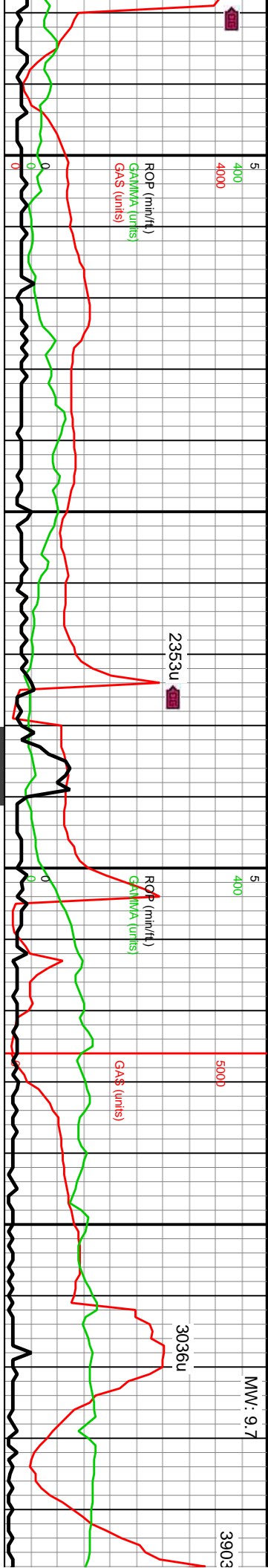
WOB: 41Klbs Rotary: 60RPM Strokes: 210SPM Pump Rate: 602GPM		6400	MD: 12,430' TVD: 7,049.66' Inclination: 90.3° Azimuth: 273.58° VS: 6,237.11'		TVD (ft)
S: gy-dk gy br, v frm-hd, sb rd-ply dst, wxy lst, tr vf pyr, tr dk gy slst, hi		12380-12440 LS: gy-gy wi bn hue, v frm-hd, cpxln mudst, wxy lst, sb rd-ply cigs, tr vf pyr, tr dk gy slst, hi calc	7500	12440-12500 LS: gy-gy wi bn hue, v frm-hd, cpxln mudst, wxy lst, sb rd-ply cigs, tr vf pyr, tr dk gy slst, hi calc	7500
12500-12560 LS: gy-dk gy br, v frm-hd, sb rd-ply cigs, cpxln mudst, wxy lst, tr vf pyr, tr dk gy slst, hi		12500-12560 LS: gy-dk gy br, v frm-hd, sb rd-ply cigs, cpxln mudst, wxy lst, tr vf pyr, tr dk gy slst, hi	7500	12500-12560 LS: gy-dk gy br, v frm-hd, sb rd-ply cigs, cpxln mudst, wxy lst, tr vf pyr, tr dk gy slst, hi	7500







2,560'	6400	6400	6400
WOB: 40Klbs			
Rotary: 60RPM			
Strokes: 209SPM			
Pump Rate: 602GPM			
MD: 12.619'			
TVD: 7,050.34'			
Inclination: 90.13°			
Azimuth: 274.12°			
TVD (ft)			
VS: 6,407.95'			
12560-12620 LS: pred offwhit- brn, sme sl trnsl brn, pred blkly, v frm- hd, pred crpxln mudst, sme intbdd carb grs, ip wxy txt, tr vf pyr, tr dk gy slstst- blk sh			
7500			
12620-12680 LS: pred offwhit- brn, sme sl trnsl brn, pred blkly, v frm- hd, pred crpxln mudst, sme intbdd carb grs, ip wxy txt, tr vf pyr, tr dk gy slstst- blk sh			
12680-12740 LS: pred offwhit- brn, sme sl trnsl brn, pred blkly, v frm- hd, pred crpxln mudst, sme intbdd carb grs, ip wxy txt, tr vf pyr, tr dk gy slstst- blk sh			
MD: 12.714'			
TVD: 7,051.55'			
Inclination: 88.41°			
Azimuth: 274.46°			
TVD (ft)			
VS: 6,493.83'			
12740-12800 LS: pred o trnsl brn, pred blkly, v frm mudst, sme intbdd carb pyr, tr dk gy slstst- blk sh			



OB: 40Klbs  
Rotary: 60RPM  
Strokes: 210SPM  
Pump Rate: 602GPM

MD: 12,808'  
TVD: 7,053.79'  
Inclination: 88.86°  
Azimuth: 274.46°  
VS: 6,578.68'

MD: 12,903'  
TVD: 7,056.8'  
Inclination: 87.51°  
Azimuth: 274.11°  
VS: 6,664.53'

MD: 12,999'  
TVD: 7,06  
Inclination: 2  
Azimuth: 2  
VS: 6,749

WOB: 41Klbs  
Rotary: 60RPM  
Strokes: 210SPM  
Pump Rate: 603GPM

ffwht- brn, sme sl  
- hd, pred crpxln  
grs, ip wxy txt, tr vf

12800-12860 LS: pred offwht- brn, sme sl  
tnsl brn, pred blk, v frm- hd, pred crpxln  
mudst, sme intbdd carb grs, ip wxy txt, tr vf  
pyr, tr dk gy sltst- blk sh

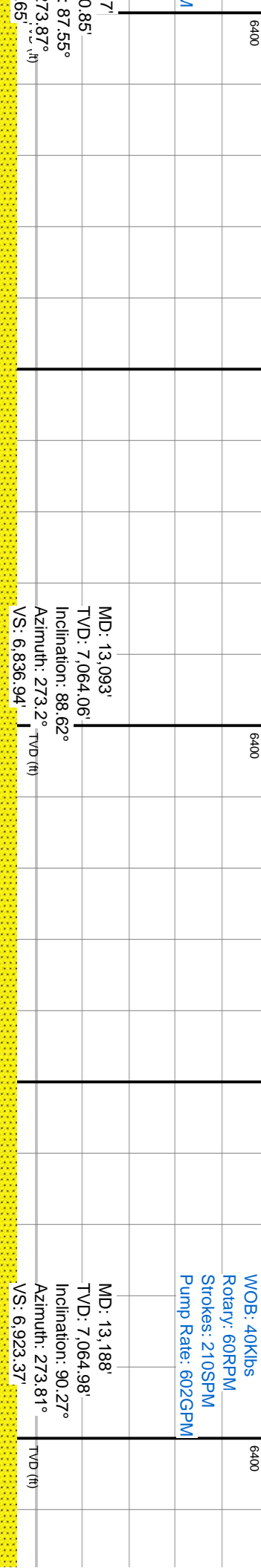
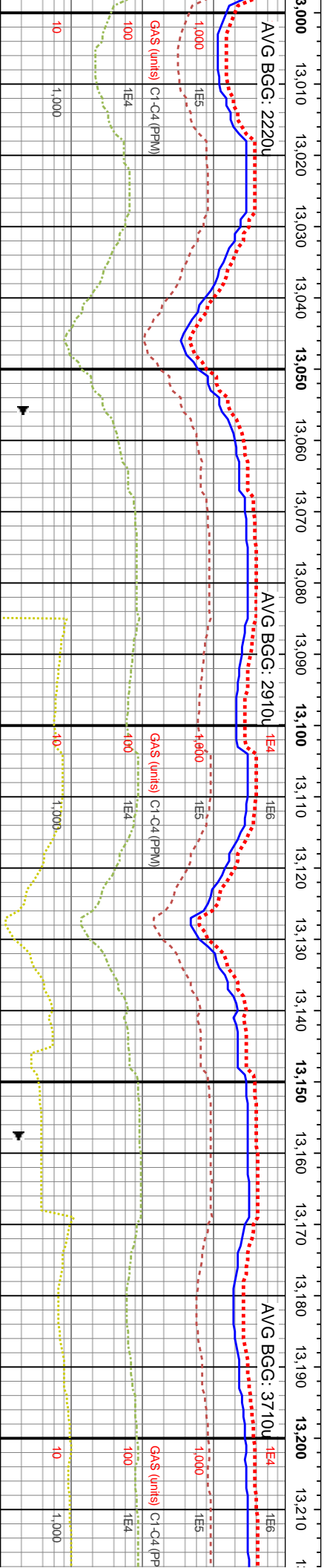
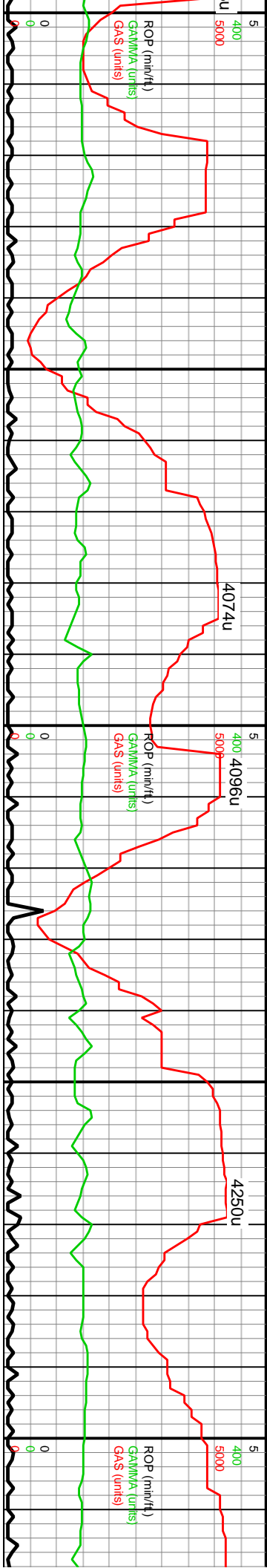
12860-12920 SD: pred gy- med gy brn, ip gy brn  
mot, sme gy- amb tnsl, ip offwht- tn, abnt sl tnsl,  
sb blk, clus, frm- hd, occ sft- fri clus, abnt v f gr-  
slt clus, pred sb md- ang grs, pred grn sup clus,  
abnt f- l med unconq qtz grs, arg- sil cnt, sme sl  
calc, sme lse sil- arg cnt, sme pyr, tr glauc, sme  
LS

12920-12980 SD: pred gy- med gy brn, ip gy  
brn mot, sme gy- amb tnsl, ip offwht- tn, abnt  
sl tnsl, sb blk, clus, frm- hd, occ sft- fri clus,  
abnt v f gr- slt clus, pred sb md- ang grs, pred  
grn sup clus, abnt f- l med unconq qtz grs, arg-  
sil cnt, sme sl calc, sme lse sil- arg cnt, sme  
pyr, tr glauc, sme LS

12980-13040  
mot, sme gy-  
sb blk, clus, fr  
clus, pred sb r  
f- l med uncon  
sme lse sil- ar

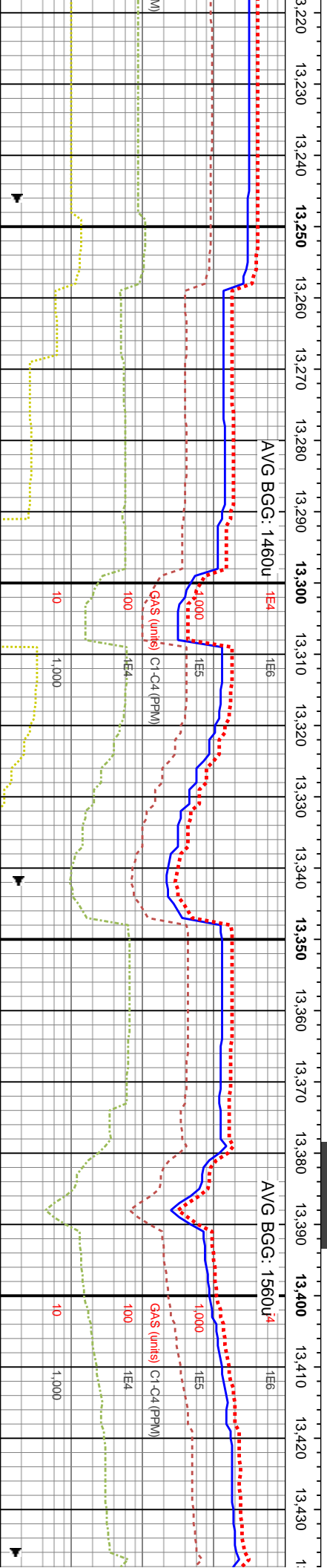
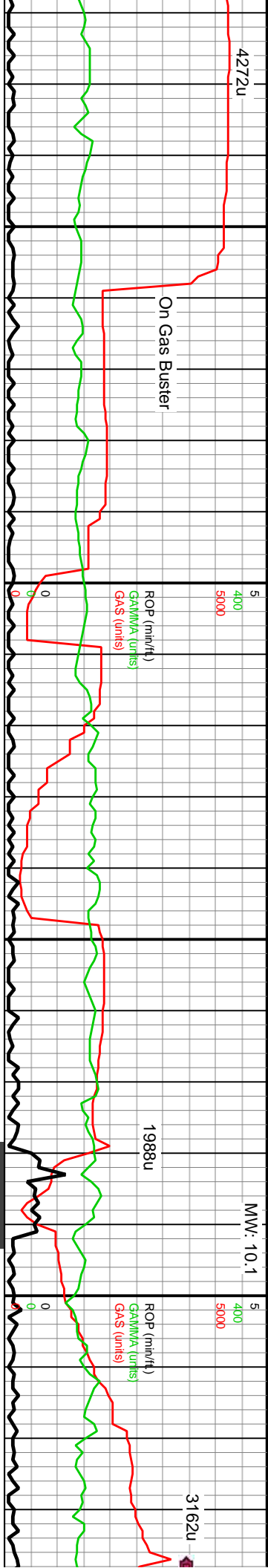






SD, pred gy- med gy brn, ip gy brn amb trns, ip offwht- tn, abnt sl trns, nd- hd, occ sft- fri clus, abnt v f gr- sft nd- ang grs, pred grn sup clus, abnt s qtz grs, arg- sil cnt, sme sl calc, g cnt, tr pyr, tr glauc	13040-13100 SD: pred gy- med gy brn, ip gy brn mot, sme gy- amb trns, ip offwht- tn, abnt sl trns, sb blkly clus, frm- hd, occ sft- fri clus, abnt v f gr- sft clus, pred sb md- ang grs, pred grn sup clus, abnt f- l med uncon s qtz grs, arg- sil cnt, sme sl calc, sme lse sil- arg cnt, tr pyr, tr glauc	13100-13160 SD: pred gy- med gy brn, ip gy brn mot, sme gy- amb trns, ip offwht- tn, abnt sl trns, sb blkly clus, frm- hd, occ sft- fri clus, abnt v f gr- sft clus, pred sb rnd- ang grs, pred grn sup clus, abnt f- l med uncon s qtz grs, arg- sil cnt, sme sl calc, sme lse sil- arg cnt, tr pyr, tr glauc	13160-13220 SD: pred gy- med gy brn, ip gy brn mot, sme gy- amb trns, occ offwht- tn, abnt sl trns, sb blkly clus, frm- hd, occ sft- fri clus, abnt v f gr clus, pred sb md- ang grs, pred grn sup clus, abnt v f- l med uncon s qtz grs, tr ang c grs, arg- sil cnt, sme sl calc, sme lse sil- arg cnt, tr pyr, tr glauc
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MD: 13,282'  
TVD: 7,063.52'  
Inclination: 91.51°  
Azimuth: 273.96°  
VS: 7,008.63'

TVD (ft)

WOB: 38Klbs  
Rotary: 60RPM  
Strokes: 209SPM  
Pump Rate: 602GPM

MD: 13,376'  
TVD: 7,061.12'  
Inclination: 91.41°  
Azimuth: 273.36°  
VS: 7,094.03'

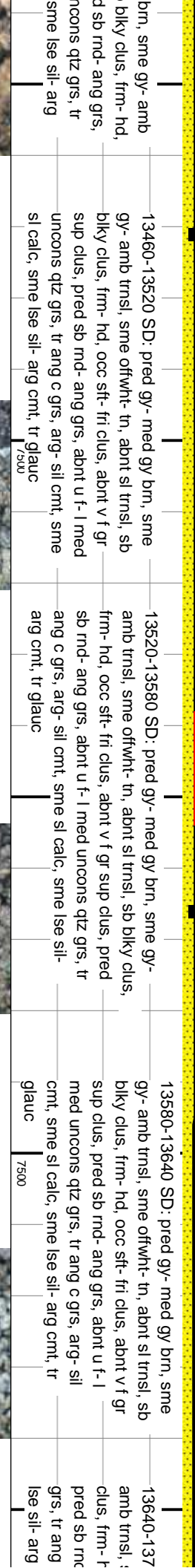
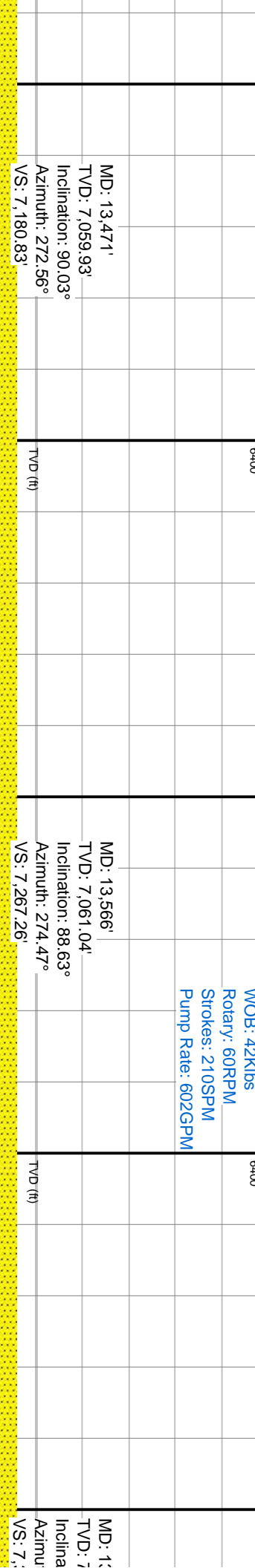
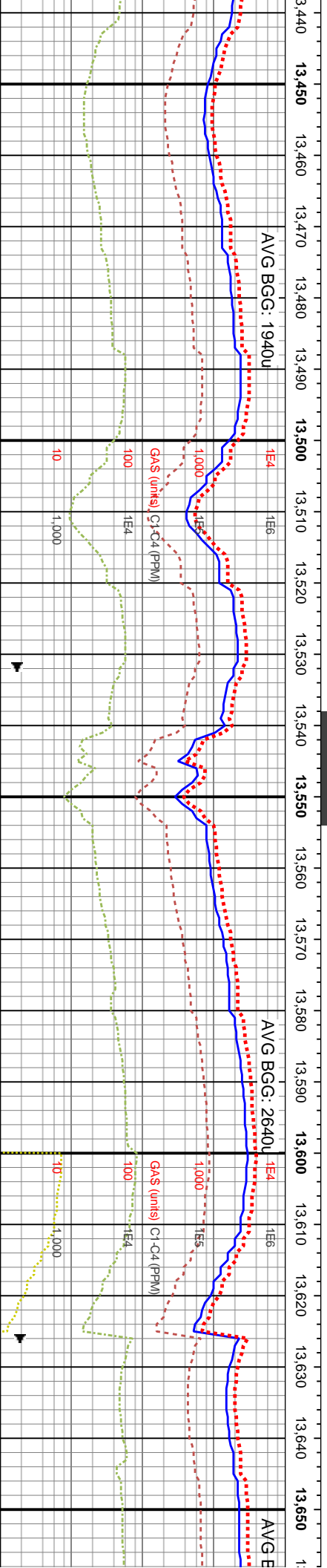
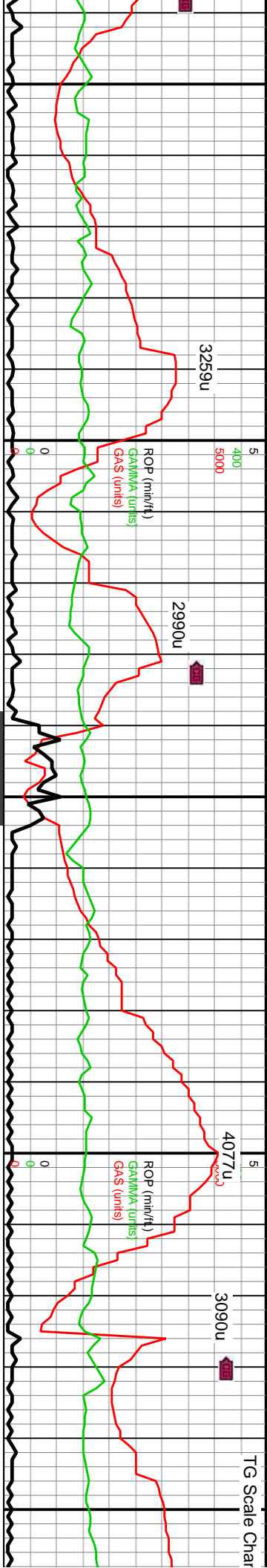
TVD (ft)

13220-13280 SD: pred gy- med gy brn, ip gy brn mot, sme gy- amb trnsi, occ offwhit- tn, abnt sl trnsi, sb blkly clus, frm- hd, occ sft- fri clus, abnt v f gr clus, pred sb rnd- ang grs, pred grn sup clus, abnt u f- l med uncongs qtz grs, tr ang c grs, arg- sil cnt, sme sl calc, sme lse sil- arg cnt, tr pyr, tr glauc

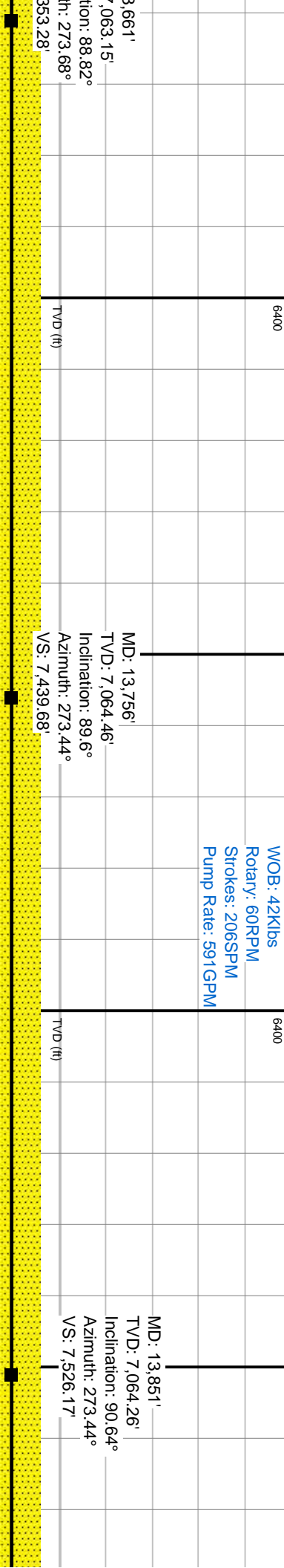
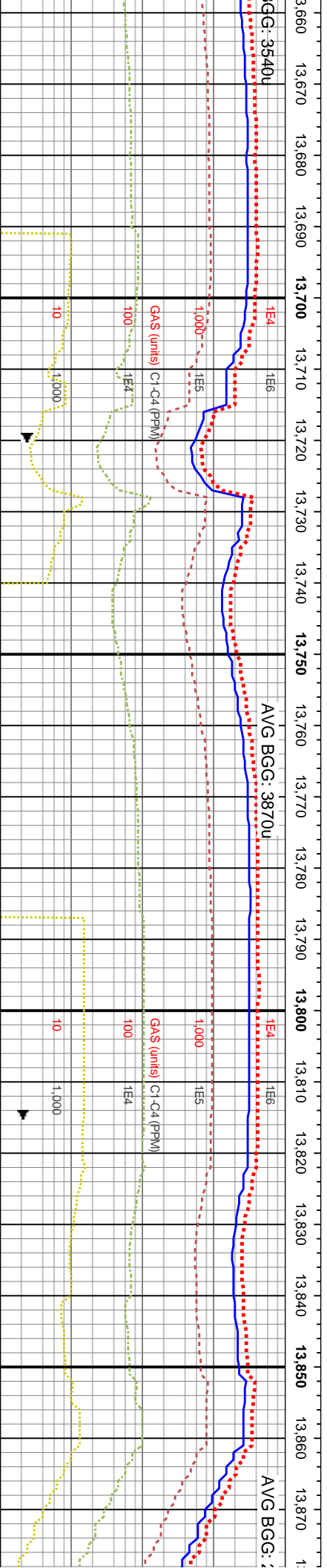
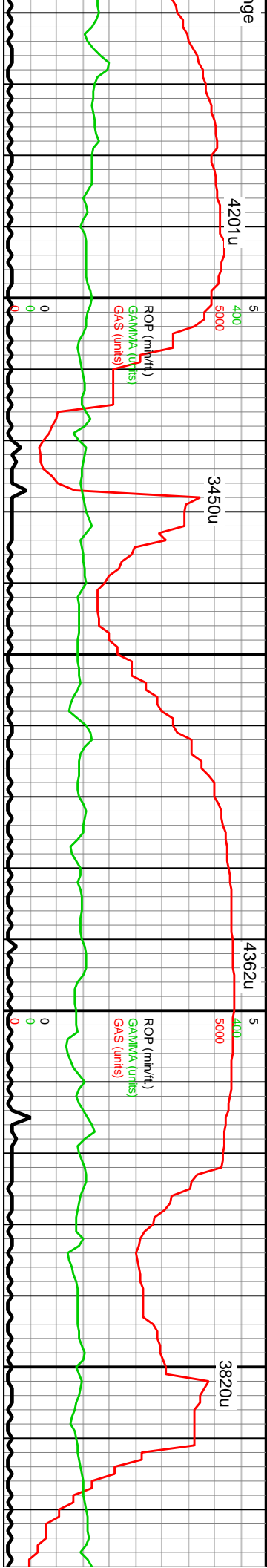
13280-13340 SD: pred gy- med gy brn, ip gy brn mot, sme gy- amb trnsi, occ offwhit- tn, abnt sl trnsi, sb blkly clus, frm- hd, occ sft- fri clus, abnt v f gr clus, pred sb rnd- ang grs, pred grn sup clus, abnt u f- l med uncongs qtz grs, tr ang c grs, arg- sil cnt, sme sl calc, sme lse sil- arg cnt, tr pyr, tr glauc

13340-13400 SD: pred gy- med gy brn, ip gy brn mot, sme gy- amb trnsi, occ offwhit- tn, abnt sl trnsi, sb blkly clus, frm- hd, occ sft- fri clus, abnt v f gr clus, pred sb rnd- ang grs, pred grn sup clus, abnt u f- l med uncongs qtz grs, tr ang c grs, arg- sil cnt, sme sl calc, sme lse sil- arg cnt, tr pyr, tr glauc

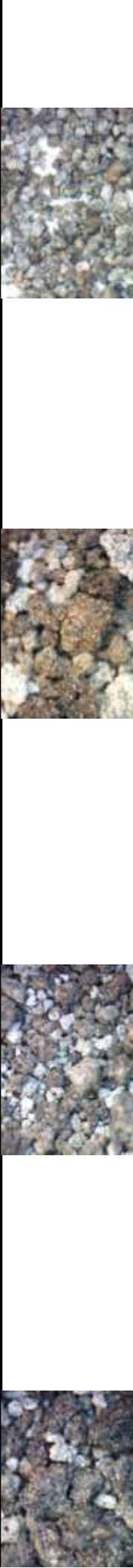
13400-13460 SD: pred gy- med gy trnsi, occ offwhit- tn, abnt sl trnsi, sb blkly clus, frm- hd, occ sft- fri clus, abnt v f gr clus, pred grn sup clus, abnt u f- l med uncongs qtz grs, tr ang c grs, arg- sil cnt, sme sl calc, sme lse sil- arg cnt, tr pyr, tr glauc



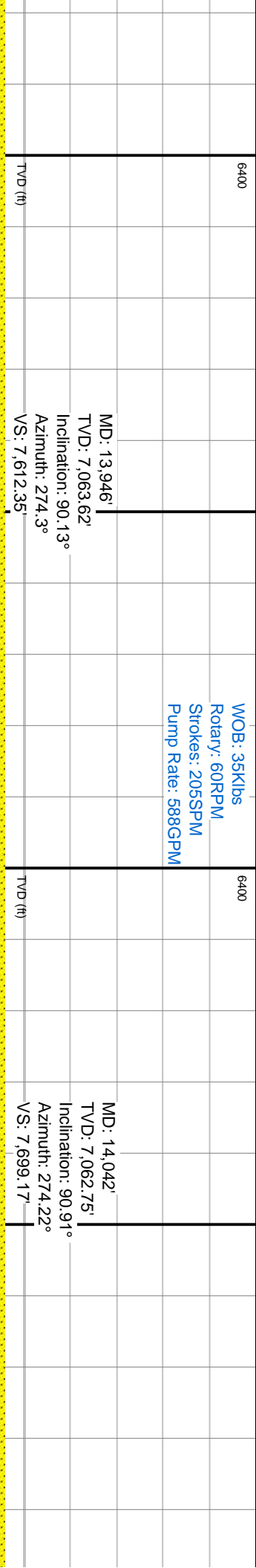
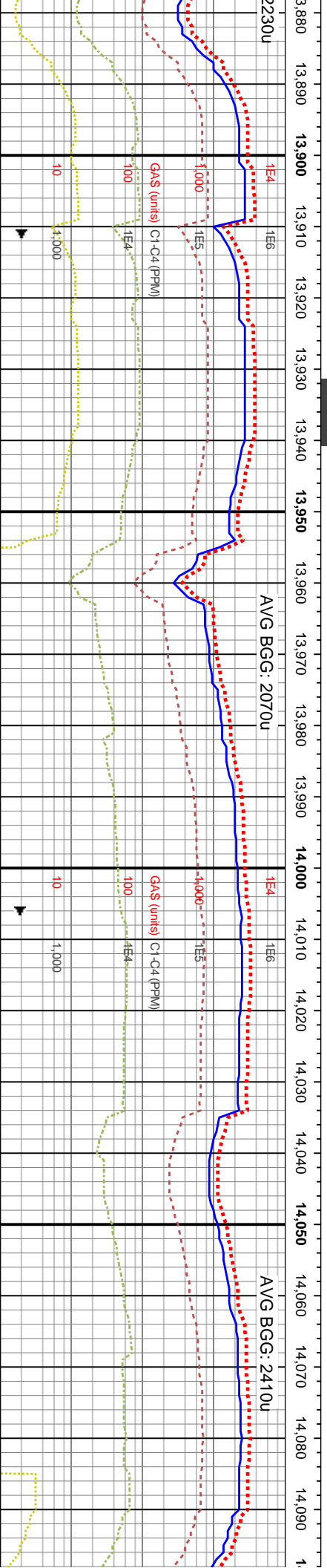
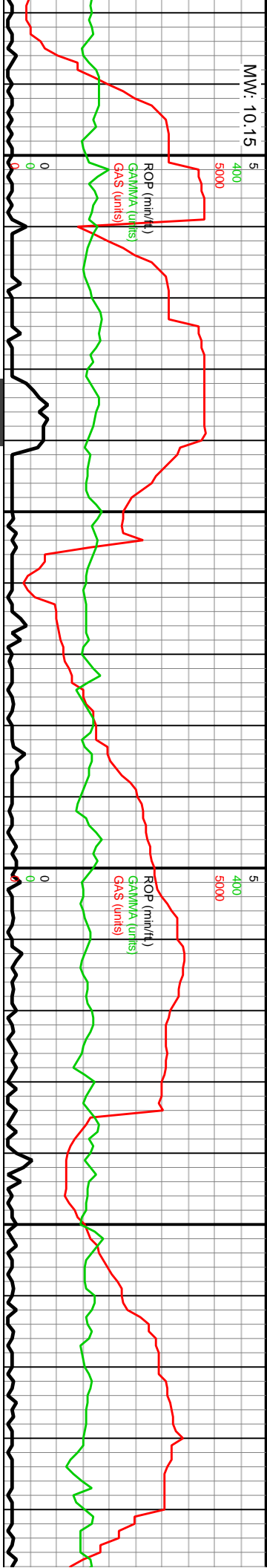




13700-13760 SD: pred gy- lt brn, sme gy- amb trnsi, sme offwht- tn, abnt sl trnsi, sb blkly clus, frm- hd, occ sft- fri clus, abnt v f gr sup clus, pred sb rnd- ang grs, abnt u f- l med uncons qtz grs, tr ang trnsi c qtz grs, arg- sil cnt, sme sl calc, sme lse sil- arg cnt, tr glauc	7500
13760-13820 SD: pred gy- lt brn, sme gy- amb trnsi, sme offwht- tn, abnt sl trnsi, sb blkly clus, frm- hd, occ sft- fri clus, abnt v f gr sup clus, pred sb rnd- ang grs, abnt u f- l med uncons qtz grs, tr ang trnsi c qtz grs, arg- sil cnt, sme sl calc, sme lse sil- arg cnt, tr glauc	7500
13820-13880 SD: pred gy- lt brn, sme gy- amb trnsi, sme offwht- tn, abnt sl trnsi, sb blkly clus, frm- hd, occ sft- fri clus, abnt v f gr sup clus, pred sb rnd- ang grs, abnt u f- l med uncons qtz grs, tr ang trnsi c qtz grs, arg- sil cnt, sme sl calc, sme lse sil- arg cnt, tr glauc	7500

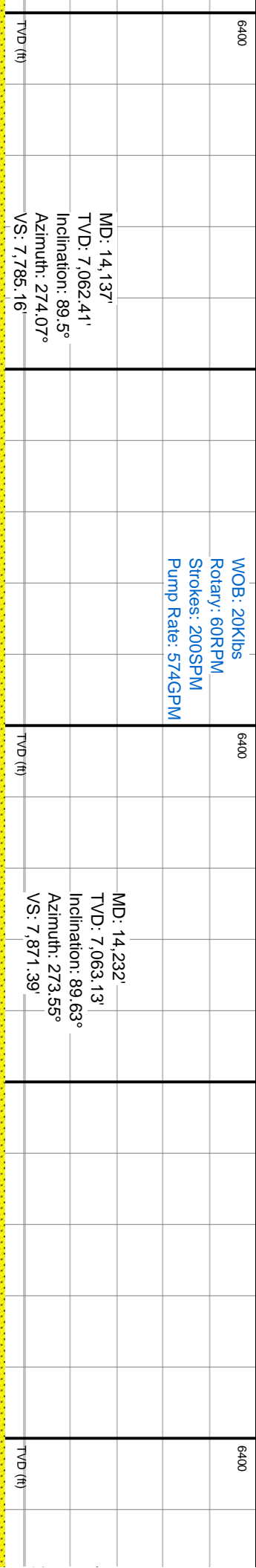
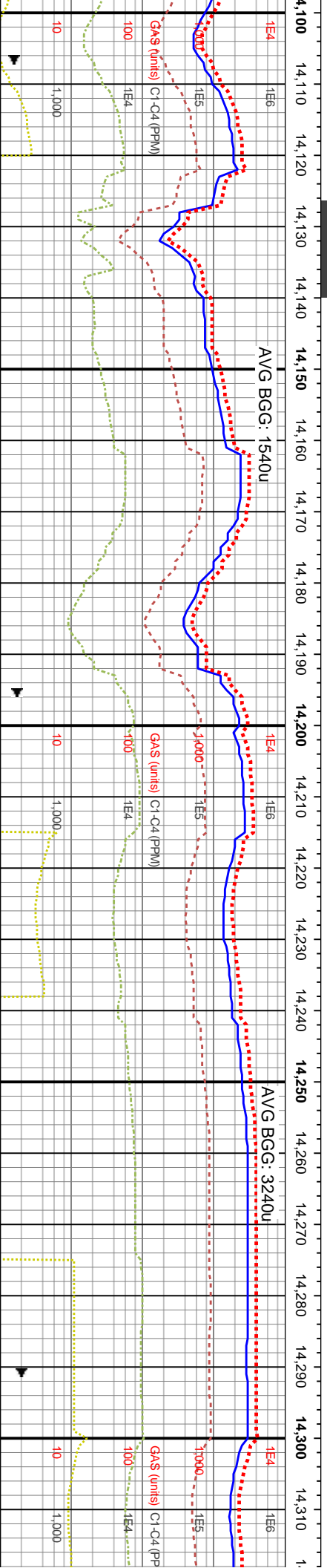
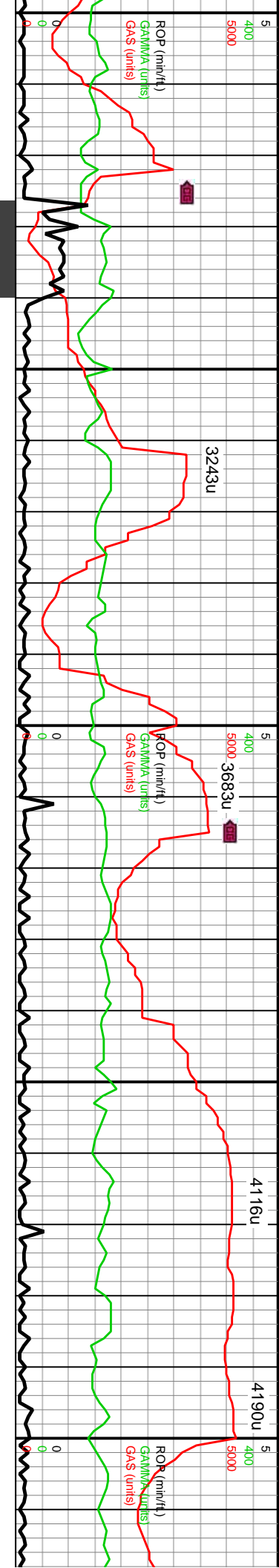






13880-13940 SD: pred gy- lt brn, sme gy- amb tmsl, sme offwht- tn, abnt sl tmsl, sb biky clus, frm- hd, occ sft- fri clus, abnt v f gr sup clus, pred sb rnd- ang grs, abnt u f- l med uncons qtz grs, tr ang tmsl c qtz grs, arg- sil cnt, sme sl calc, sme lse sil- arg cnt, tr glauc	7500
13940-14000 SD: pred gy- lt brn, sme brn, sme gy- amb tmsl, sme offwht- tn, abnt sl tmsl, sb biky clus, frm- sft- fri clus, abnt v f gr sup clus, pred sb rnd- ang grs, abnt u f- l med uncons qtz grs, arg- sil cnt, sme sl calc, sme lse sil- arg cnt	7500
14000-14060 SD: pred gy- lt brn, sme brn, sme gy- amb tmsl, sme offwht- tn, abnt sl tmsl, sb biky clus, frm- sft- fri clus, abnt v f gr sup clus, pred sb rnd- ang grs, abnt u f- l med uncons qtz grs, arg- sil cnt, sme sl calc, sme lse sil- arg cnt	7500
14060-14120 SD: pred gy- lt brn, sme brn, sme gy- amb tmsl, sme offwht- tn, abnt sl tmsl, sb biky clus, frm- sft- fri clus, abnt v f gr sup clus, pred sb rnd- ang grs, abnt u f- l med uncons qtz grs, arg- sil cnt, sme sl calc, sme lse sil- arg cnt	7500





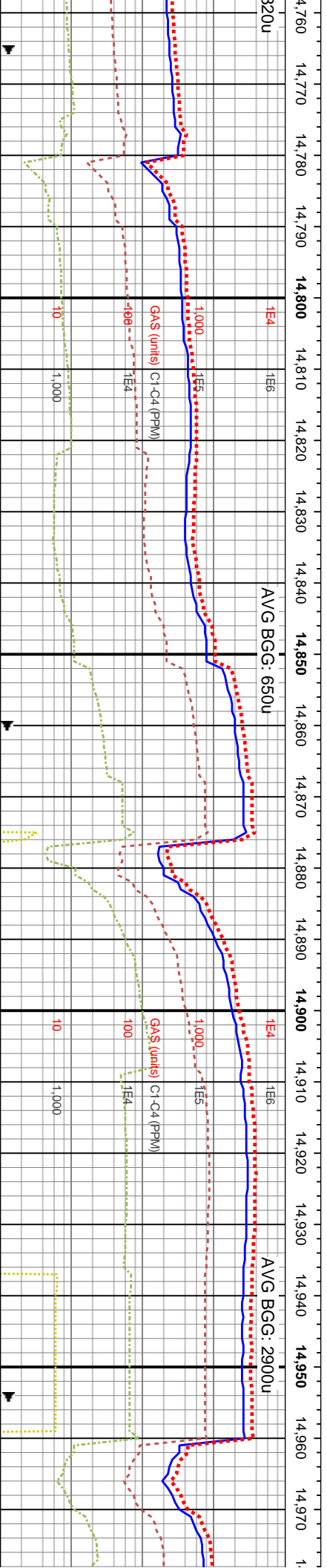
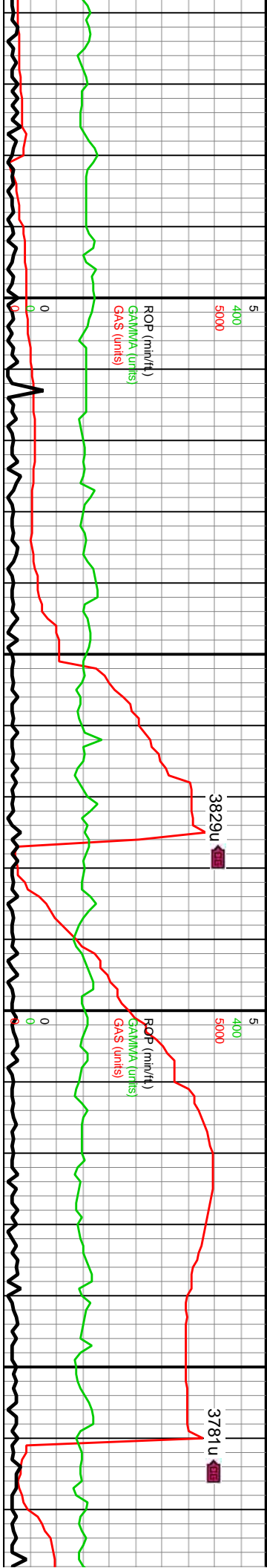
MD: 14,137' TVD: 7,062.41' Inclination: 89.5° Azimuth: 274.07° VS: 7,785.16'	MD: 14,232' TVD: 7,063.13' Inclination: 89.63° Azimuth: 273.55° VS: 7,871.39'	MD: 14,232' TVD: 7,063.13' Inclination: 89.63° Azimuth: 273.55° VS: 7,871.39'	MD: 14,232' TVD: 7,063.13' Inclination: 89.63° Azimuth: 273.55° VS: 7,871.39'	MD: 14,232' TVD: 7,063.13' Inclination: 89.63° Azimuth: 273.55° VS: 7,871.39'	MD: 14,232' TVD: 7,063.13' Inclination: 89.63° Azimuth: 273.55° VS: 7,871.39'
14120-14180 SD: pred gy- lt brn, sme brn, offwht- tn, abnt sl ft- fri clus, abnt v f ang grs, abnt u f- l sil cnt, sme sl	14180-14240 SD: pred gy- lt brn, sme brn, sme gy- amb trnsi, sme offwht- tn, abnt sl trnsi, sb blkly clus, frm- sft- fri clus, abnt v f gr sup clus, pred sb rnd- ang grs, abnt u f- l med uncons qtz grs, arg- sil cnt, sme sl calc, sme lse sil- arg cnt	14180-14240 SD: pred gy- lt brn, sme brn, sme gy- amb trnsi, sme offwht- tn, abnt sl trnsi, sb blkly clus, frm- sft- fri clus, abnt v f gr sup clus, pred sb rnd- ang grs, abnt u f- l med uncons qtz grs, arg- sil cnt, sme sl calc, sme lse sil- arg cnt	14240-14300 SD: pred gy- lt brn, sme brn, sme gy- amb trnsi, sme offwht- tn, abnt sl trnsi, sb blkly clus, frm- sft- fri clus, sme hd, abnt v f gr sup clus, pred sb rnd- ang grs, abnt u f- l med uncons qtz grs, ip c qtz grs, arg- sil cnt, sme sl calc, sme lse sil- arg cnt, tr pyr	14240-14300 SD: pred gy- lt brn, sme brn, sme gy- amb trnsi, sme offwht- tn, abnt sl trnsi, sb blkly clus, frm- sft- fri clus, sme hd, abnt v f gr sup clus, pred sb rnd- ang grs, abnt u f- l med uncons qtz grs, ip c qtz grs, arg- sil cnt, sme sl calc, sme lse sil- arg cnt, tr pyr	14300-14360 SD: pred gy- lt brn, sme brn, sme gy- amb trnsi, sme offwht- tn, abnt sl trnsi, sb blkly clus, frm- sft- fri clus, sme hd, abnt v f gr sup clus, pred sb rnd- ang grs, abnt u f- l med uncons qtz grs, ip c qtz grs, arg- sil cnt, sme sl calc, sme lse sil- arg cnt, tr pyr









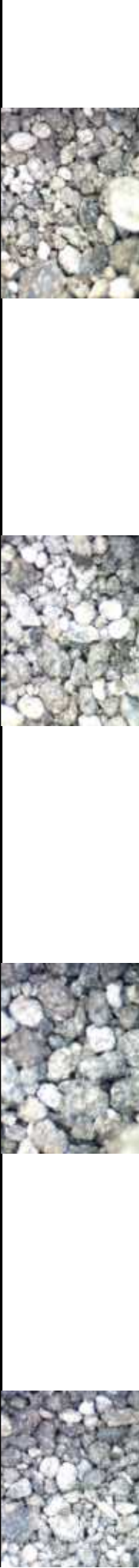
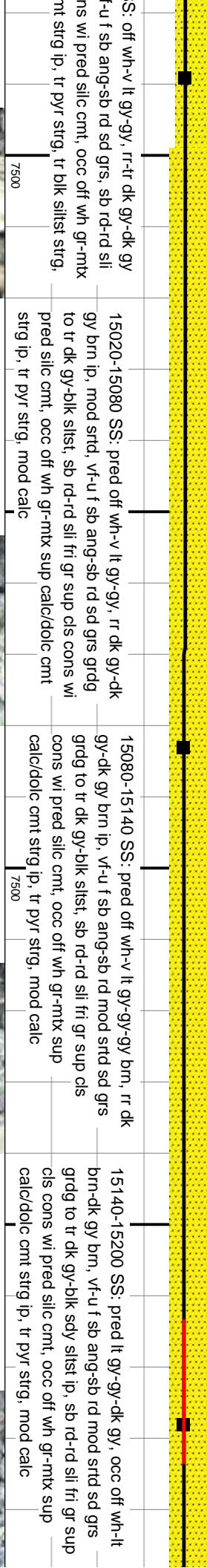
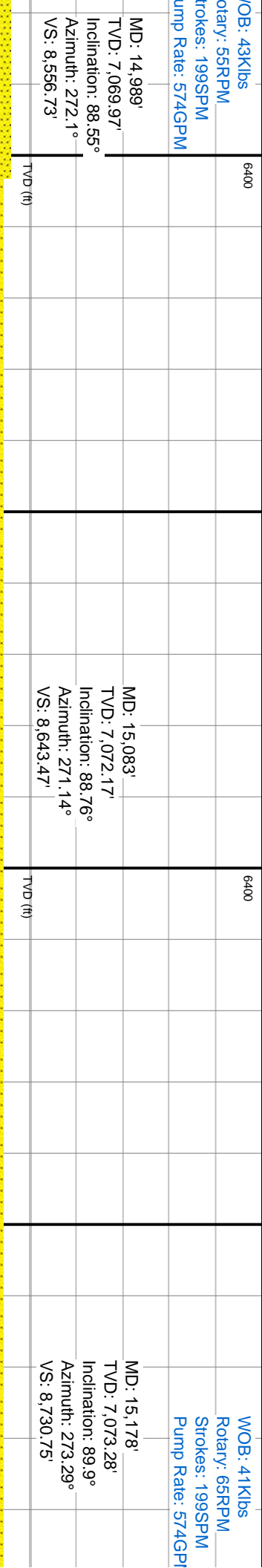
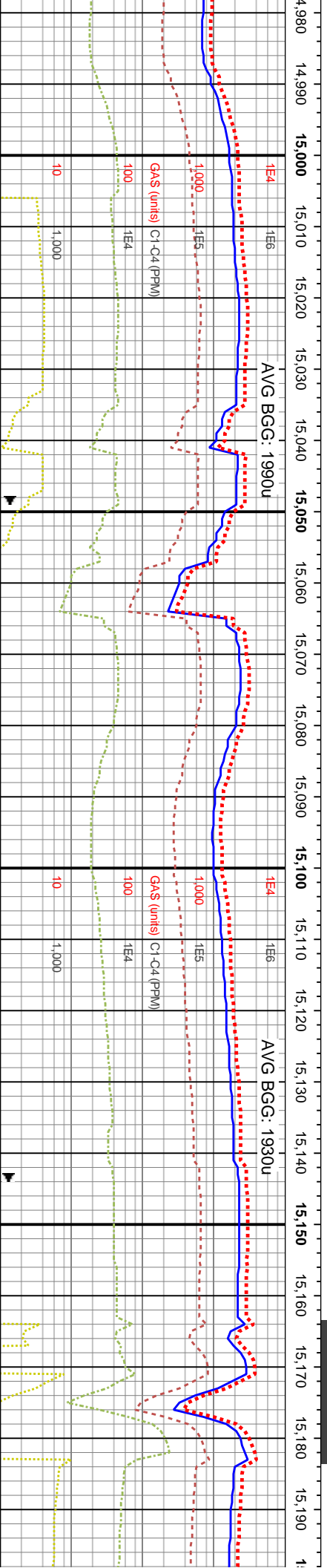
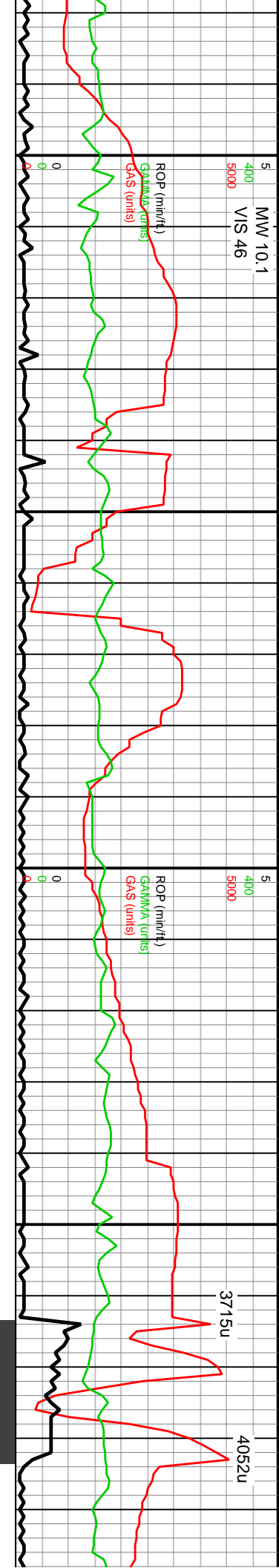


WOB: 41Klbs  
Rotary: 65RPM  
Strokes: 199SPM  
Pump Rate: 574GPM

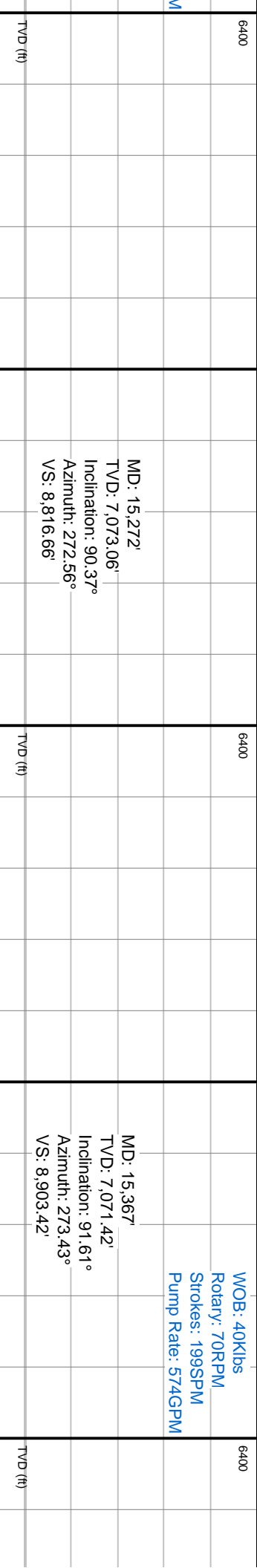
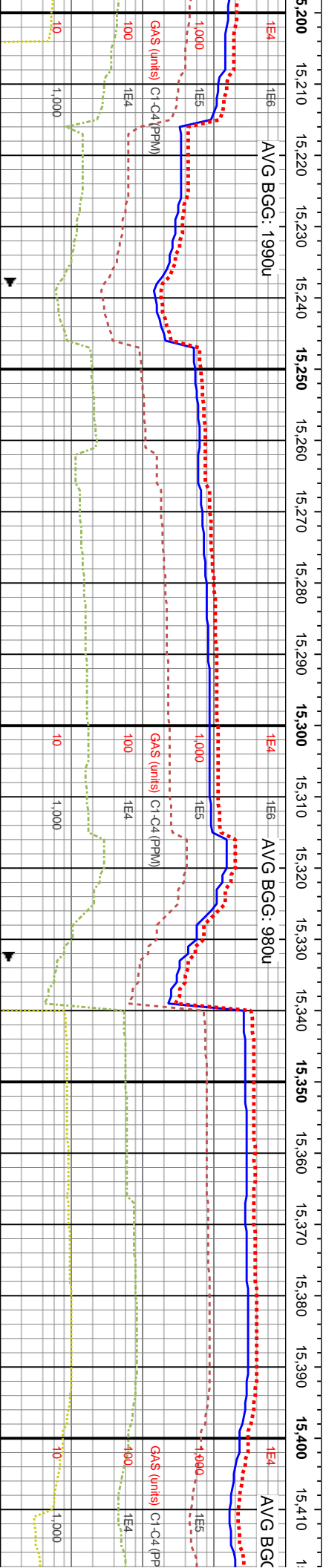
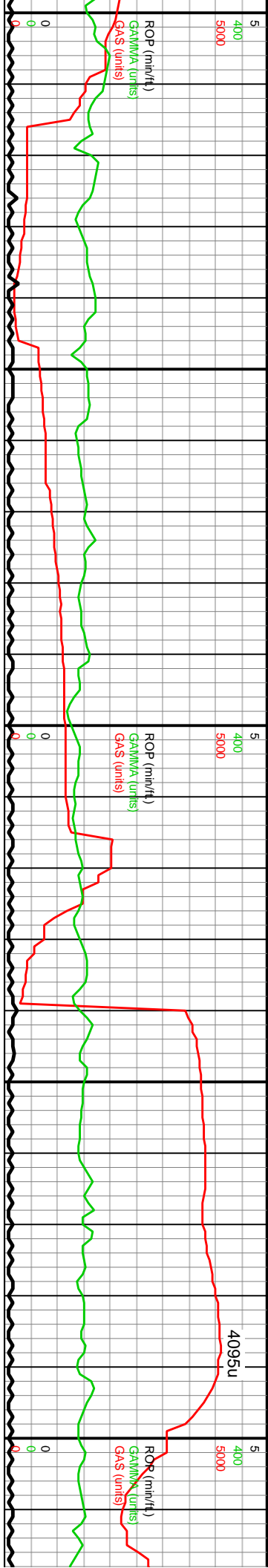
MD: 14,894'  
TVD: 7,068.13'  
Inclination: 89.23°  
Azimuth: 274.75°  
VS: 8,470.27'

14780-14840 SS: pred off wh-v lt gy-gy, com v lt brn-dk gy, mod strd, vf-u f sb	14840-14900 SS: off wh-v lt gy-gy, rr-tr dk gy-dk gy brn, mod strd vf-u f sb ang-sb rd sd grs grdg	14900-14960 SS: pred off wh-v lt gy-gy, rr dk gy-dk gy brn ip, mod strd, vf-u f sb ang-sb rd sd grs grdg to tr dk gy-blk silst, sb rd-rd sil fri gr sup cls cons wi pred silc cnt, occ off wh gr-mtx sup calc/dolc cnt strg ip, tr pyr strg, mod calc	14960-15020 S
calcd/dolc cnt strg	fri gr sup cls cons	fri gr sup cls cons	sup calc/dolc cnt
strg ip, tr pyr strg, mod calc	mod calc	pyr strg, mod calc	mod calc
7500	7500	7500	



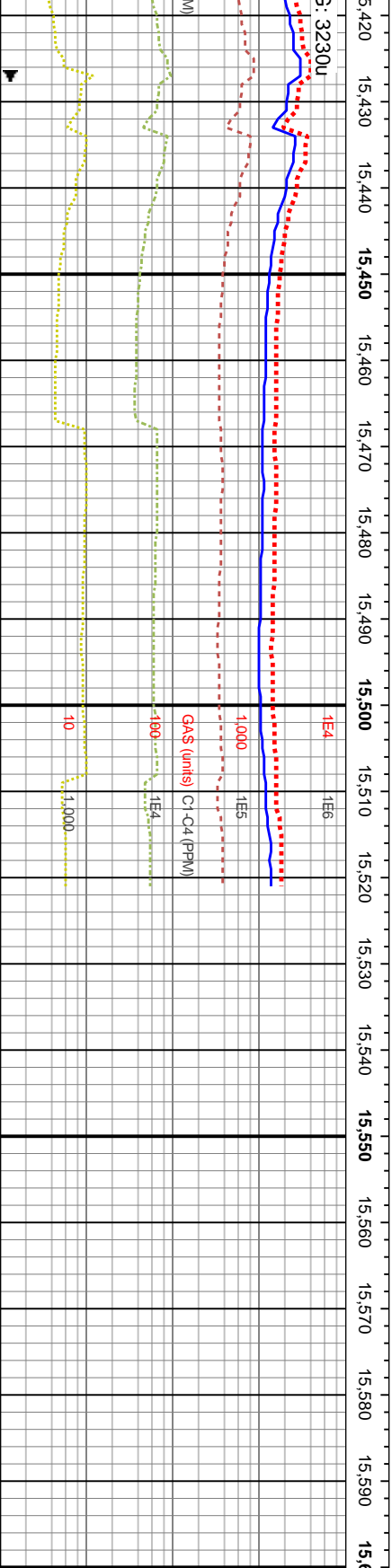
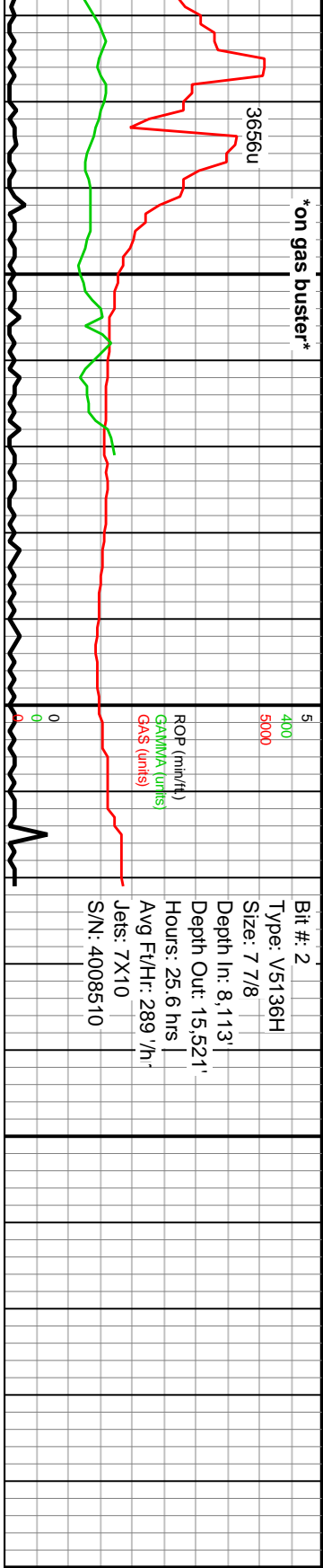






15200-15260 SS: pred lt gy-gy-dk gy, occ off wh-lt brn-dk gy brn, mod srtf vf-u f sb ang-sb rd sd grs, sb rd-rd sli fri gr sup cls cons wi pred silic cnt, occ off wh gr-mtx sup calc/dolic cnt strg ip, tr pyr strg, tr blk siltst strg, mod calc	15260-15320 SS: pred gy-dk gy, com lt gy, occ off wh-lt brn-dk gy brn, vf-u f sb ang-sb rd mod srtf sd grs, sb rd-rd sli fri gr sup cls cons wi pred silic cnt, occ off wh gr-mtx sup calc/dolic cnt strg ip, tr pyr strg, tr dk gy ss grdg down sdy siltst, mod calc	15320-15380 SS: pred lt gy-gy-dk gy, occ off wh-lt brn-dk gy brn, mod srtf vf-u f sb ang-sb rd sd grs, sb rd-rd sli fri gr sup cls cons wi pred silic cnt, occ off wh gr-mtx sup calc/dolic cnt strg ip, tr pyr strg, tr blk siltst strg, mod calc	15380-15440 SS: pred lt gy-gy-dk gy, occ off wh-lt brn-dk gy brn, vf-u f sb ang-sb rd sd grs, sb rd-rd sli fri gr sup cls cons wi pred silic cnt, occ off wh gr-mtx sup calc/dolic cnt strg ip, tr pyr strg, tr blk siltst strg, mod calc
7500	7500	7500	7500





MD: 15,462'  
TVD: 7,067.56'  
Inclination: 93.05°  
Azimuth: 273.51°  
VS: 8,989.8'

**Projection to bit:**  
MD: 15,522'  
TVD: 7,064.4'  
Inclination: 93.05°  
Azimuth: 273.51°  
VS: 9,043.4'

TVD (ft)

Reached TD @ 20:53 on 10/26/15

15440-15521 SS: gy-dk gy, com lt gy, occ off wh-lt	15440-15521 SS: gy-dk gy, com lt gy, occ off wh-lt brn-dk gy brn, vf-u f sb
mod strd sd grs	ang-sb rd mod strd sd grs, sb rd-rd sli fri gr sup cls cons wi pred silic cnt,
occ off wh gr sup	occ off wh gr-rntx sup calc/dole cnt strg ip, tr pyr strg, tr gn glauc, r dk gy ss
gr-rntx sup	grdg down sdy slist, mod calc
d calc	

7500

