



Empirica

Scale: 5" / 100'
Measured Depth Log

Well Name Janssen 2_horizontal

Location Sec.8-T06N-R65W

State Colorado

Country USA

API Number 05-123-42359-00

Geographic Region DJ Basin

Spud Date 12/14/2015

Surface Coordinates SHL: 2147' FNL, 2397' FWL Sec. 8 T6N R65W

Lat: 40 30' 11.948 N

Long: 104 41' 17.768 W

County Weld

Rig Number Patterson UTI 346

AFE # NA

Field Wattenberg

Drilling Completed 12/16/2015

Bottom Hole Coordinates PBHL:

Lat: 40 30' 33.703 N

Long: 104 42' 14.325 W

Ground Elevation 4,779'

K.B. Elevation 4,803.5'

Logged Interval 6,850' To 11,945'

Total Depth 11,945'

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

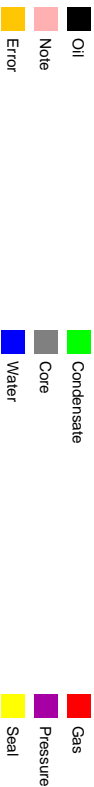
Comments Start: 12-14-15
TD: 12-16-15

Services Provided 2-man Logging
On Site Geosteering

Logger Names Dominic Pitre / Nicholas V

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

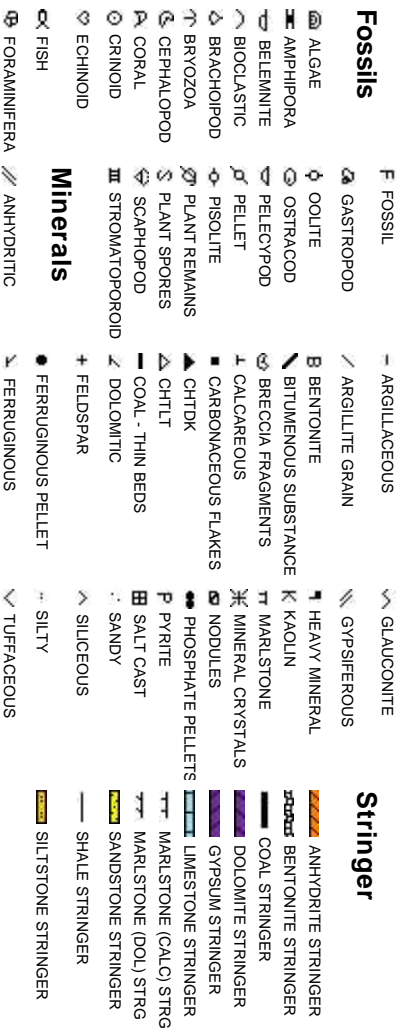
Zone Color Coding



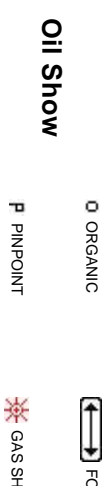
Rock Types



Accessories



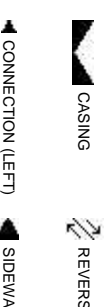
Other Sy



Engineering



Porosity



Symbols

FORMATION TOP L LITHOGRAPHIC

Rounding

LOW MX MICROXLN

MIN DEPTH AN ANGULAR MS MUDSTONE

FL FAULT R ROUNDED PS PACKSTONE

DW SB SUBANG WS WACKESTONE

TURNED STRATA SN SUBRND

Sorting

SE FAULT

Textures

LL CORE (LEFT) M MODERATE

LL CORE (RIGHT) BS BOUNDSTONE P POOR

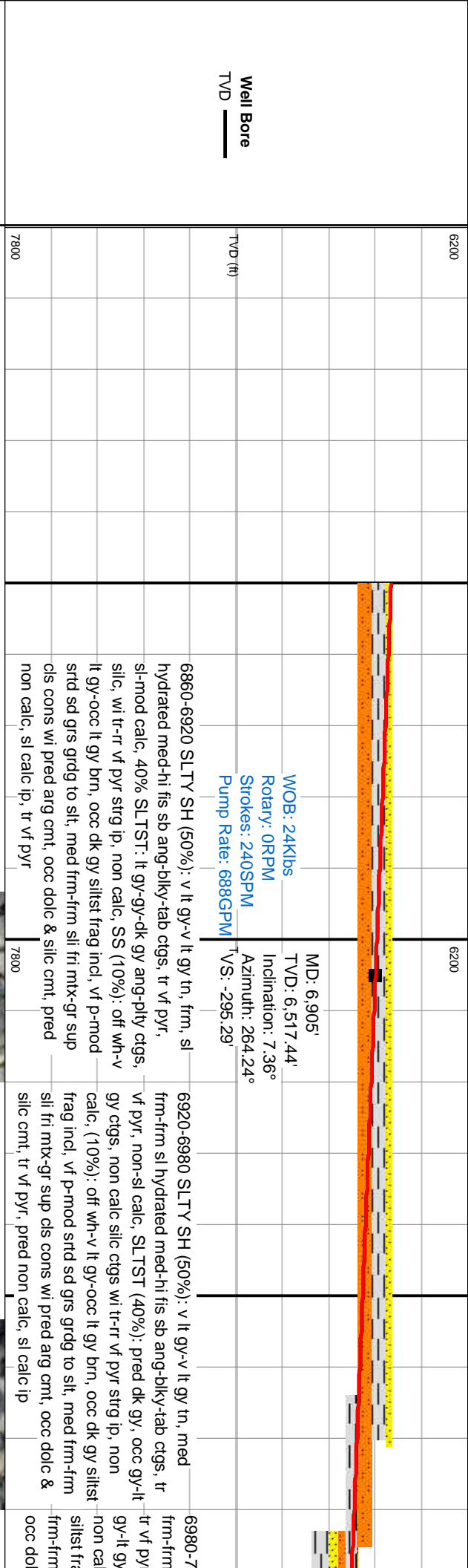
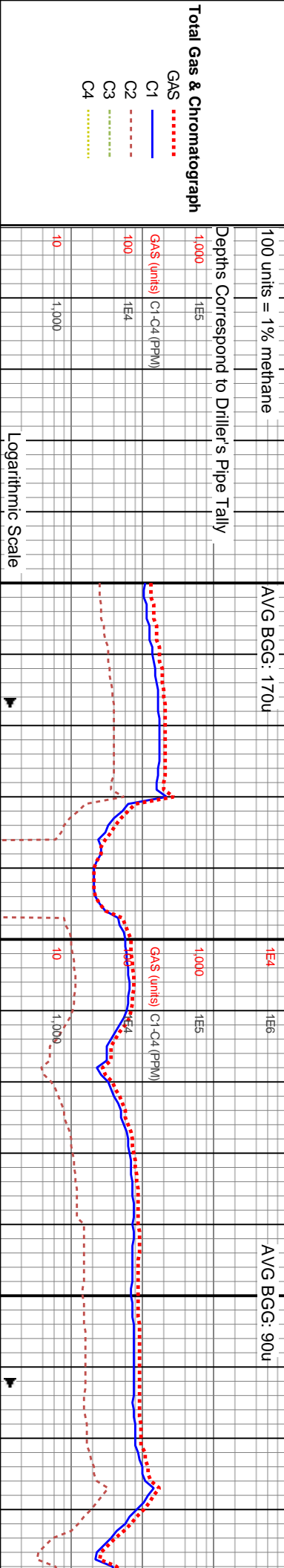
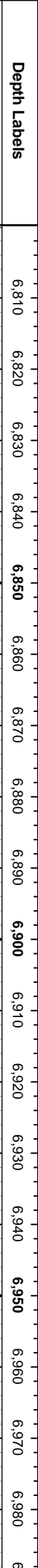
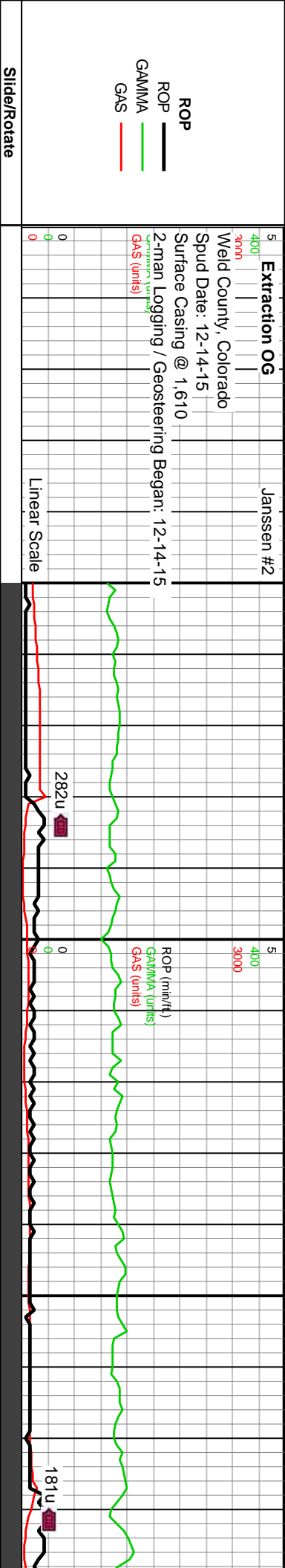
C CHALKY W WELL

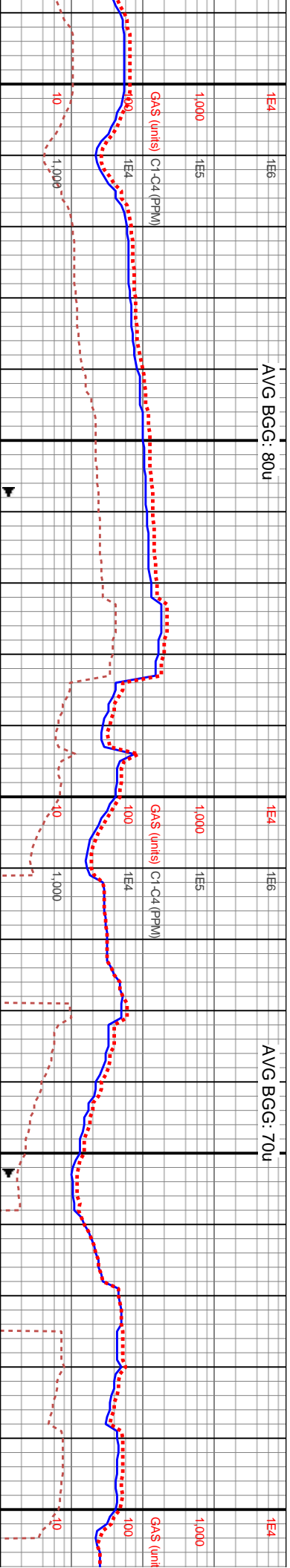
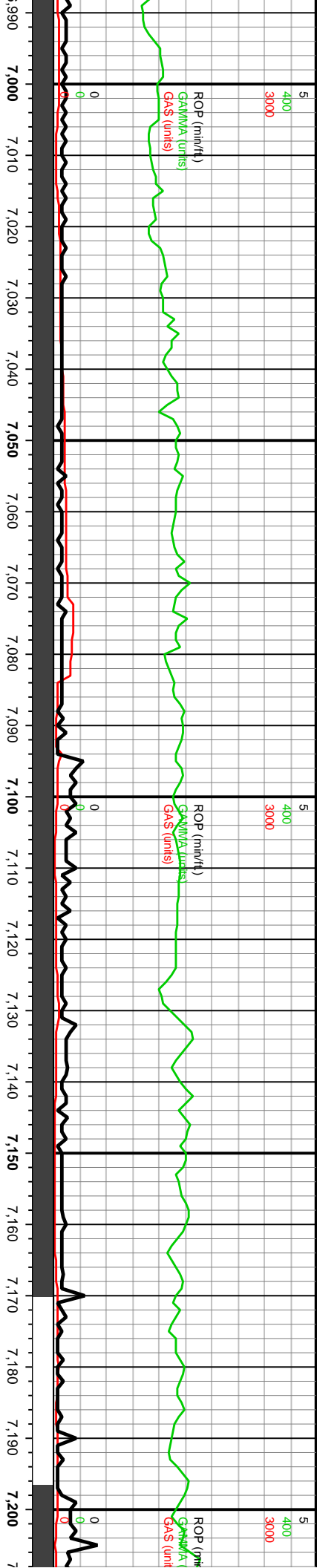
CRY CRYPTOXLN

SAS E EARTHY

IE TESTED - LEFT FX FINELYXLN

IE TESTED - RT GS GRAINSTONE





MD: 7,001.00'
TVD: 6,611.05'
Inclination: 17.67°
Azimuth: 276.97°
VS: -274.61'

WOB: 25Klbs
Rotary: 0RPM
Strokes: 240SPM
Pump Rate: 689GPM

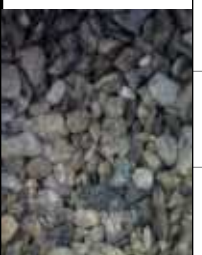
MD: 7,096'
TVD: 6,698.79'
Inclination: 27.11°
Azimuth: 281.19°
VS: -238.72'

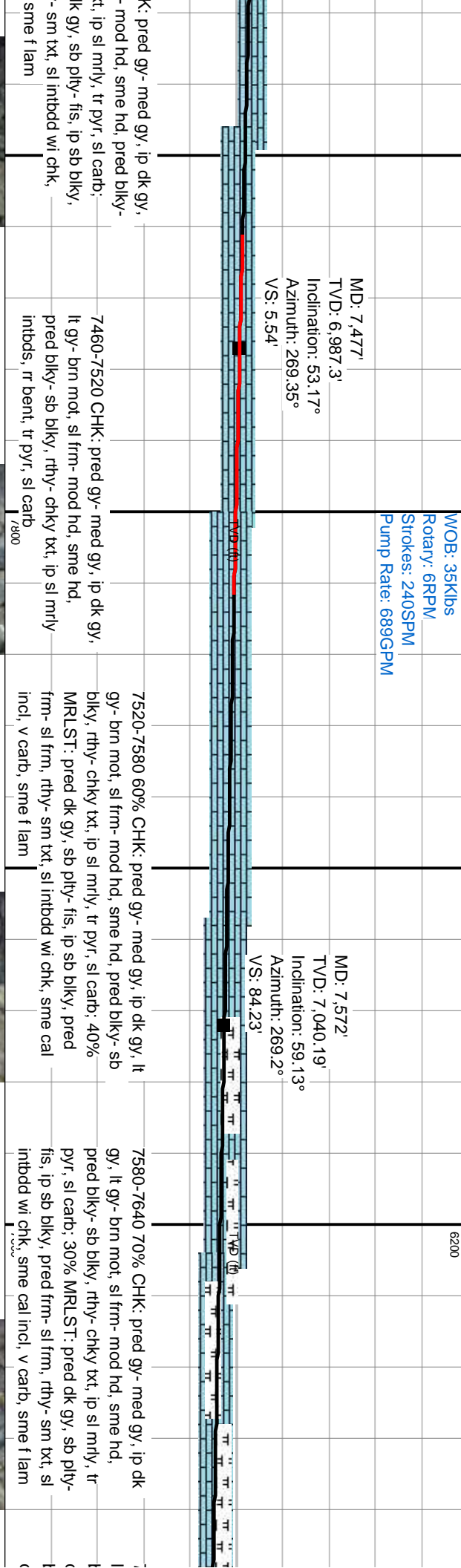
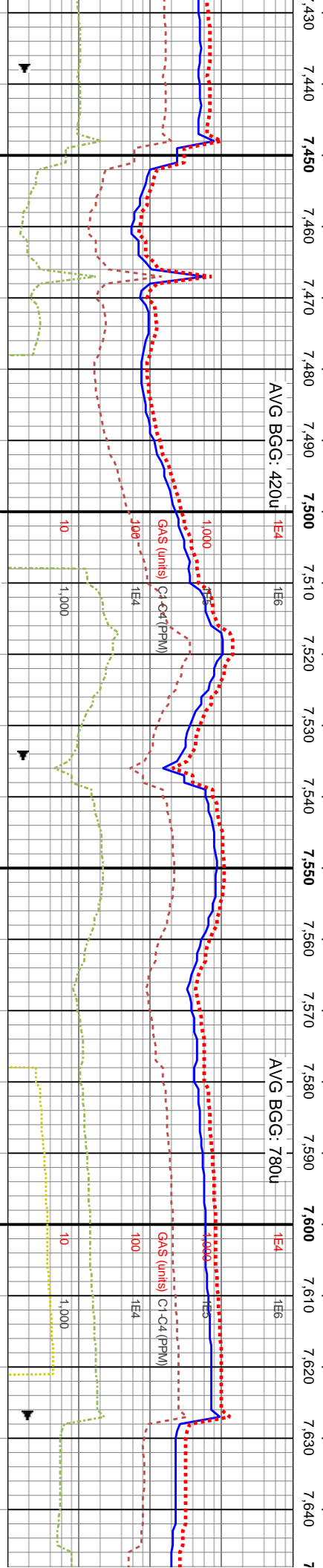
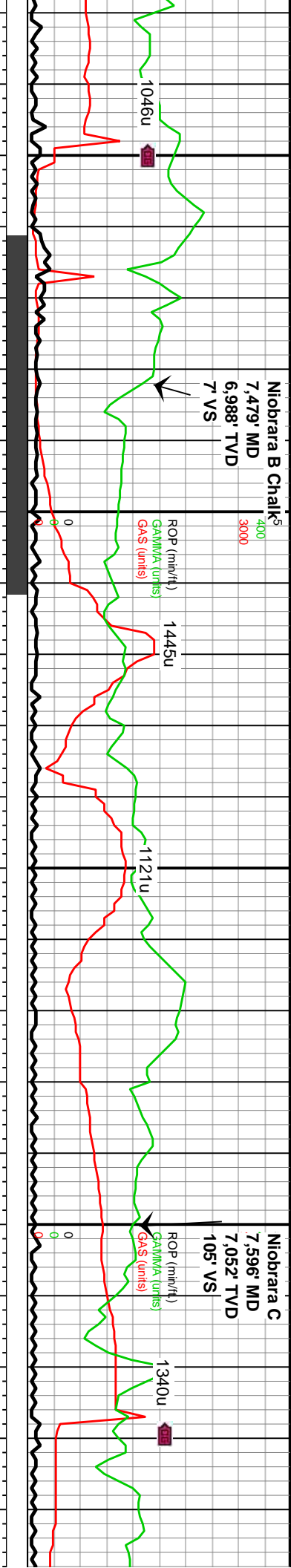
MD: 7,191'
TVD: 6,779.73'
Inclination: 35.91°
Azimuth: 274.45°
VS: -189.33'

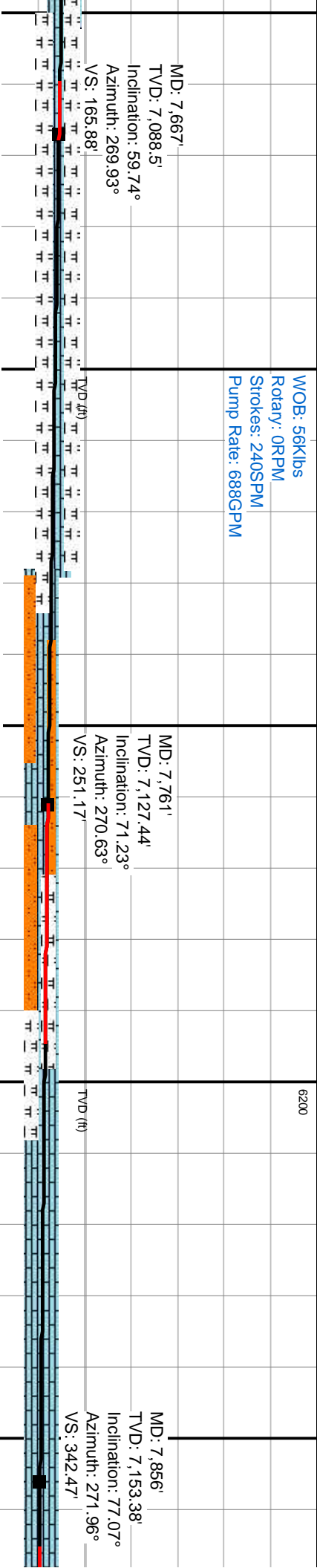
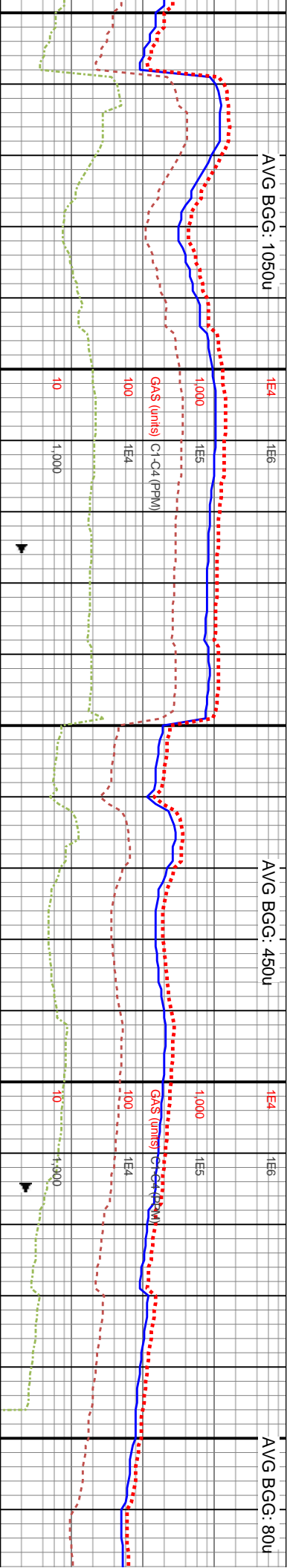
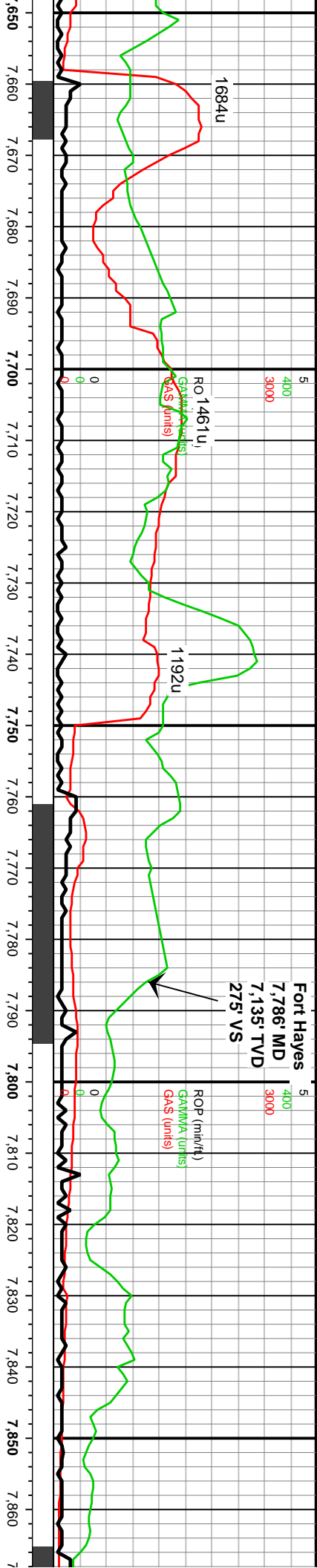
040 SLTY SH (50%): v lt gy-v lt gy tn, med sl hydrated med-hi fls sb ang-bkly-tab ctgs, non-sl calc, SLTST (40%): pred dk gy, occ ctgs, non calc silic ctgs wi tr-rr vf pyr strg ip, c, (10%): off wh-v lt gy-occ lt gy brn, occ dk gy incl, vf p-mod strd sd grs grdg to silt, med sil fri mtx-gr sup cls cons wi pred arg cmt, c & silic cmt, tr vf pyr, pred non calc, sl calc ip

7040-7160 SLTY SH (55%): lt gy-lt gy brn, med frm-frm sl hydrated mod fls bkly ctgs, grdg to sdy SS inbds ip, non calc-sl calc ip, grdg to silic SLTST (25%): gy-dk gy, frm-brt, ang-pty ctgs, silic, tr-rr vf pyr strg ip, non calc, SS (20%): off wh-v lt gy-occ lt gy brn, occ dk gy siltst frag incl, vf p-mod strd sd grs grdg to silt, med frm-frm sil fri mtx-gr sup cls cons wi pred arg cmt, occ dolc & silic cmt, tr vf pyr, pred non calc, sl calc ip

7160-7220 SLTY SH (55%): lt gy-lt gy brn, nm sl hydrated mod fls bkly ctgs, grdg to sdy SS non calc-sl calc ip, grdg to silic SLTST (25%): frm-brt, ang-pty ctgs, silic, tr-rr vf pyr strg ip, SS (20%): off wh-v lt gy-occ lt gy brn, occ dk frag incl, vf p-mod strd sd grs grdg to silt, med sil fri mtx-gr sup cls cons wi pred arg cmt, occ silic cmt, tr vf pyr, pred non calc, sl calc ip







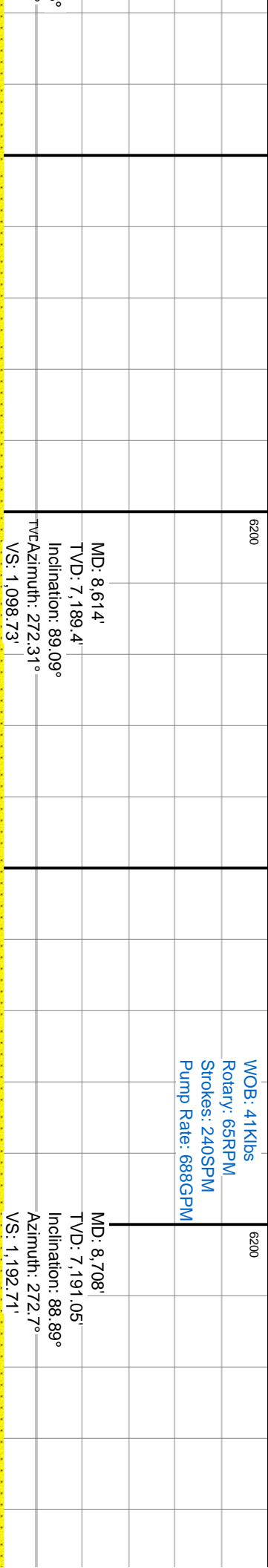
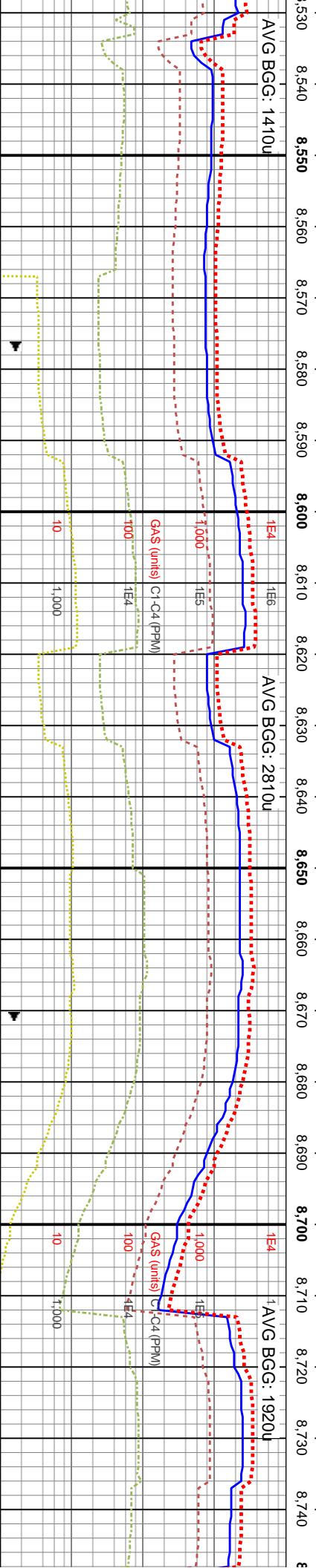
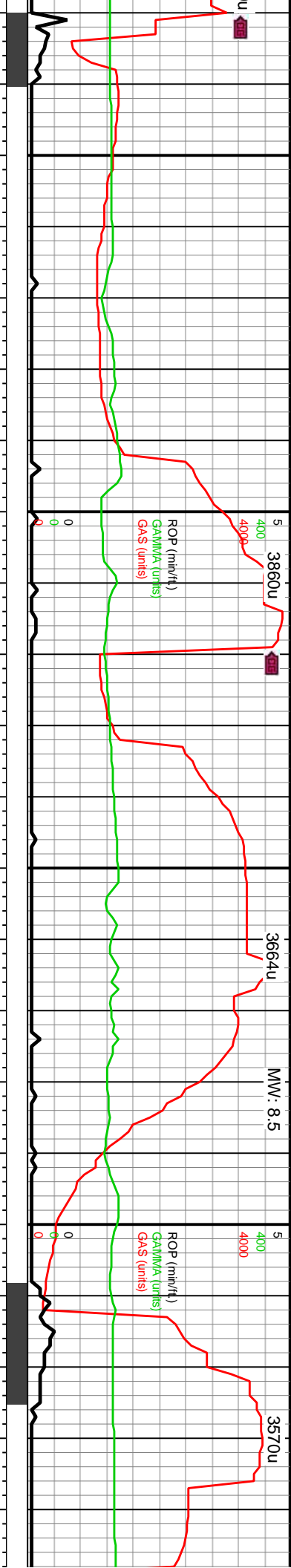
6640-7700 70% CHK: pred gy- med gy, ip dk gy, t gy- brn mot, sl frm- mod hd, sme hd, pred blkly- sb blkly, rthy- chky txt, ip sl mrlty, tr pyr, sl carb; 30% MRLST: pred dk gy, sb plty- fls, ip sb blkly, pred frm- sl frm, rthy- sm txt, sl intbdd wi chk, sme cal incl, v carb, sme f lam

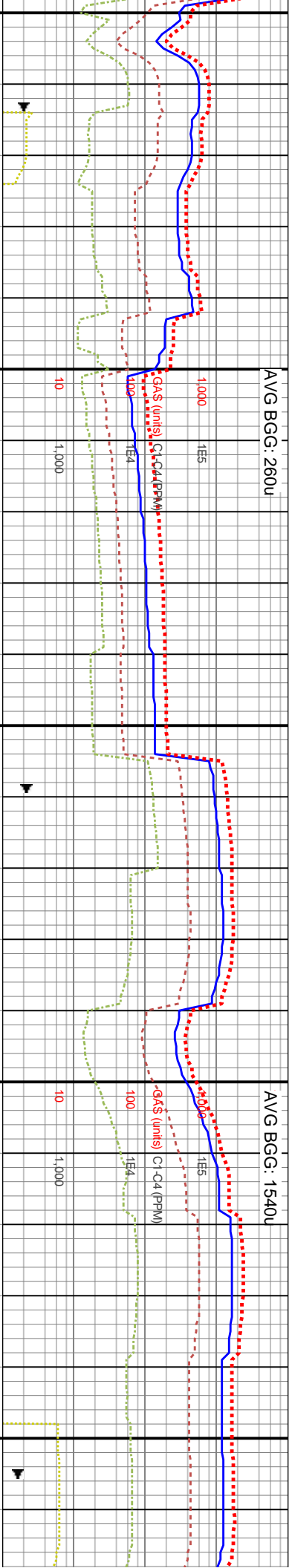
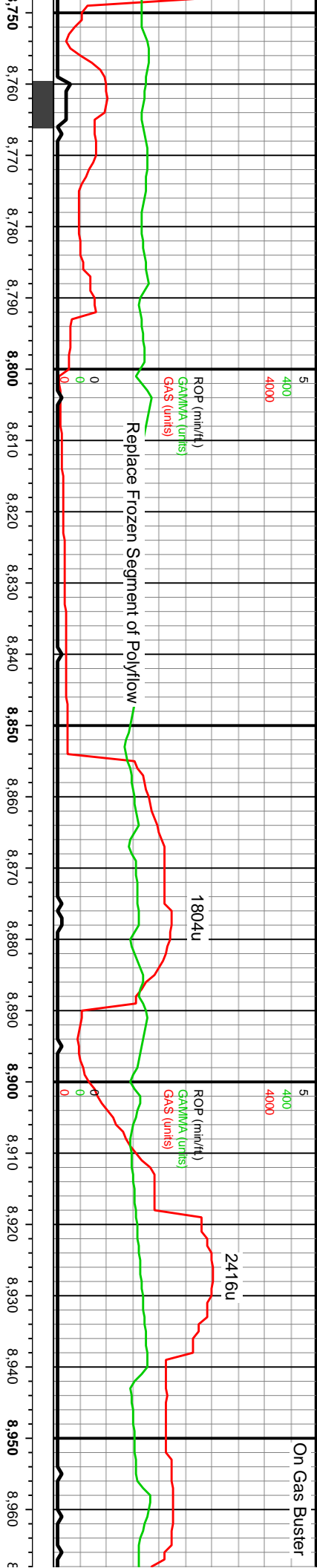
7700-7760: 40% SLTST: med gy, ip gy, sb blkly, sl frm- hd, calc, sme sh- chky intbds; 40% LS: offwht- bf, ip sl tn- med gy mot, occ wht, pred blkly- sb blkly, ip sb plty, frm, pred mudst wi sme intbd carb grs; 20% MRLST: dk gy- blk, sl frm, sb blkly- sb plty, ip sm txt, tr frac fl cal, occ f lam, mod - v carb

7760-7820: 80% LS: offwht- bf, ip sl tn- med gy mot, occ wht, pred blkly- sb blkly, ip sb plty, frm, pred mudst wi sme intbd carb grs; 20% SLTST: med gy, ip gy, sb blkly, sl frm- hd, calc, sme sh- chky intbds, sl carb

7820-7880: LS: offwht- bf, ip sl tr mot, occ wht, pred blkly- sb blkly, frm, pred mudst wi sme intbd carb grs, sme mrlty intbds







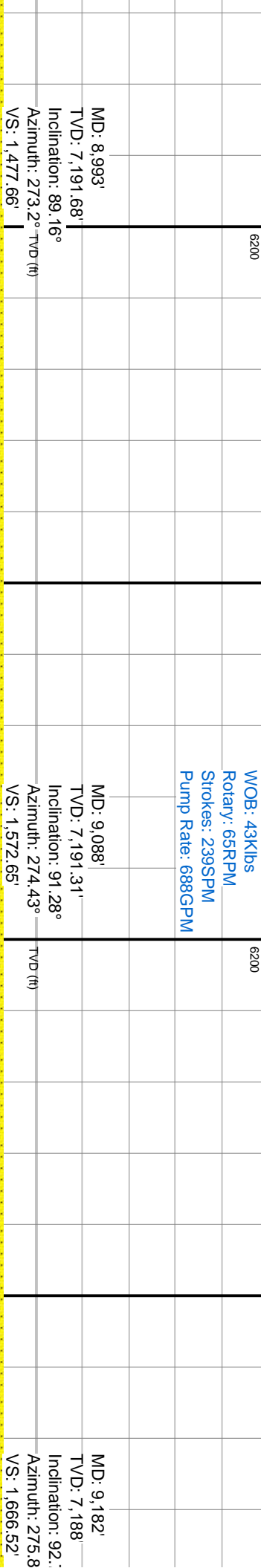
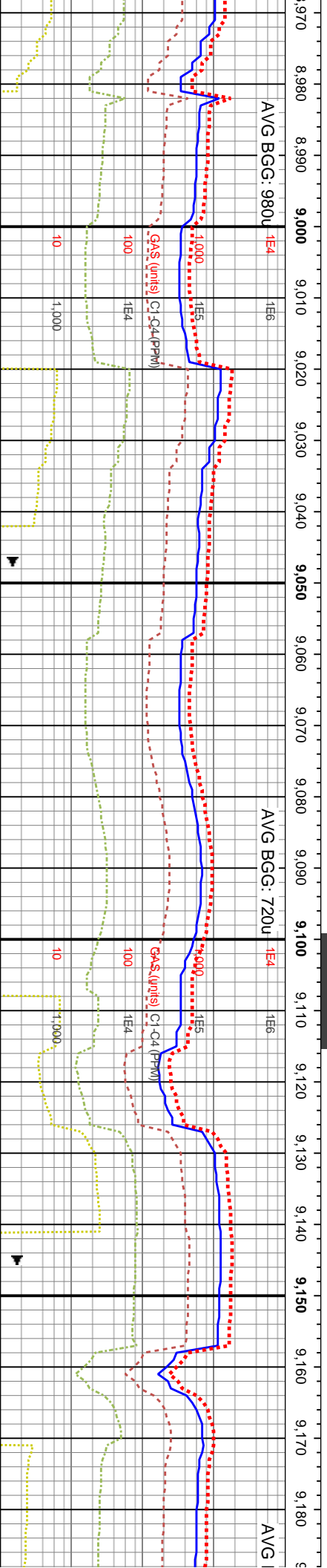
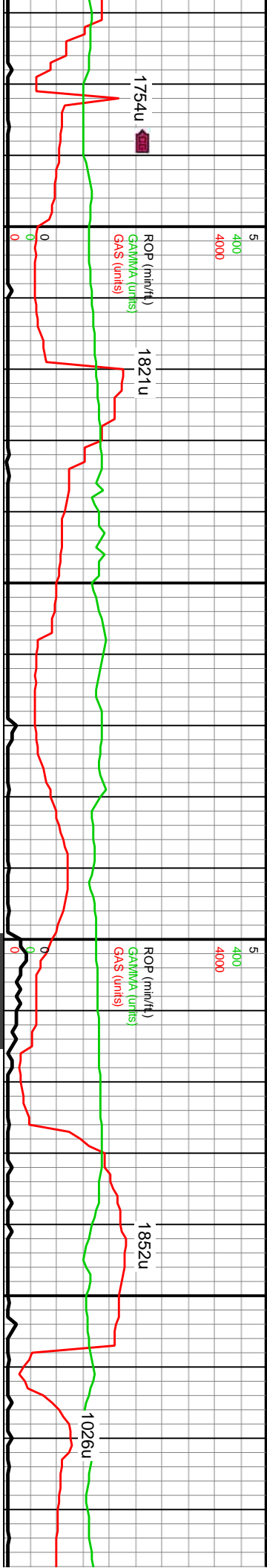
MD: 8,803'
TVD: 7,191.34'
Inclination: 90.77°
Azimuth: 274.6°
VS: 1,287.69'

WOB: 27Klbs
Rotary: 65RPM
Strokes: 239SPM
Pump Rate: 689GPM

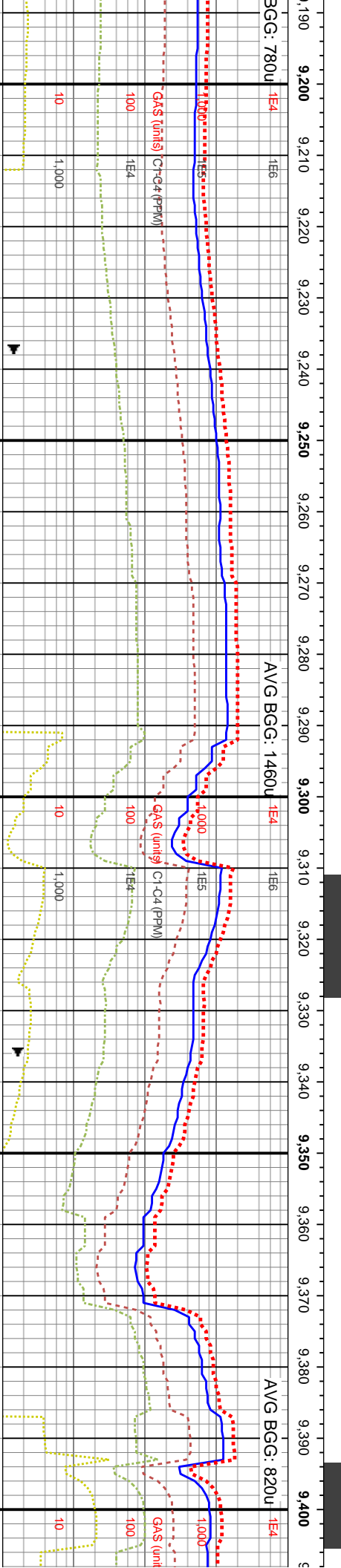
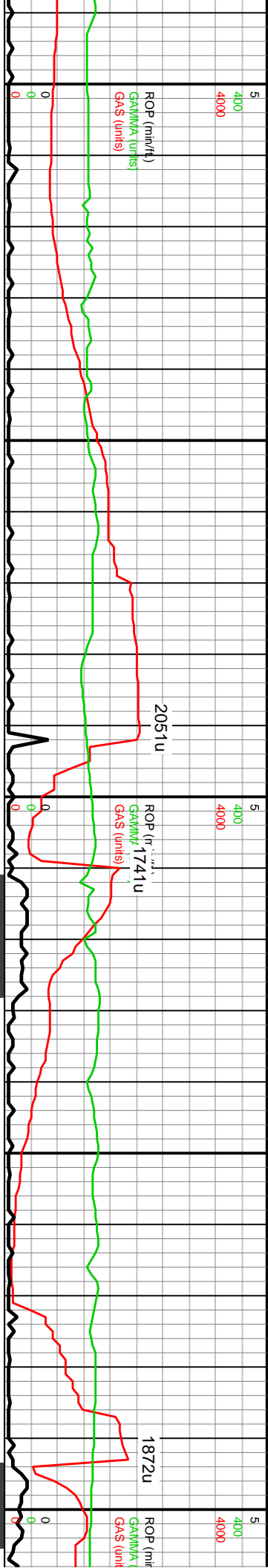
MD: 8,898'
TVD: 7,190.84'
Inclination: 89.83°
Azimuth: 273.79°
VS: 1,382.67'

- lt brn, ip med gy- amb trnsl, grs, sb blkly clus, frm- fri - f grd, sb md- ang grs, occ grn sup clus, ip unconcs qtz od calc, sme lse sil- calc	8780-8840 SD: pred gy- lt brn, ip med gy- amb trnsl, sme dk gy, pred sl trnsl grs, sb blkly clus, frm- fri clus, ip sft clus, pred v f- f grd, sb md- ang grs, occ ang u f- l med grs, pred grn sup clus, ip unconcs qtz grs, arg- sil cmt, sme mod calc, sme lse sil- calc cmt, abnt lith frags, sme pyr	8840-8900 SD: pred gy- lt brn, ip med gy- amb trnsl, sme dk gy, pred sl trnsl grs, sb blkly clus, frm- fri clus, ip sft clus, pred v f- f grd, sb md- ang grs, occ ang u f- l med grs, pred grn sup clus, ip unconcs qtz grs, arg- sil cmt, sme mod calc, sme lse sil- calc cmt, abnt lith frags, sme pyr	8900-8960 SD: pred gy- lt brn, ip med gy- amb trnsl, sme dk gy, pred sl trnsl grs, sb blkly clus, frm- fri clus, ip sft clus, pred v f- f grd, sb md- ang grs, occ ang u f- l med grs, pred grn sup clus, ip unconcs qtz grs, arg- sil cmt, sme mod calc, sme lse sil- calc cmt, abnt lith frags, sme pyr	8960-8980 SD: pred gy- lt brn, ip med gy- amb trnsl, sme dk gy, pred sl trnsl grs, sb blkly clus, frm- fri clus, ip sft clus, pred v f- f grd, sb md- ang grs, occ ang u f- l med grs, pred grn sup clus, ip unconcs qtz grs, arg- sil cmt, sme mod calc, sme lse sil- calc cmt, abnt lith frags, sme pyr
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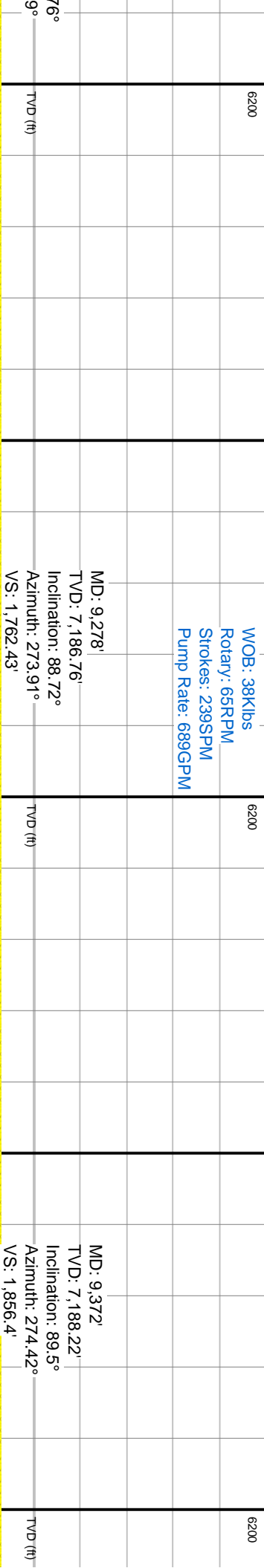




MD: 8,993' TVD: 7,191.68' Inclination: 89.16° Azimuth: 273.2° TVD (ft) VS: 1,477.66'	MD: 9,088' TVD: 7,191.31' Inclination: 91.28° Azimuth: 274.43° VS: 1,572.65'	MD: 9,182' TVD: 7,188' Inclination: 92.1° Azimuth: 275.8° VS: 1,666.52'
0-9020 SD: pred gy- lt brn, ip med gy- amb l, sme dk gy, pred sl trnsi grs, sb blkyl clus, frm- clus, ip sft clus, pred v f- f grd, sb rnd- ang grs, ang u f- l med grs, pred grn sup clus, ip ons qtz grs, arg- sil cnt, sme mod calc, sme sil- calc cnt, abnt lith frags, sme pyr	9020-9080 SD: pred gy- lt brn, ip med gy- amb trnsi, sme dk gy, pred sl trnsi grs, sb blkyl clus, frm- fri clus, ip sft- hd clus, pred v f- f grd, sb rnd- ang grs, occ ang u f- l med grs, pred grn sup clus, ip uncons qtz grs, arg- sil cnt, sme mod calc, sme lse sil- calc cnt, abnt lith frags, sme pyr	9080-9140 SD: pred gy- lt brn, ip med gy- amb trnsi, sme dk gy, pred sl trnsi grs, sb blkyl clus, frm- fri clus, ip sft- hd clus, pred v f- f grd, sb rnd- ang grs, occ ang u f- l med grs, pred grn sup clus, ip uncons qtz grs, arg- sil cnt, sme mod calc, sme lse sil- calc cnt, abnt lith frags, sme pyr



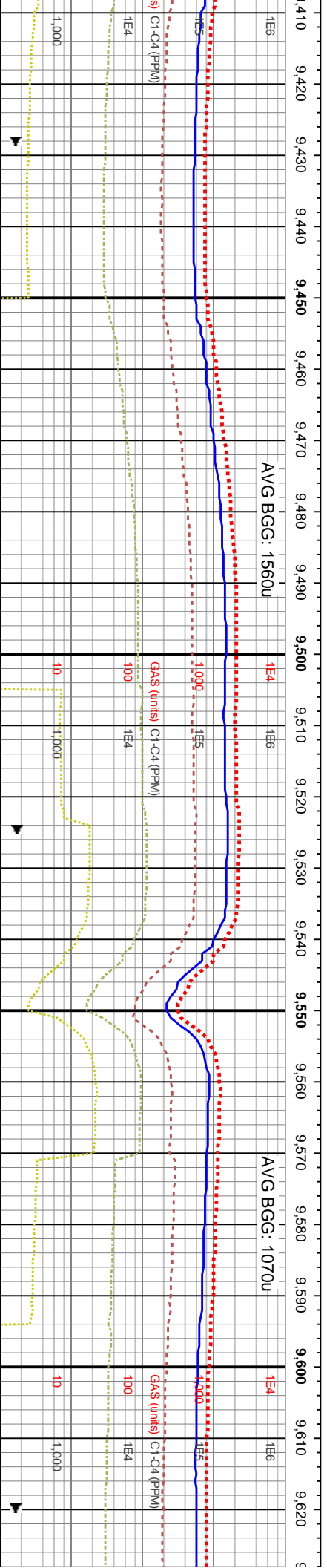
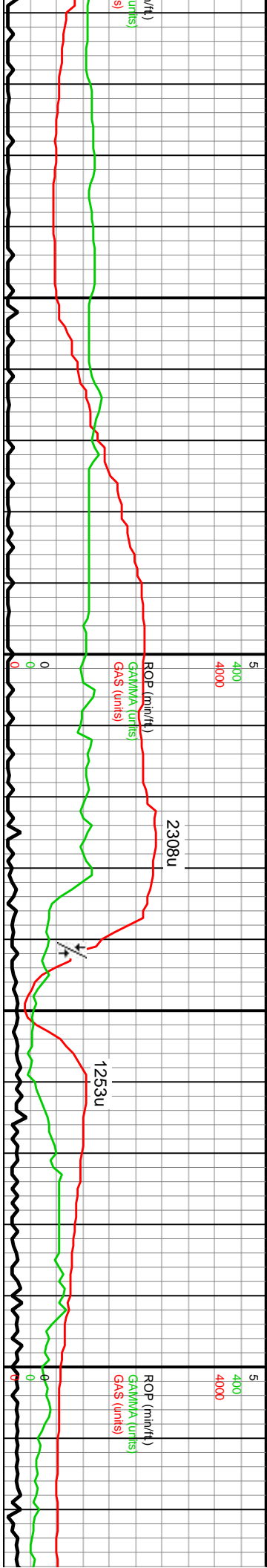
WOB: 38Klbs
Rotary: 65RPM
Strokes: 239SPM
Pump Rate: 689GPM



MD: 9,278'
TVD: 7,186.76'
Inclination: 88.72°
Azimuth: 273.91°
VS: 1,762.43'

MD: 9,372'
TVD: 7,188.22'
Inclination: 89.5°
Azimuth: 274.42°
VS: 1,856.4'

amb trnsI, frn-fri ang grs, o uncons	9200-9260 SD: pred gy- lt brn, ip med gy- amb trnsI, sme dk gy, pred sl trnsI grs, sb blkly clus, frm-fri clus, ip sft- hd clus, pred v f- f grd, sb md- ang grs, occ ang u f- l med grs, pred grn sup clus, ip uncons qtz grs, arg- sil cmt, sme mod calc, sme lse sil- calc cmt, abnt lith frags, sme pyr	9260-9320 SD: pred gy- lt brn, ip med gy- amb trnsI, sme dk gy, pred sl trnsI grs, sb blkly clus, frm-fri clus, ip sft- hd clus, pred v f- f grd, sb md- ang grs, occ ang u f- l med grs, pred grn sup clus, ip uncons qtz grs, arg- sil cmt, sme mod calc, sme lse sil- calc cmt, abnt lith frags, sme pyr	9320-9380 SD: pred gy- lt brn, ip med gy- amb trnsI, sme dk gy, pred sl trnsI grs, sb blkly clus, frm-fri clus, ip sft- hd clus, pred v f- f grd, sb md- ang grs, occ ang u f- l med grs, pred grn sup clus, ip uncons qtz grs, arg- sil cmt, sme mod calc, sme lse sil- calc cmt, abnt lith frags, sme pyr	9380-9440 SD: pred gy- lt brn, ip med gy- amb trnsI, sme dk gy, pred sl trnsI grs, sb blkly clus, frm-fri clus, ip sft- hd clus, pred v f- f grd, sb md- ang grs, occ ang u f- l med grs, pred grn sup clus, ip uncons qtz grs, arg- sil cmt, sme mod calc, sme lse sil- calc cmt, abnt lith frags, sme pyr
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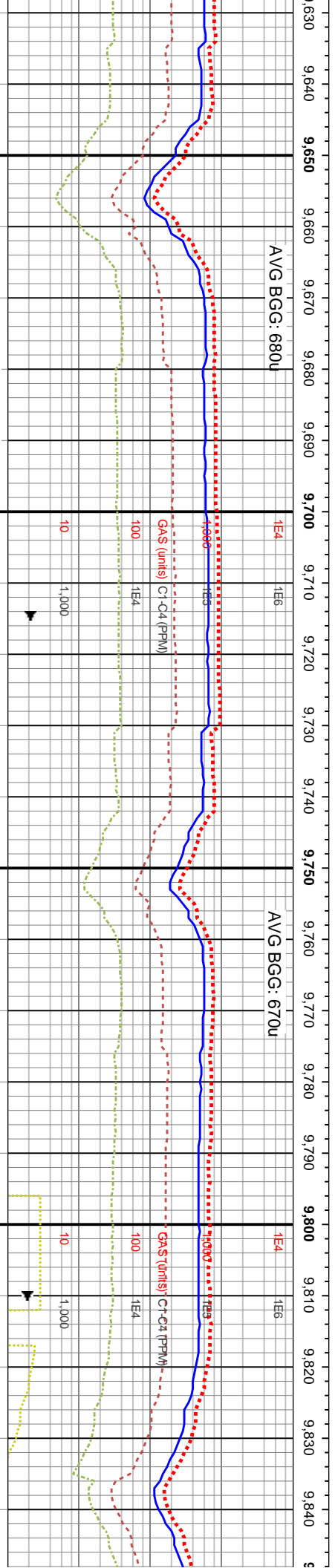
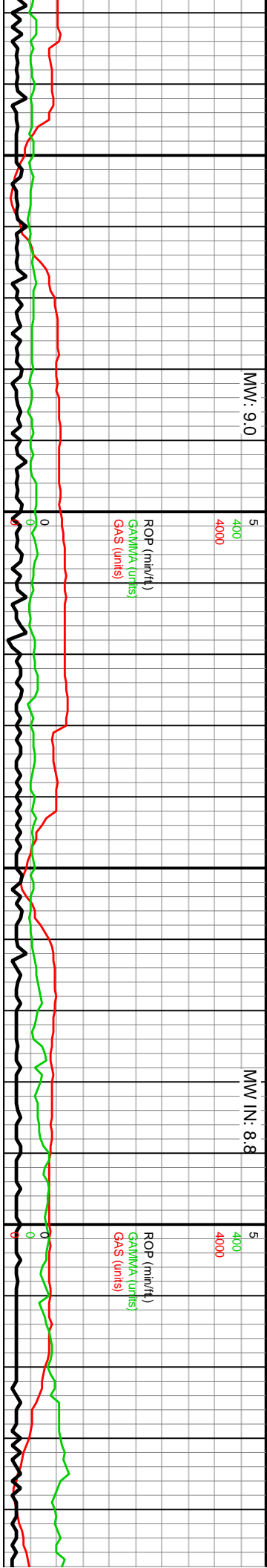
WOB: 43Klbs
Rotary: 65RPM
Strokes: 239SPM
Pump Rate: 687GPM

MD: 9,468'
TVD: 7,188.75'
Inclination: 89.87°
Azimuth: 274.11°
VS: 1,952.38'

MD: 9,564'
TVD: 7,189.25'
Inclination: 89.53°
Azimuth: 273.34°
VS: 2,048.37'

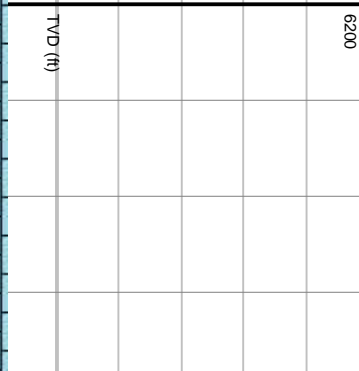
9440-9500 SD: pred gy- lt brn, ip med gy- amb trnsi, sme dk gy, pred sl trnsi grs, sb blkly clus, frm- fri clus, ip sft- hd clus, pred v f- f grd, sb rnd- ang grs, ooc ang u f- l med grs, pred grn sup clus, ip uncongs qtz grs, ang- sil cnt, sme mod calc, sme lse sil- calc cnt, abnt lith frags, sme pyr	9500-9560: LS: lt brn- bf, ip sl tn- gy mot, ip offwht, pred blkly- sb blkly, ip sb plty, frm- hd, ip sl frm, pred mudst wi sme intbd carb grs, sme intbd sh & vf sd grs	9560-9620: LS: lt brn- bf, ip sl tn- gy mot, ip offwht, pred blkly- sb blkly, ip sb plty, frm- hd, ip sl frm, pred mudst wi sme intbd carb grs, sme intbd sh & vf sd grs



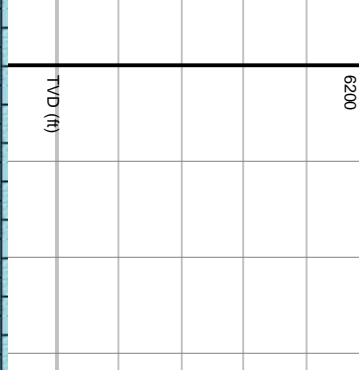


MD: 9,659'
TVD: 7,189.11'
Inclination: 90.64°
Azimuth: 273.21°
VS: 2,143.37'

WOB: 40Klbs
Rotary: 65RPM
Strokes: 239SPM
Pump Rate: 688GPM



MD: 9,755'
TVD: 7,187.76'
Inclination: 90.97°
Azimuth: 272.88°
VS: 2,239.36'

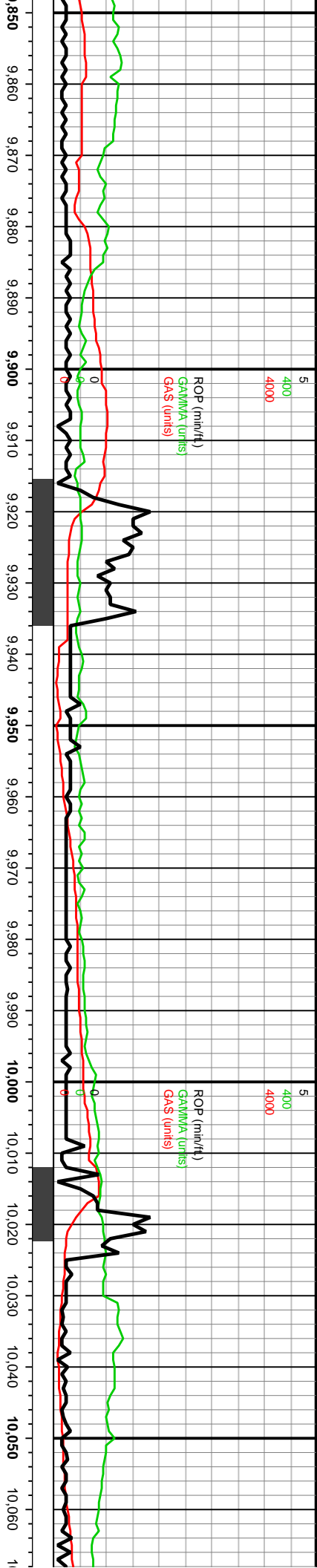


MD: 9,860'
TVD: 7,187.76'
Inclination: 90.97°
Azimuth: 272.88°
VS: 2,239.36'

9680-9740: LS: lt brn- bf, ip sl tn- gy mot, ip offwht, pred blk- sb blk, ip sb ply, frm- hd, ip sl frm, pred mudst wi sme intbd carb grs, sme sh strg

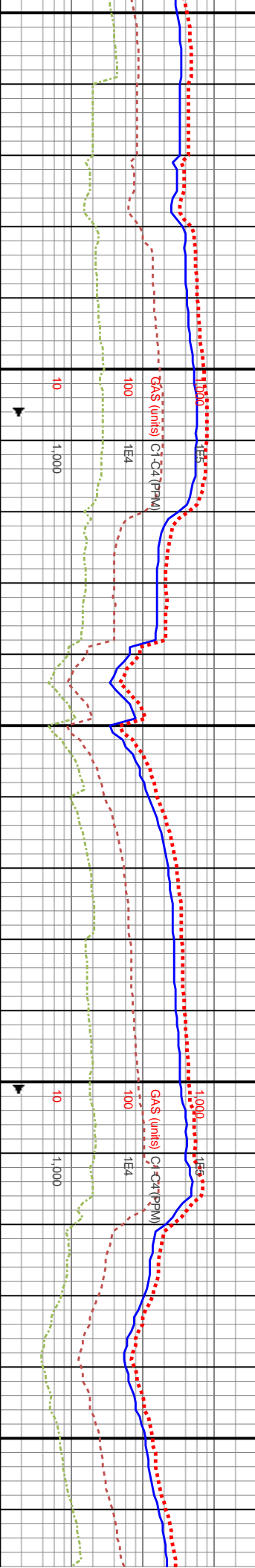
9740-9800: LS: lt brn- bf, ip sl tn- gy mot, ip offwht, pred blk- sb blk, ip sb ply, frm- hd, ip sl frm, pred mudst wi sme intbd carb grs, sme blk sh strg



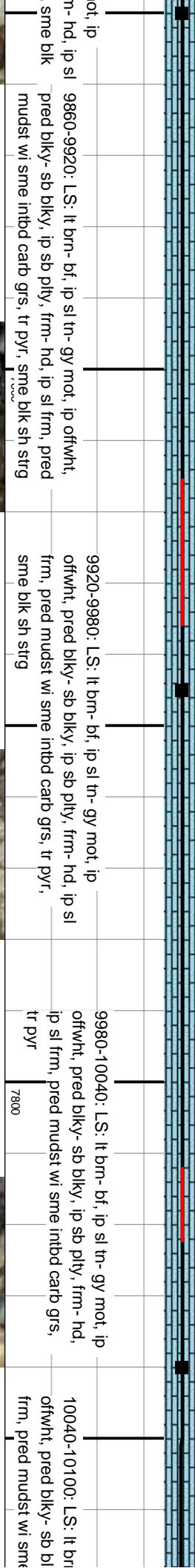
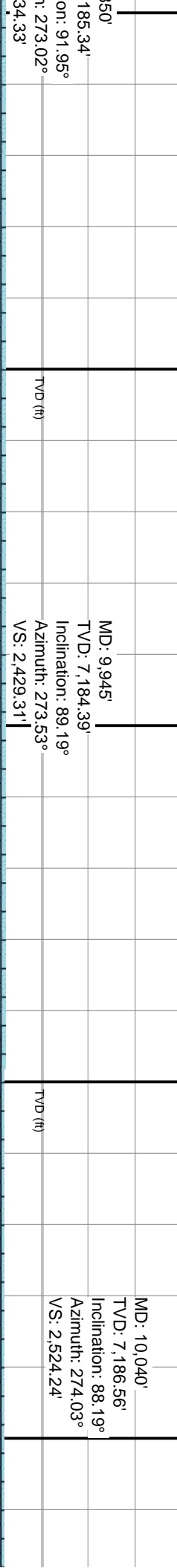


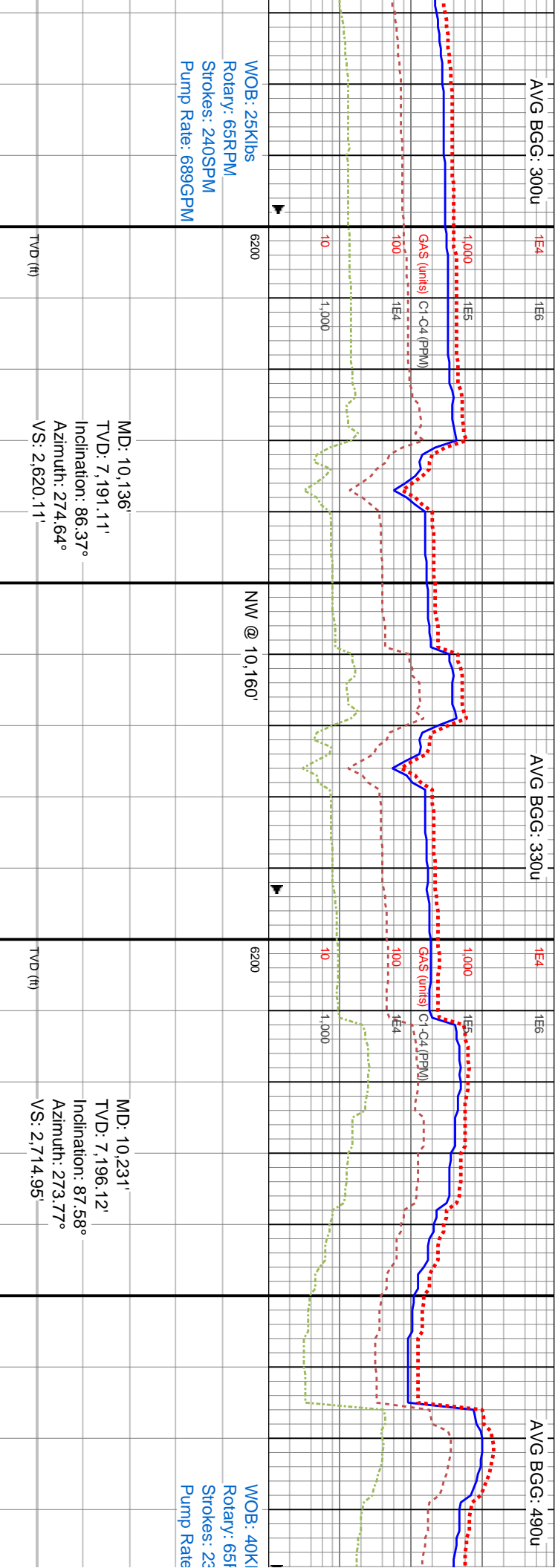
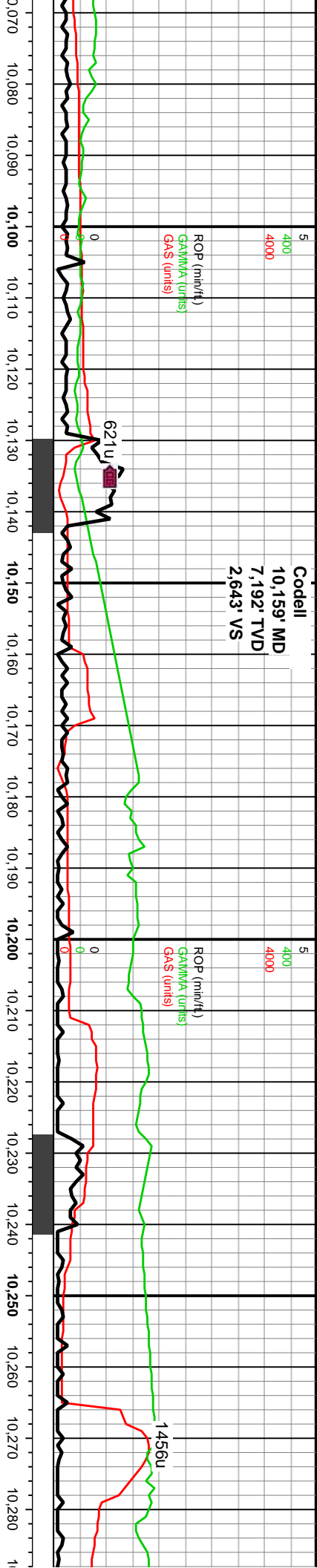
AVG BGG: 440u

AVG BGG: 330u

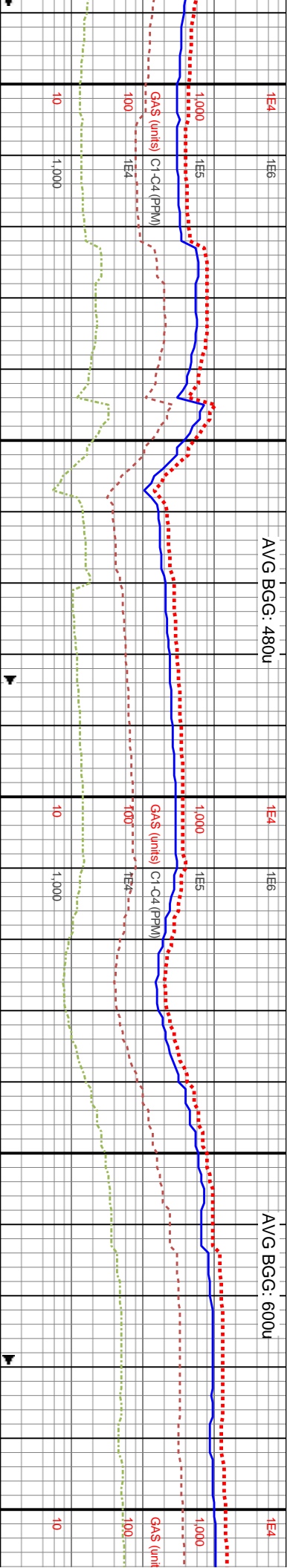
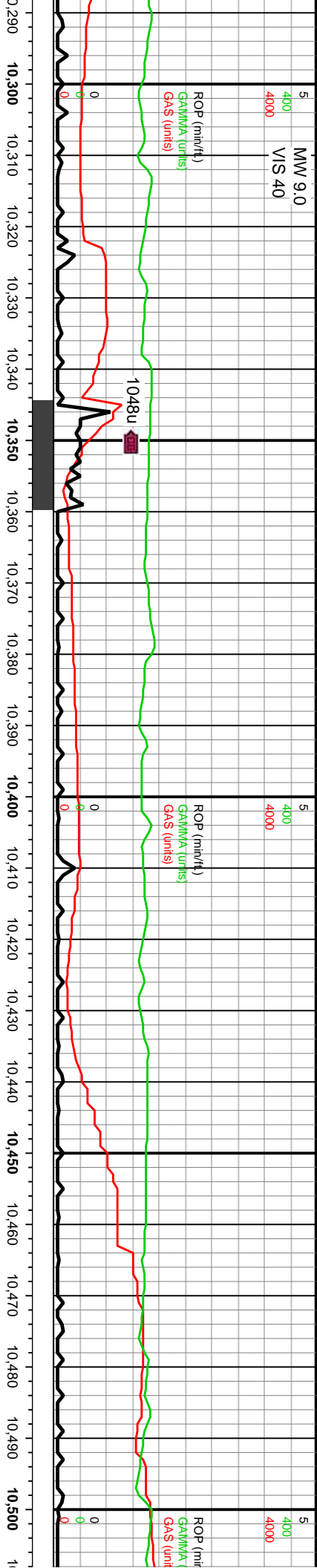


WOB: 41Klbs
Rotary: 65RPM
Strokes: 240SPM
Pump Rate: 688GPM





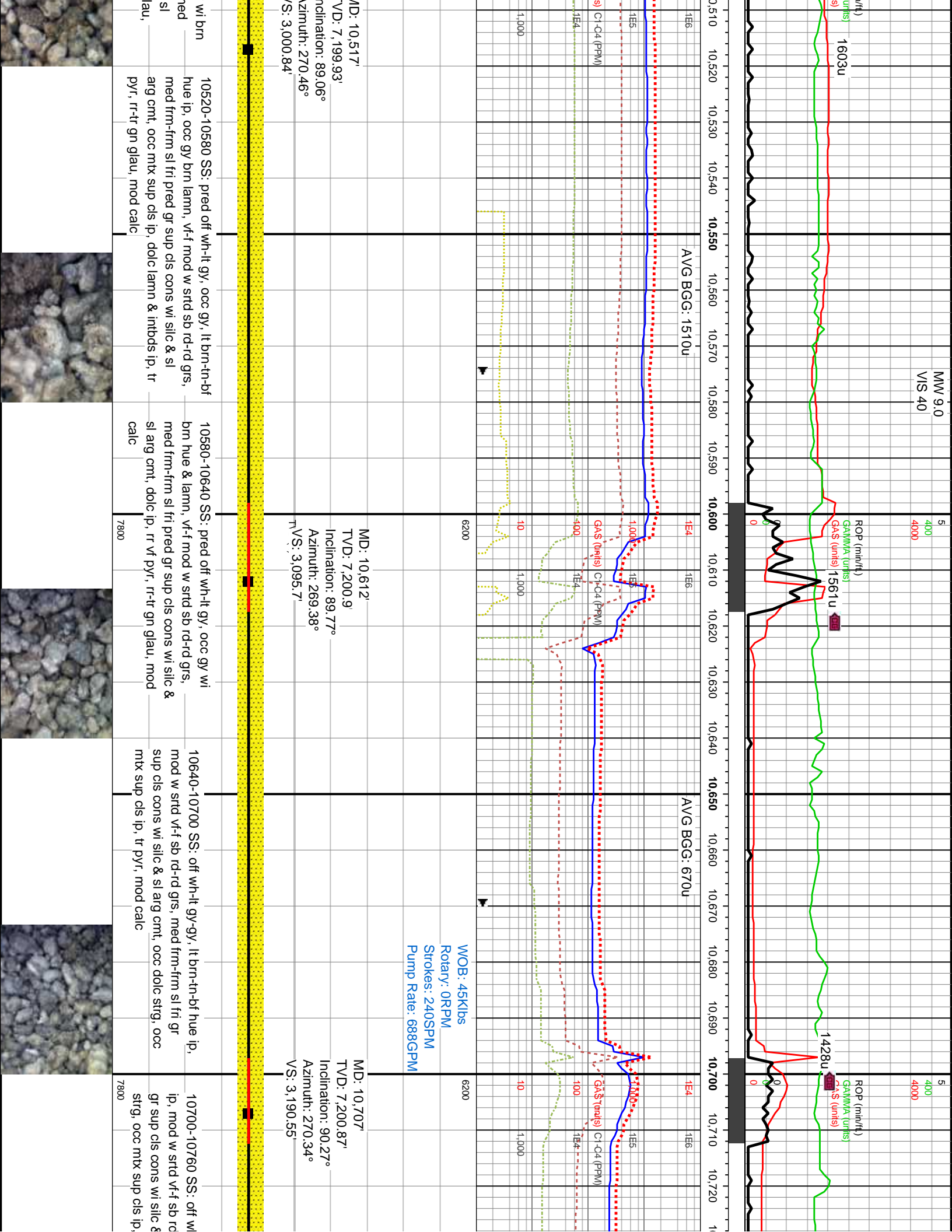
10100-10160: LS: lt brn- bf, ip sl tn- gy mot, ip offtwht, pred blk- sb blk- y, ip sb ply, frm- hd, ip sl frm, pred mustd wi sme intbd carb grs, tr pyr	7800	10160-10220 SS: off wh- lt gy- gy, occ lt gy brn- bf, vf- f mod w srt- d sb rd- rd grs, med frm- frm sl fri pred gr sup cls cons wi silc & sl arg cnt, dolc ip, occ vf- f pyr strg, rr- tr gn glau, mod calc	7800	10220-10280 SS: off wh- lt gy- gy, occ lt gy brn, rr sl brn hue- bf cls, vf- f mod w srt- d sb rd- rd grs, med frm- frm sl fri pred gr sup cls cons wi silc & sl arg cnt, occ mx sup cls ip, dolc larn & intbds ip, occ vf- f pyr strg, rr- tr gn glau, mod calc	10280
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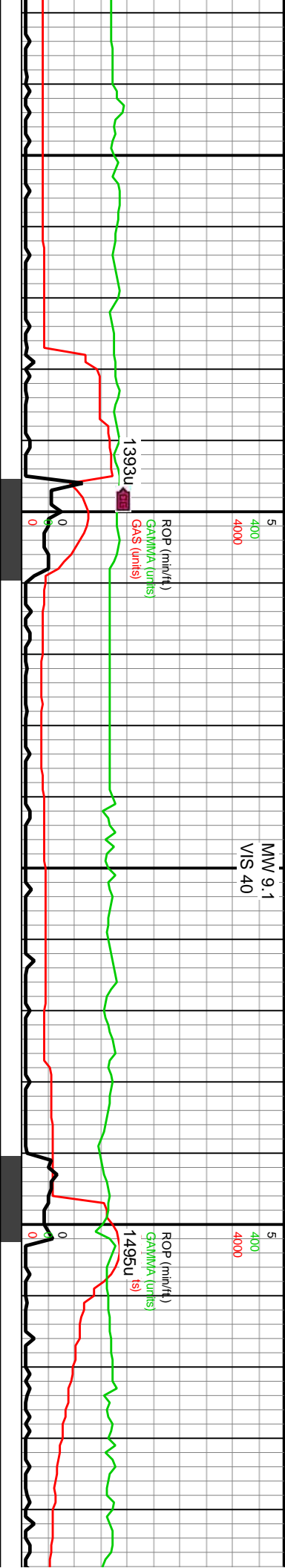


bs	6200	6200	6200
RPM			WOB: 41Klbs
9SPM			Rotary: 65RPM
688GPM			Strokes: 240SPM
			Pump Rate: 688GPM

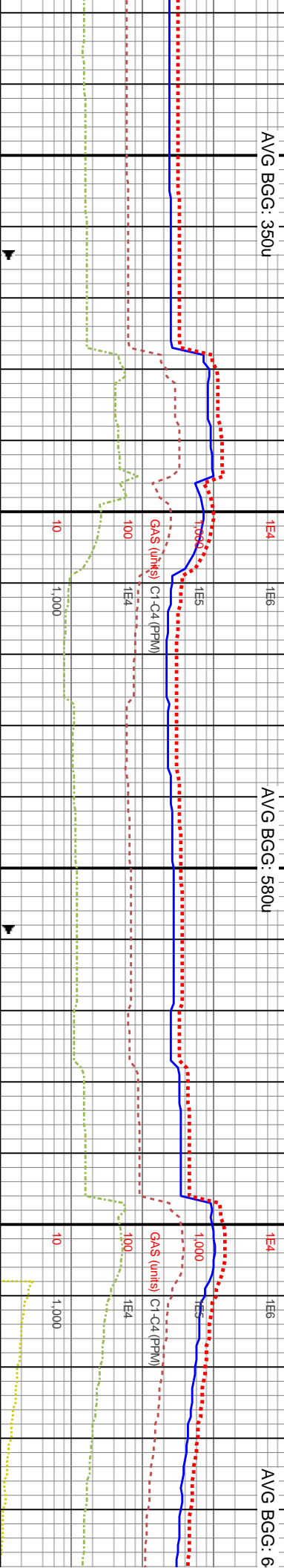
[illegible]

10340 SS: off wh-It gy-gy, occ It gy brn-bf, vf-f srtbd sb rd-rd grs, med frm-frm sl fri pred gr s cons wi silc & sl arg cmt, dolc ip, occ vf-f pyr -tr gn glau, mod calc	7800	10340-10400 SS: off wh-It gy-gy, occ It gy brn, rr sl brn hue-bf cis, vf-f mod w srtbd sb rd-rd grs, med frm-frm sl fri pred gr sup cis cons wi silc & sl arg cmt, occ mtx sup cis ip, dolc lamm & intbds ip, occ vf-f pyr strg, rr-tr gn glau, mod calc	7800	10400-10460 SS: pred off wh-It gy, occ gy, It brn-tr-bf hue ip, occ gy brn lamm, vf-f mod w srtbd sb rd-rd grs, med frm-frm sl fri pred gr sup cis cons wi silc & sl arg cmt, occ mtx sup cis ip, dolc lamm & intbds ip, occ vf-f pyr strg, rr-tr gn glau, mod calc	7800	10460-10520 SS: pred off wh-It gy, occ gy hue & lamm, vf-f mod w srtbd sb rd-rd grs, n frm-frm sl fri pred gr sup cis cons wi silc & arg cmt, dolc ip, occ vf-f pyr strg, rr-tr gn g mod calc	7800
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10,730 10,740 10,750 10,760 10,770 10,780 10,790 10,800 10,810 10,820 10,830 10,840 10,850 10,860 10,870 10,880 10,890 10,900 10,910 10,920 10,930 10,940



10,750 10,760 10,770 10,780 10,790 10,800 10,810 10,820 10,830 10,840 10,850 10,860 10,870 10,880 10,890 10,900 10,910 10,920 10,930 10,940

MD: 10,802'
TVD: 7,200.6'
Inclination: 90.07°
Azimuth: 271.12°
VS: 3,285.47 ft

WOB: 28Klbs
Rotary: 66RPM
Strokes: 240SPM
Pump Rate: 689GPM

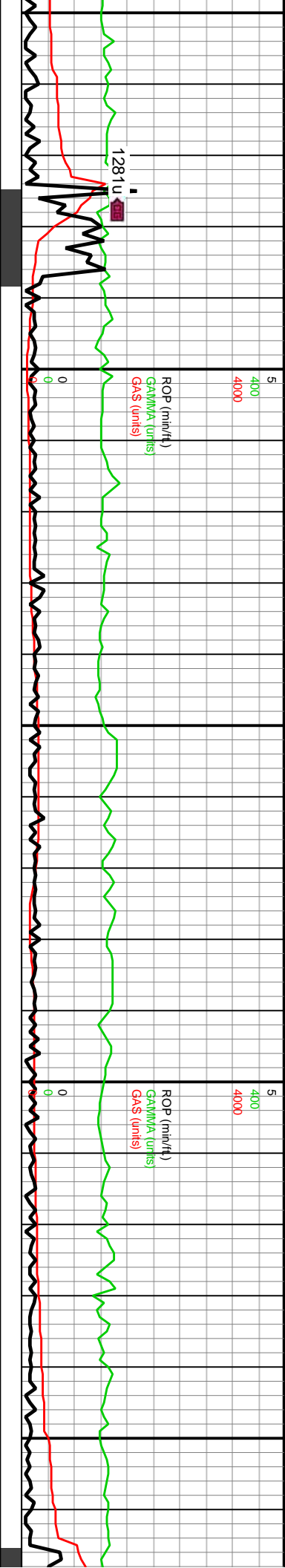
MD: 10,897'
TVD: 7,199.18'
Inclination: 91.64°
Azimuth: 271.94°
VS: 3,380.42 vd (ft)

10760-10820 SS: off wh-it gy-gy, occ lt brn-brn lamn & hue ip, mod w srtd vf-f sb rd-rd grs, med frm-frm sl fri gr sup cls cons wi silc & sl arg cnt, occ dolc strg, occ mtix sup cls ip, tr pyr, mod calc

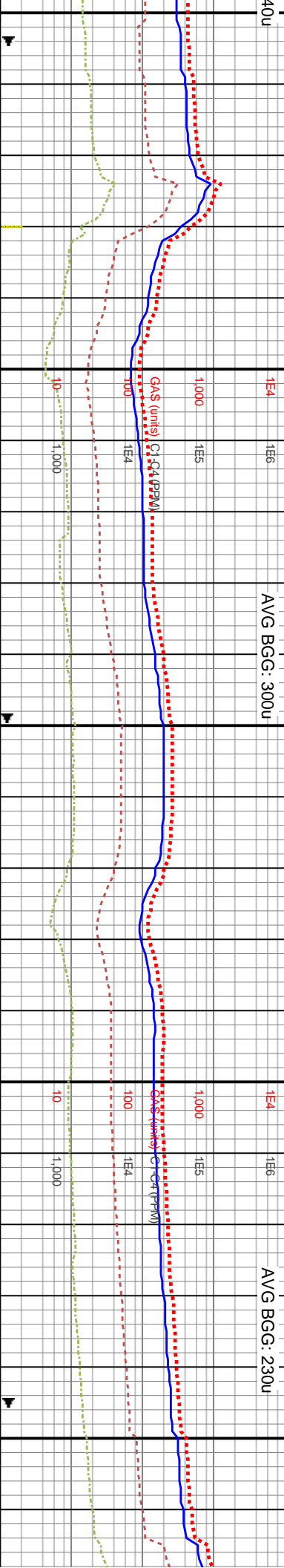
10820-10880 SS: off wh-it gy-gy, occ lt brn-brn lamn & hue ip, mod w srtd vf-f sb rd-rd grs, med frm-frm sl fri gr sup cls cons wi silc & sl arg cnt, occ dolc strg, occ mtix sup cls ip, tr pyr, mod calc

10880-10940 SS: off wh-it gy-gy, occ brn grdg to dk gy slst ip, mod w srtd vf-f sb rd-rd grs, med frm-frm sl fri gr sup cls cons wi silc & sl arg cnt, occ dolc strg, occ mtix sup cls ip, tr pyr, mod calc



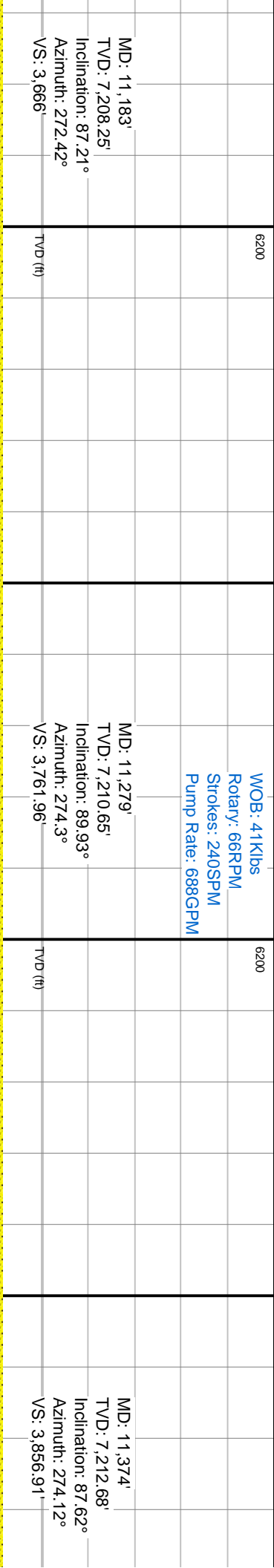
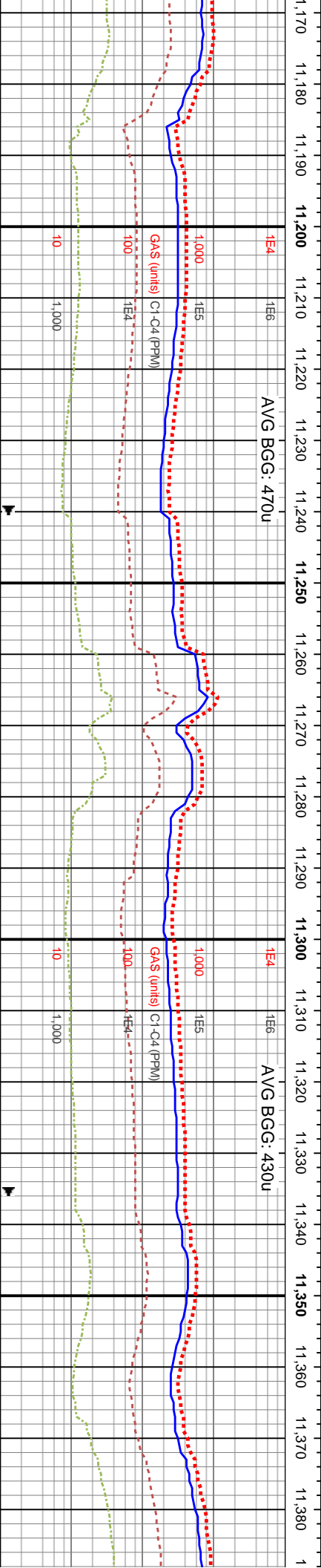
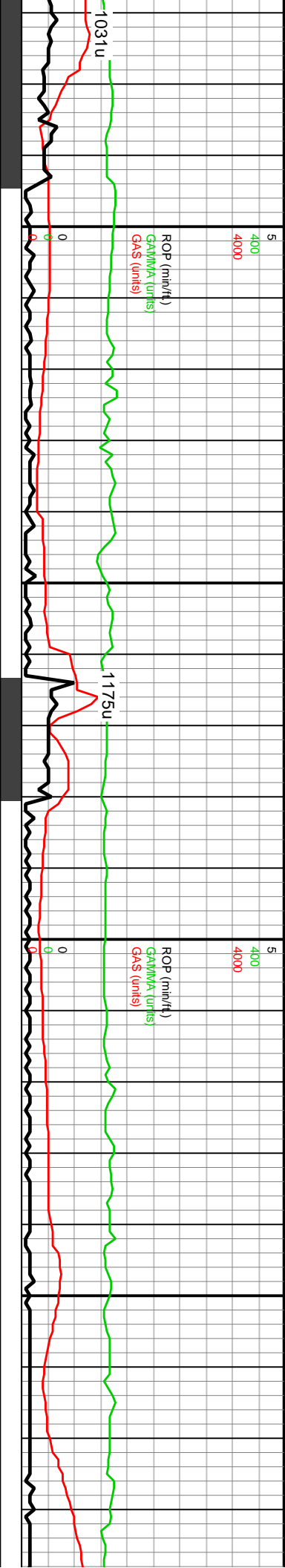


10,950 10,960 10,970 10,980 10,990 11,000 11,010 11,020 11,030 11,040 11,050 11,060 11,070 11,080 11,090 11,100 11,110 11,120 11,130 11,140 11,150 11,160 1

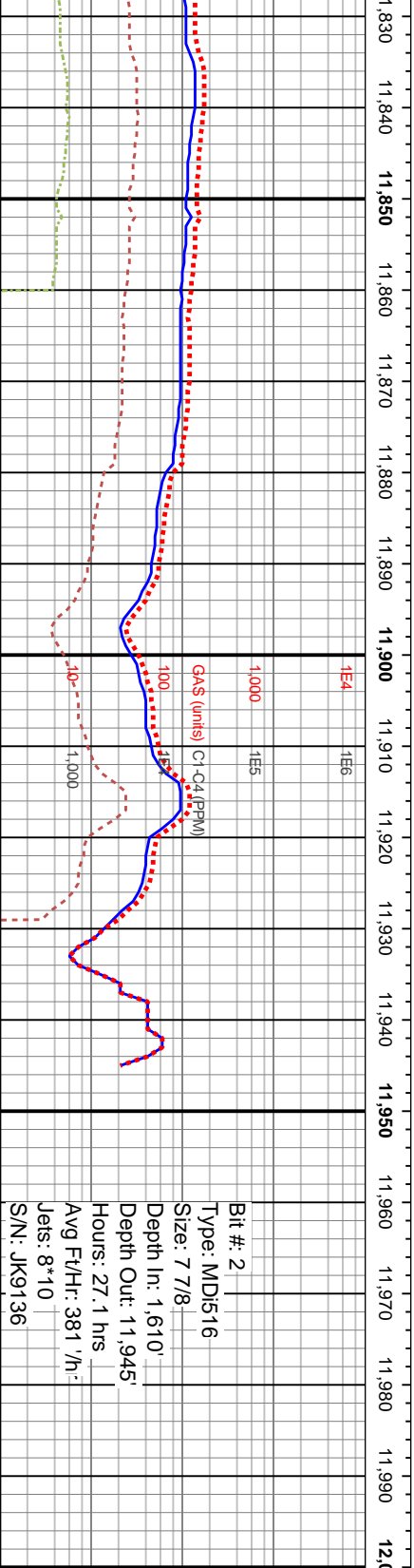
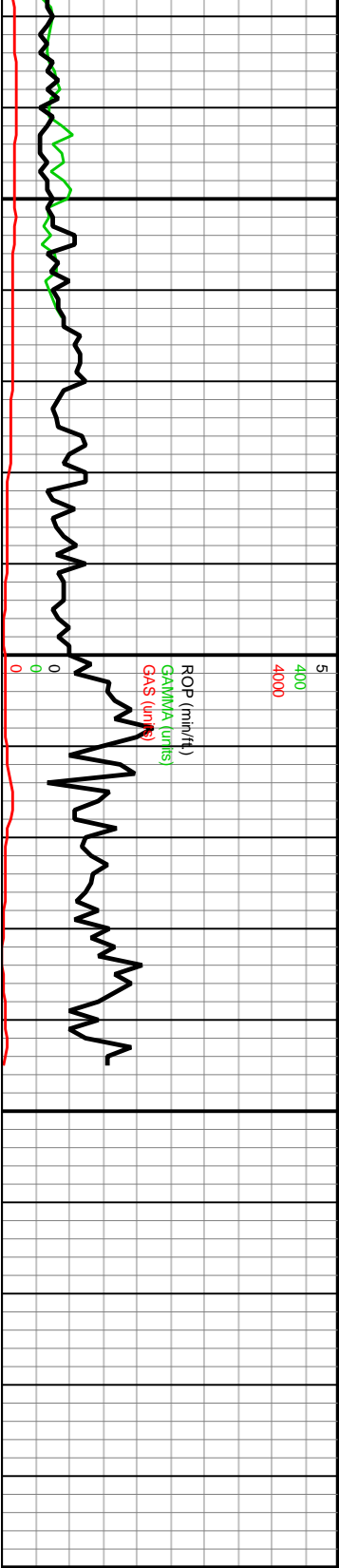


MD: 10,992' TVD: 7,198.99' Inclination: 88.59° Azimuth: 270.79° VS: 3,475.37'		MD: 11,088' TVD: 7,203.07' Inclination: 86.53° Azimuth: 270.29° VS: 3,571.19'	
TVD (ft)		TVD (ft)	
6200		6200	

10950-11000 SS: off wh-lt gy-gy, occ lt brn-brn & hue ip, mod w strd vf-f sb rd-rd grs, med m sl fri gr sup cls cons wi silc & sl arg cnt, mtx sup cls ip, tr pyr, mod calc	11000-11060 SS: off wh-lt gy-gy, occ brn grgd to dk gy silst ip, mod w strd vf-f sb rd-rd grs, med frm-frm sl fri gr sup cls cons wi silc & sl arg cnt, occ dolc strg, occ mtx sup cls ip, tr pyr, mod calc	11060-11120 SS: off wh-lt gy-gy, occ brn grgd to dk gy silst ip, mod w strd vf-f sb rd-rd grs, med frm-frm sl fri gr sup cls cons wi silc & sl arg cnt, occ dolc strg, occ mtx sup cls ip, tr pyr, ~10% dk gy silst strg, mod calc	11120-11180 SS: off wh-v lt gy-lt gy-gy, occ ip, mod w strd vf-f sb rd-rd grs, med frm-frm gr sup cls cons wi silc & arg cnt ip, occ dc occ mtx sup cls ip, tr pyr, mod calc
7800	7800	7800	



MD: 11,183' TVD: 7,208.25' Inclination: 87.21° Azimuth: 272.42° VS: 3,666'		MD: 11,279' TVD: 7,210.65' Inclination: 89.93° Azimuth: 274.3° VS: 3,761.96'		MD: 11,374' TVD: 7,212.68' Inclination: 87.62° Azimuth: 274.12° VS: 3,856.91'	
11180-11240 SS: off wh-v lt gy-lt gy-gy, occ brn hue ip, mod w strd vf-f sb rd-rd grs, med frm-frm sl fri rd gr sup clgs cons wi silc & arg cnt ip, occ mtx sup cls, occ dolc lamm, tr pyr, mod calc		11240-11300 SS: off wh-v lt gy-lt gy-gy, occ brn hue ip, mod w strd vf-f sb rd-rd grs, med frm-frm sl fri rd gr sup clgs cons wi silc & arg cnt ip, occ dolc strg, occ mtx sup cls ip, tr pyr, mod calc		11300-11360 SS: off wh-lt gy, occ gy, occ brn hue ip, mod w strd vf-f sb rd-rd grs, med frm-frm sl fri rd gr sup clus cons wi silc & arg cnt ip, occ mtx sup cls, dolc thru, rr slst incl & strg, tr pyr, mod calc	
11360-11420 SS: off wh-lamm ip, mod w strd, vf-f fri gr sup clus cons wi silc cls ip, dolc & calc strg ip, mod calc					



Bit #: 2
Type: MDJ516
Size: 7 7/8
Depth In: 1,610'
Depth Out: 11,945'
Hours: 27.1 hrs
Avg Ft/Hr: 381 ' / hr
Jets: 8*10
S/N: JK9136

WOB: 48Klbs
Rotary: 56RPM
Strokes: 240SPM
Pump Rate: 689GPM

DP @ 11,900'

MD: 11,849'
TVD: 7,217.64'
Inclination: 92.95°
Azimuth: 271.89°
VS: 4,331.67'

Projected
MD: 11,945'
TVD: 7,217.7'
Inclination: 92.95°
Azimuth: 271.89°
VS: 4,427.53'

TD Reached 12-16-15

TVD (ft)

11840-11900 LS: offwby-lt gy, tn- bf mot, sme gy, crpxln-micxln, pred mudst, rr pkst- wkst, sme carb grs, pred wxy lstr ip, rr vf-f pyr, sme blk sh	11900-11945 LS: offwby-lt gy, tn- bf mot, sme gy, crpxln-micxln, pred mudst, rr pkst- wkst, sme carb grs, pred wxy lstr ip, rr vf-f pyr, sme blk sh
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