Scale: 5" / 100'
Measured Depth Log

Well Name	WAAG 23_hz
Location	Sec. 19 T7N-R65W
State	Colorado
County	Weld
Country	USA
Rig Number	Patterson UTI 346
API Number	051234034900
Field	Wattenberg
Region	DJ Basin
Drilling Completed	7/19/2015
Spud Date	7/13/2015
Surface Coordinates	SHL: 2343' FWL, 285' FSL Sec. 19 T7N-R65W Latitude: 40.55485° Longitude: 104.7079°
Bottom Hole Coordinates	Proposed BHL: 2225' FEL, 495' FSL Sec. 24 T7N-R66W Latitude: 40.55498° Longitude: 104.7239°
Ground Elevation	4,868'
K.B. Elevation	4,892.5'
Logged Interval	5,000' **To** 11,939'
Total Depth	11,939'
Formation	Niobrara B
Type of Drilling Fluid	Water Based

Operator

Company Extraction Oil & Gas

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

Geologist

Name Jared Rouse

Company Extraction Oil & Gas

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

Other

Equipment ML-339

Comments Start: 7-13-15
Standby: TBD
TD: TBD

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

Oil	Condensate	Gas
Note	Core	Pressure
Error	Water	Seal

Rock Types

UNKNOWN	DOLOMITE	SHALE GRAY	TILL
ANHYDRITE	CHERT	SHALE COLORED	BENTONITE
GYPSUM	COAL	SILTSTONE	TUFF
SALT	MARLSTONE	SANDSTONE	IGNEOUS
SIDERITE or LIMONITE	CLAYSTONE	CONGLOMERATE	METAMORPHIC
LIMESTONE	SHALE	BRECCIA	CEMENT

Accessories

Fossils

- ALGAE
- AMPHIPORA
- BELEMNITE
- BIOCLASTIC
- BRACHOIPOD
- BRYOZOA
- CEPHALOPOD
- CORAL
- CRINOID
- ECHINOID
- FISH
- FORAMINIFERA
- FOSSIL
- GASTROPOD
- OOLITE
- OSTRACOD
- PELECYPOD
- PELLET
- PISOLITE
- PLANT REMAINS
- PLANT SPORES
- SCAPHOPOD
- STROMATOPOROID

Minerals

- ANHYDRITIC
- ARGILLACEOUS
- ARGILLITE GRAIN
- BENTONITE
- BITUMENOUS SUBSTANCE
- BRECCIA FRAGMENTS
- CALCAREOUS
- CARBONACEOUS FLAKES
- CHTDK
- CHTLT
- 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

Stringer

- 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 Sy

Oil Show

- ORGANIC
- PINPOINT
- DEAD
- VUGGY
- EVEN
- QUESTIONABLE
- SPOTTED STAINING

Engineering

- BIT
- CASING

Porosity

- CONNECTION (LEFT)
- CONNECTION (RIGHT)
- CONNECTION GAS
- CORE - LOST
- CORE - RECOVERED
- DST INTERVAL
- FAULT
- EARTHY
- FENESTRAL
- FRACTURE
- INTERCRYSTALLINE
- INTEROOLITIC
- MOLDIC

Watkins

wy N

ymbols

ORMATION TOP

IOW

MN DEPTH

L FAULT

OW

URNED STRATA

SE FAULT

LL CORE (LEFT)

LL CORE (RIGHT)

EY

GAS

NE TESTED - LEFT

NE TESTED - RT

L LITHOGRAPHIC

Rounding

MX MICROXLN

A ANGULAR

MS MUDSTONE

R ROUNDED

PS PACKSTONE

a SUBANG

WS WACKESTONE

r SUBRND

Sorting

M MODERATE

P POOR

W WELL

Textures

BS BOUNDSTONE

C CHALKY

CX CRYPTOXLN

E EARTHY

FX FINELYXLN

GS GRAINSTONE

ROP
ROP
GAMMA
GAS
DPHI

Extraction OG
Weld County, Colorado
Spud Date: 7-13-15
Surface Casing @ 927'
Intermediate Csg @
2-man Logging / Geosteering Began: 7-13-15

Waag 23

5
200
4000
25
ROP (min/ft)
GAMMA (units)
GAS (units)
DPHI (pu)
0
40
0
Linear Scale

MW: 9.0+
VIS: 34

Bit #: 1
Type: VS513HG
Size: 8 3/4
Depth In: 910'
Depth Out: 6,603'
Hours: 12.6 hrs
Avg Ft/Hr: 451 '/hr
Jets: 7*14
S/N: 4008557

480u

MWDEPTH
7/15/15

Calibrate Filaments

Bit #: 2
Type: Varel
Size: 8.75
Depth In: 6,603'
Hours: 2.2 hrs
Jets: 8*11
S/N: JJ5345

Slide/Rotate

Depth Labels

6,460 6,470 6,480 6,490 **6,500** 6,510 6,520 6,530 6,540 **6,550** 6,560 6,570 6,580 6,590 **6,600** 6,610 6,620 6,630

Total Gas & Chromatograph
GAS
C1
C2
C3
C4

100 units = 1% methane

Depths Correspond to Driller's Pipe Tally

1E4
1E6
1,000
1E5
GAS (units)
C1-C4 (PPM)
100
1E4
10
1,000
Logarithmic Scale

AVG BGG: 170u

Well Bore
TVD

6300
TVD (ft)

NW @ 6560'

MD: 6,543'
TVD: 6,519.32'
Inclination: 1.8°
Azimuth: 32.7°
VS: -268.86'

6500-6560 80% SS 20% SLTST: pred gy, ip wh-offwht- tn, pred sb blky, occ sb plty, mod- p srtd, pred f gr sd clus, occ u f gr clus, frm- fri, sl arg- slty thru, sme pyr,lith frag thru, sil- cal cmt, ip sl calc, sme gy slty intbds, v g bri lt bl flor cut, dk yel- org gn resd cut

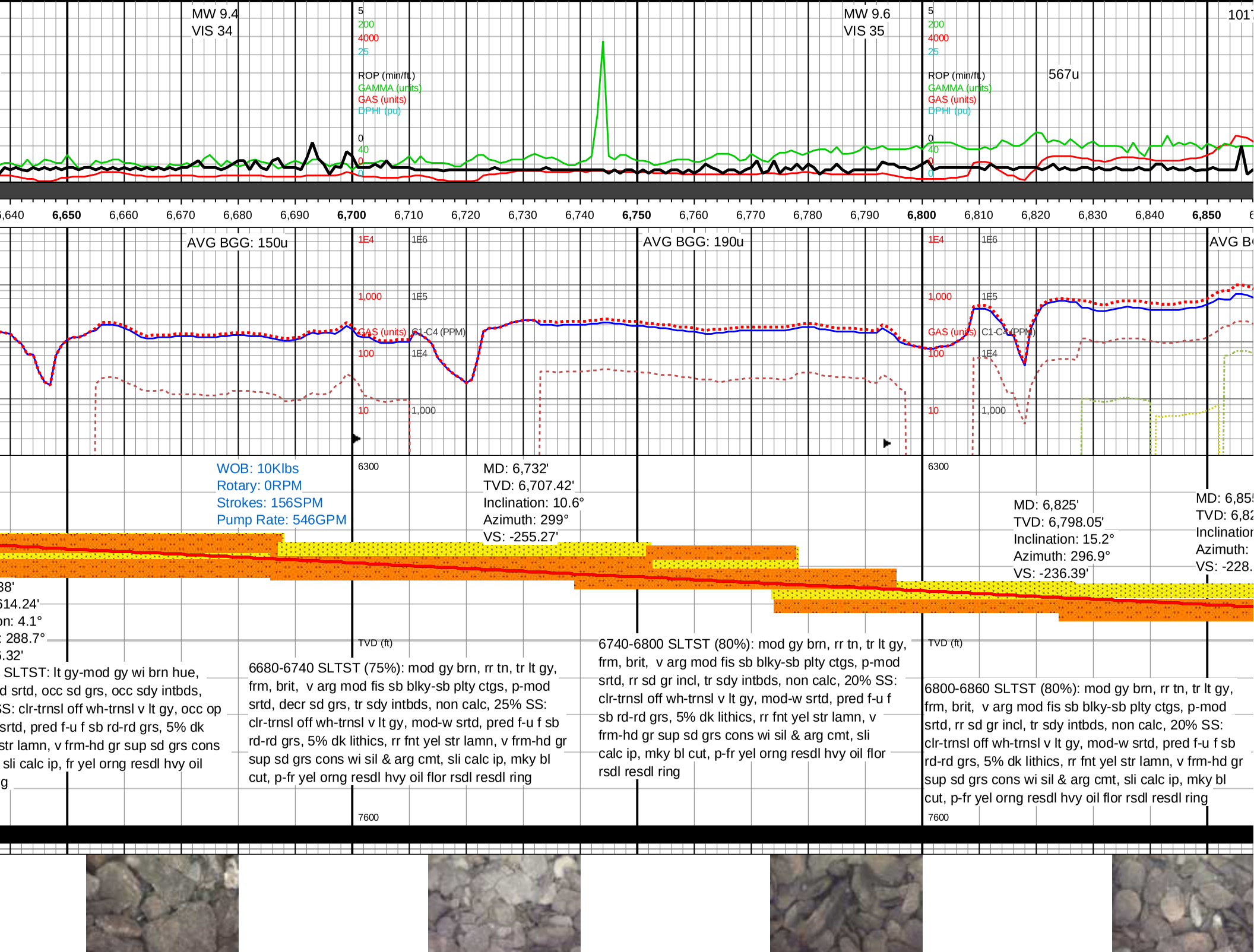
6560-6620 60% SS: clr-trnsl off wh-trnsl v lt gy, occ op wh bdg, mod-w srtd, pred f-u f sb rd-rd grs, 5% dk lithics, rr fnt yel str lamn, v frm-hd gr sup sd grs cons wi sil & arg cmt, sli calc ip, 40% SLTST: lt gy-mod gy wi brn hue, frm, v arg, p-mod srtd, occ sd grs, occ sdy intbds, non calc, fr mky bl cut, fr yel orng resdl hvy oil flor rsdl resdl ring

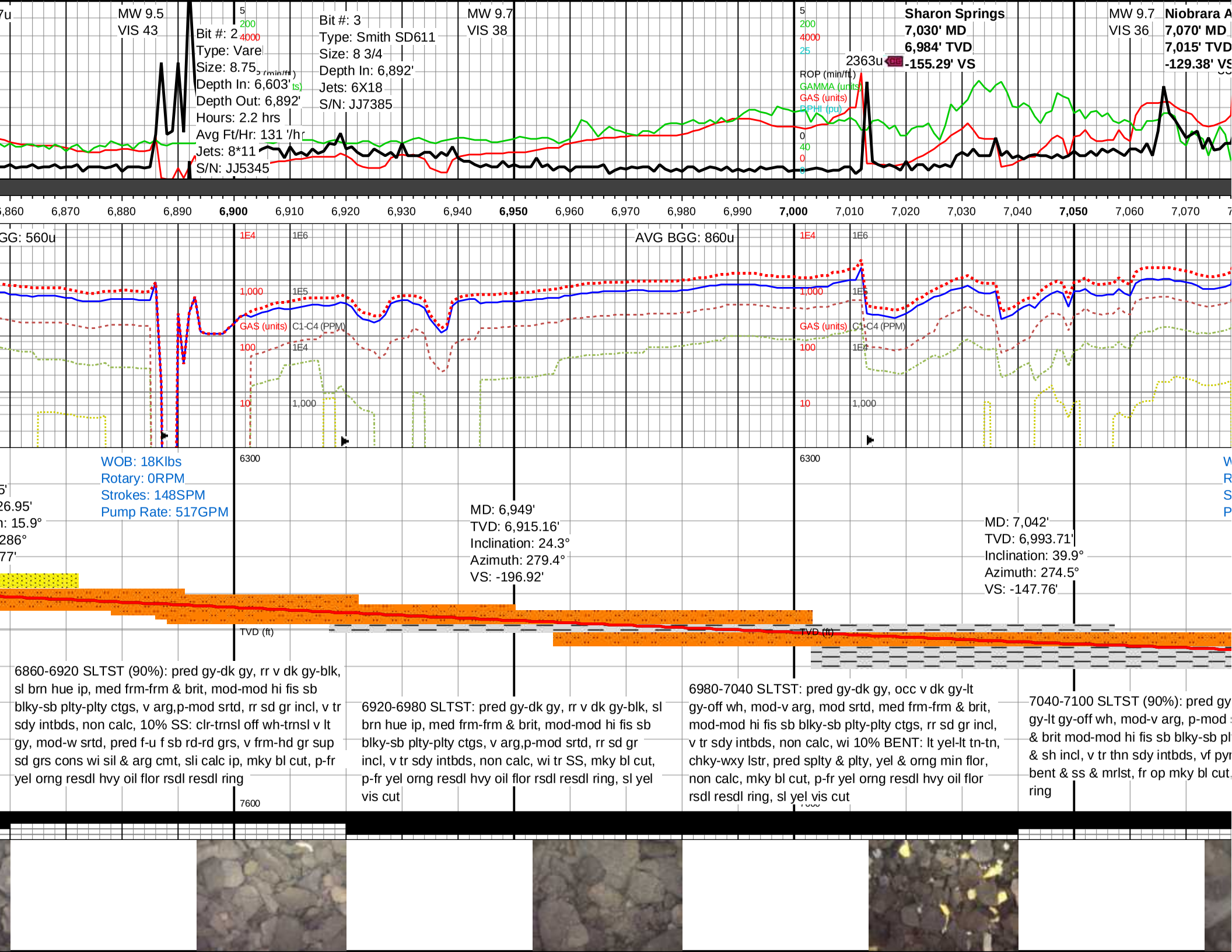
6620-6680 65% frm, v arg, p-mo non calc, 35% S wh bdg, mod-w lithics, rr fnt yel wi sil & arg cmt, flor rsdl resdl rin

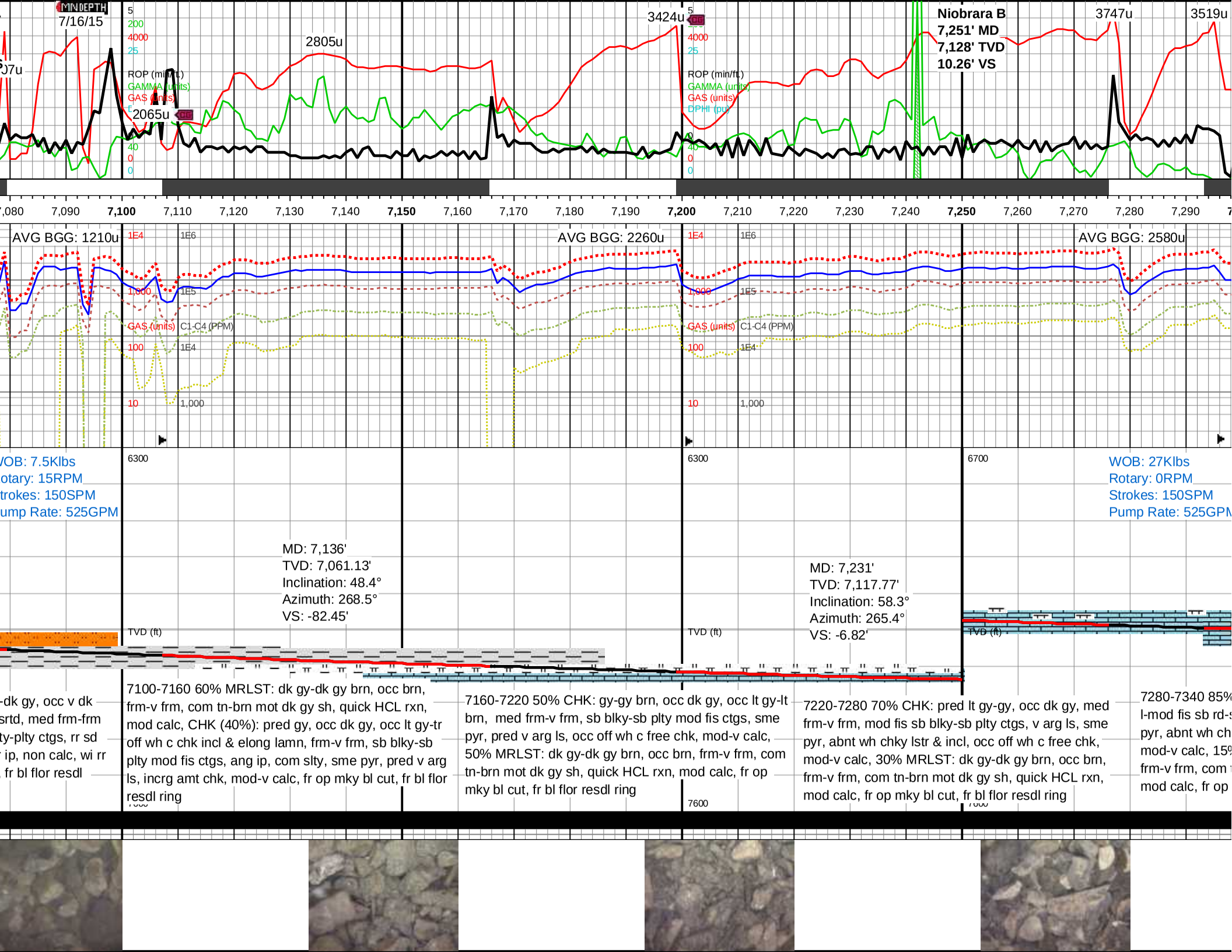
7600

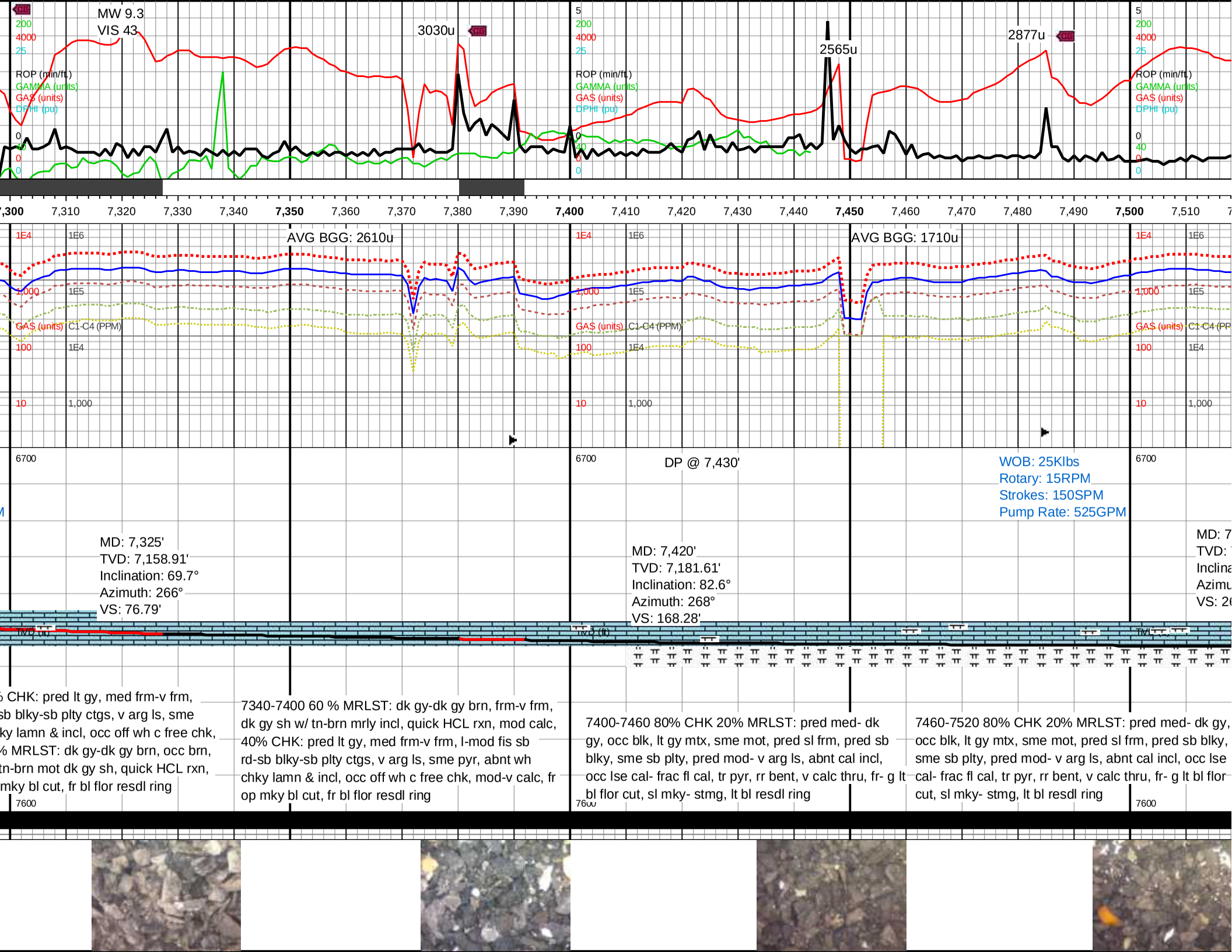
Oil Show

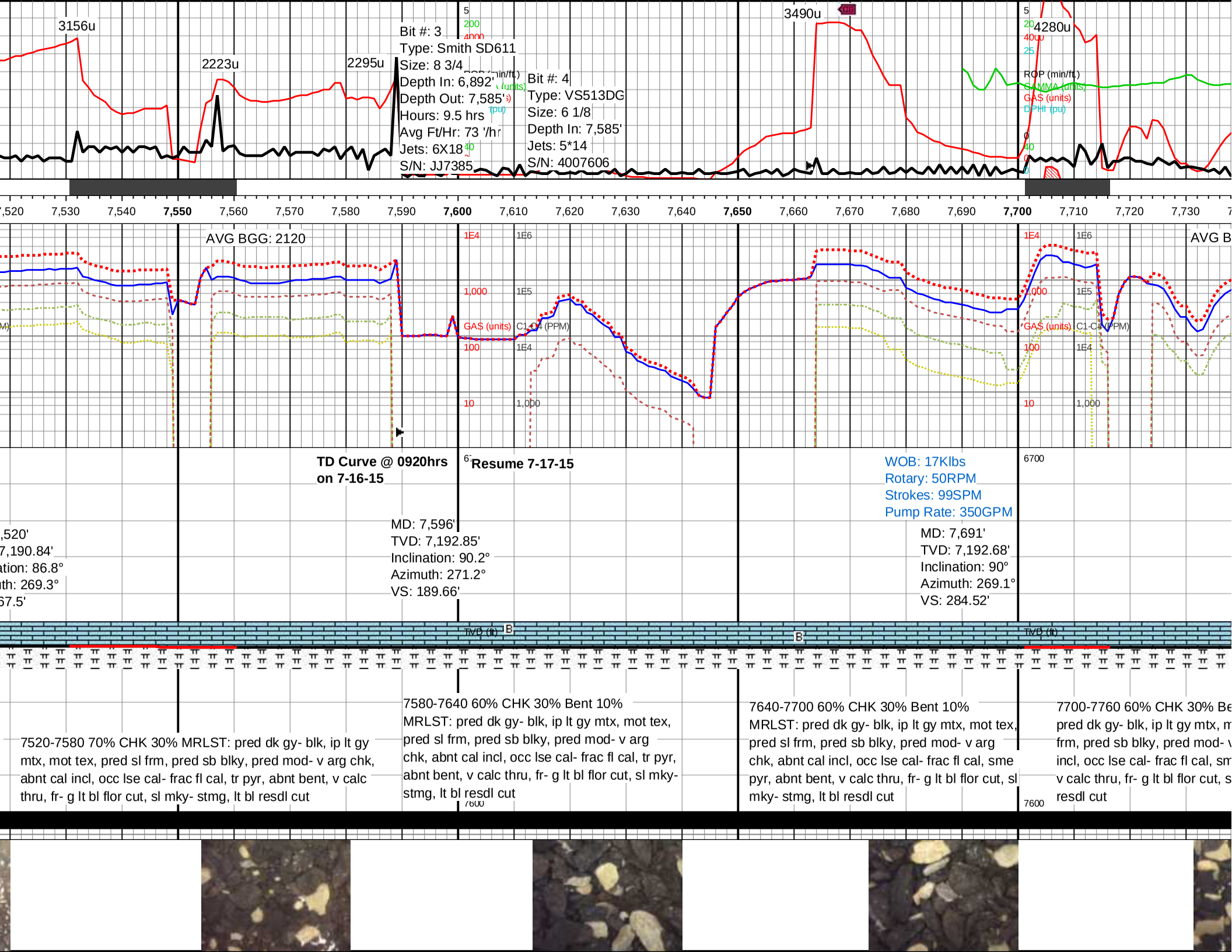
Images

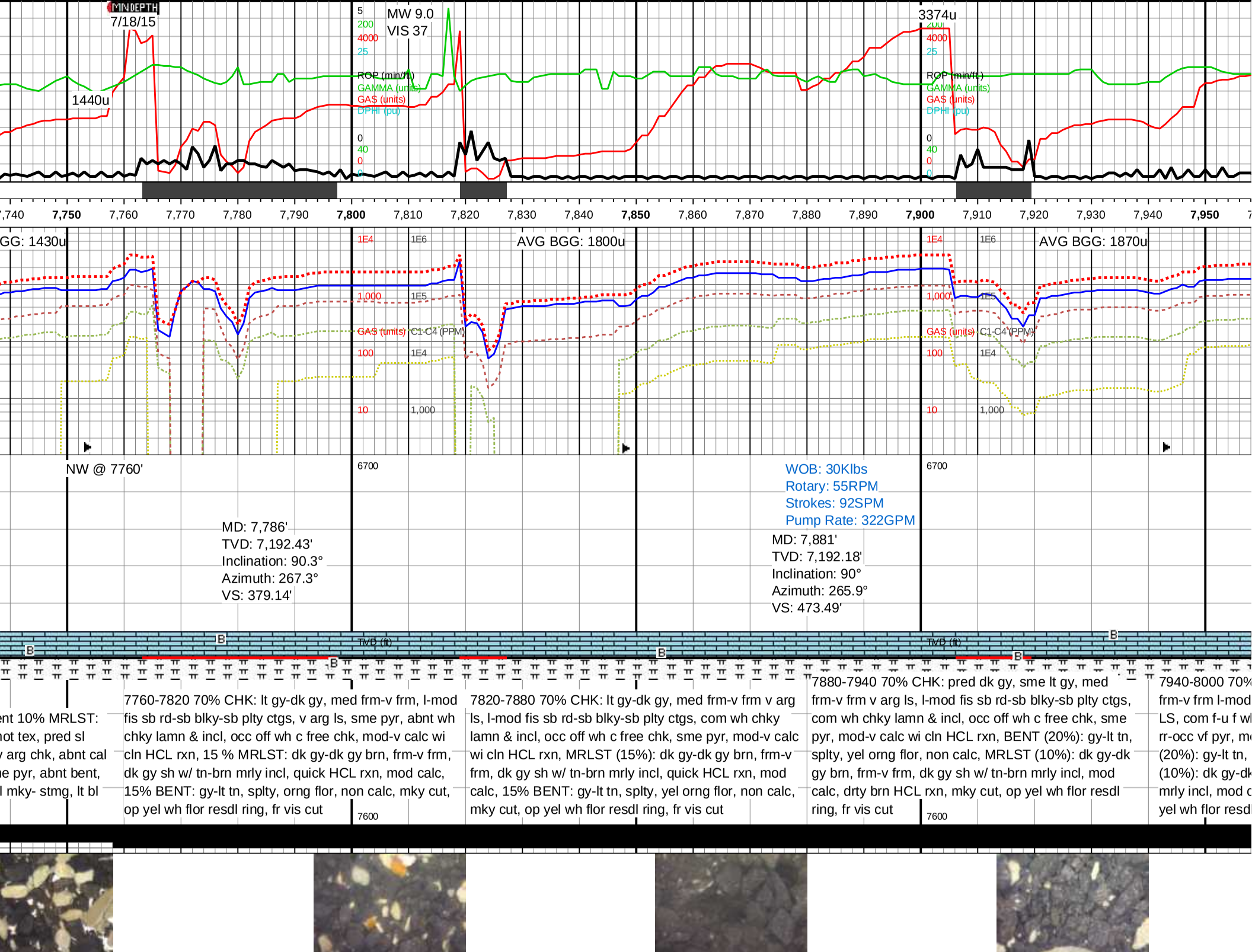

MW 9.4
VIS 34
MW 9.6
VIS 35
ROP (min/ft)
GAMMA (units)
GAS (units)
DPHI (pu)
567u
6,640
6,650
6,660
6,670
6,680
6,690
6,700
6,710
6,720
6,730
6,740
6,750
6,760
6,770
6,780
6,790
6,800
6,810
6,820
6,830
6,840
6,850
AVG BGG: 150u
AVG BGG: 190u
GAS (units)
C1-C4 (PPM)
WOB: 10Klbs
Rotary: 0RPM
Strokes: 156SPM
Pump Rate: 546GPM
MD: 6,732'
TVD: 6,707.42'
Inclination: 10.6°
Azimuth: 299°
VS: -255.27'
MD: 6,825'
TVD: 6,798.05'
Inclination: 15.2°
Azimuth: 296.9°
VS: -236.39'
TVD (ft)
6300
7600
SLTST: lt gy-mod gy wi brn hue,
d srtd, occ sd grs, occ sdy intbds,
SS: clr-trnsl off wh-trnsl v lt gy, occ op
srtd, pred f-u f sb rd-rd grs, 5% dk
str lamn, v frm-hd gr sup sd grs cons
sli calc ip, fr yel orng resdl hvy oil
g
6680-6740 SLTST (75%): mod gy brn, rr tn, tr lt gy, frm, brit, v arg mod fis sb blky-sb plty ctgs, p-mod srtd, decr sd grs, tr sdy intbds, non calc, 25% SS: clr-trnsl off wh-trnsl v lt gy, mod-w srtd, pred f-u f sb rd-rd grs, 5% dk lithics, rr fnt yel str lamn, v frm-hd gr sup sd grs cons wi sil & arg cmt, sli calc ip, mky bl cut, p-fr yel orng resdl hvy oil flor rsdl resdl ring
6740-6800 SLTST (80%): mod gy brn, rr tn, tr lt gy, frm, brit, v arg mod fis sb blky-sb plty ctgs, p-mod srtd, rr sd gr incl, tr sdy intbds, non calc, 20% SS: clr-trnsl off wh-trnsl v lt gy, mod-w srtd, pred f-u f sb rd-rd grs, 5% dk lithics, rr fnt yel str lamn, v frm-hd gr sup sd grs cons wi sil & arg cmt, sli calc ip, mky bl cut, p-fr yel orng resdl hvy oil flor rsdl resdl ring
6800-6860 SLTST (80%): mod gy brn, rr tn, tr lt gy, frm, brit, v arg mod fis sb blky-sb plty ctgs, p-mod srtd, rr sd gr incl, tr sdy intbds, non calc, 20% SS: clr-trnsl off wh-trnsl v lt gy, mod-w srtd, pred f-u f sb rd-rd grs, 5% dk lithics, rr fnt yel str lamn, v frm-hd gr sup sd grs cons wi sil & arg cmt, sli calc ip, mky bl cut, p-fr yel orng resdl hvy oil flor rsdl resdl ring


MW 9.5
VIS 43
Bit #: 2
Type: Vare
Size: 8.75
Depth In: 6,603'
Depth Out: 6,892'
Hours: 2.2 hrs
Avg Ft/Hr: 131 '/hr
Jets: 8*11
S/N: JJ5345
Bit #: 3
Type: Smith SD611
Size: 8 3/4
Depth In: 6,892'
Jets: 6X18
S/N: JJ7385
MW 9.7
VIS 38
Sharon Springs
7,030' MD
6,984' TVD
-155.29' VS
2363u
ROP (min/ft)
GAMMA (units)
GAS (units)
RPMI (pu)
MW 9.7
VIS 36
Niobrara A
7,070' MD
7,015' TVD
-129.38' VS
6,860 6,870 6,880 6,890 6,900 6,910 6,920 6,930 6,940 6,950 6,960 6,970 6,980 6,990 7,000 7,010 7,020 7,030 7,040 7,050 7,060 7,070
GG: 560u
AVG BGG: 860u
GAS (units) C1-C4 (PPM)
WOB: 18Klbs
Rotary: 0RPM
Strokes: 148SPM
Pump Rate: 517GPM
MD: 6,949'
TVD: 6,915.16'
Inclination: 24.3°
Azimuth: 279.4°
VS: -196.92'
MD: 7,042'
TVD: 6,993.71'
Inclination: 39.9°
Azimuth: 274.5°
VS: -147.76'
TVD (ft)
6860-6920 SLTST (90%): pred gy-dk gy, rr v dk gy-blk, sl brn hue ip, med frm-frm & brit, mod-mod hi fis sb blky-sb plty-plty ctgs, v arg,p-mod srtd, rr sd gr incl, v tr sdy intbds, non calc, 10% SS: clr-trnsl off wh-trnsl v lt gy, mod-w srtd, pred f-u f sb rd-rd grs, v frm-hd gr sup sd grs cons wi sil & arg cmt, sli calc ip, mky bl cut, p-fr yel orng resdl hvy oil flor rsdl resdl ring
6920-6980 SLTST: pred gy-dk gy, rr v dk gy-blk, sl brn hue ip, med frm-frm & brit, mod-mod hi fis sb blky-sb plty-plty ctgs, v arg,p-mod srtd, rr sd gr incl, v tr sdy intbds, non calc, wi tr SS, mky bl cut, p-fr yel orng resdl hvy oil flor rsdl resdl ring, sl yel vis cut
6980-7040 SLTST: pred gy-dk gy, occ v dk gy-lt gy-off wh, mod-v arg, mod srtd, med frm-frm & brit, mod-mod hi fis sb blky-sb plty-plty ctgs, rr sd gr incl, v tr sdy intbds, non calc, wi 10% BENT: lt yel-lt tn-tn, chky-wxy lstr, pred splty & plty, yel & orng min flor, non calc, mky bl cut, p-fr yel orng resdl hvy oil flor rsdl resdl ring, sl yel vis cut
7040-7100 SLTST (90%): pred gy gy-lt gy-off wh, mod-v arg, p-mod & brit mod-mod hi fis sb blky-sb pl & sh incl, v tr thn sdy intbds, vf pyr bent & ss & mrlst, fr op mky bl cut, ring


MNDEPTH
7/16/15
2805u
3424u
3747u
3519u
2065u
Niobrara B
7,251' MD
7,128' TVD
10.26' VS
ROP (min/ft)
GAMMA (units)
GAS (units)
DPHI (pu)
7,080
7,090
7,100
7,110
7,120
7,130
7,140
7,150
7,160
7,170
7,180
7,190
7,200
7,210
7,220
7,230
7,240
7,250
7,260
7,270
7,280
7,290
AVG BGG: 1210u
AVG BGG: 2260u
AVG BGG: 2580u
GAS (units) C1-C4 (PPM)
WOB: 7.5Klbs
Rotary: 15RPM
Strokes: 150SPM
Pump Rate: 525GPM
WOB: 27Klbs
Rotary: 0RPM
Strokes: 150SPM
Pump Rate: 525GPM
MD: 7,136'
TVD: 7,061.13'
Inclination: 48.4°
Azimuth: 268.5°
VS: -82.45'
MD: 7,231'
TVD: 7,117.77'
Inclination: 58.3°
Azimuth: 265.4°
VS: -6.82'
TVD (ft)
7100-7160 60% MRLST: dk gy-dk gy brn, occ brn, frm-v frm, com tn-brn mot dk gy sh, quick HCL rxn, mod calc, CHK (40%): pred gy, occ dk gy, occ lt gy-tr off wh c chk incl & elong lamn, frm-v frm, sb blky-sb plty mod fis ctgs, ang ip, com slty, sme pyr, pred v arg ls, incrg amt chk, mod-v calc, fr op mky bl cut, fr bl flor resdl ring
7160-7220 50% CHK: gy-gy brn, occ dk gy, occ lt gy-lt brn, med frm-v frm, sb blky-sb plty mod fis ctgs, sme pyr, pred v arg ls, occ off wh c free chk, mod-v calc, 50% MRLST: dk gy-dk gy brn, occ brn, frm-v frm, com tn-brn mot dk gy sh, quick HCL rxn, mod calc, fr op mky bl cut, fr bl flor resdl ring
7220-7280 70% CHK: pred lt gy-gy, occ dk gy, med frm-v frm, mod fis sb blky-sb plty ctgs, v arg ls, sme pyr, abnt wh chky lstr & incl, occ off wh c free chk, mod-v calc, 30% MRLST: dk gy-dk gy brn, occ brn, frm-v frm, com tn-brn mot dk gy sh, quick HCL rxn, mod calc, fr op mky bl cut, fr bl flor resdl ring
7280-7340 85%
l-mod fis sb rd-
pyr, abnt wh ch
mod-v calc, 15%
frm-v frm, com
mod calc, fr op
-dk gy, occ v dk
srtd, med frm-frm
ty-plty ctgs, rr sd
ip, non calc, wi rr
fr bl flor resdl


MW 9.3
VIS 43
3030u
2565u
2877u
200
4000
25
ROP (min/ft)
GAMMA (units)
GAS (units)
DPHI (pu)
7,300
7,310
7,320
7,330
7,340
7,350
7,360
7,370
7,380
7,390
7,400
7,410
7,420
7,430
7,440
7,450
7,460
7,470
7,480
7,490
7,500
7,510
AVG BGG: 2610u
AVG BGG: 1710u
GAS (units)
C1-C4 (PPM)
6700
DP @ 7,430'
WOB: 25Klbs
Rotary: 15RPM
Strokes: 150SPM
Pump Rate: 525GPM
MD: 7,325'
TVD: 7,158.91'
Inclination: 69.7°
Azimuth: 266°
VS: 76.79'
MD: 7,420'
TVD: 7,181.61'
Inclination: 82.6°
Azimuth: 268°
VS: 168.28'
TVD (ft)
MD (ft)
% CHK: pred lt gy, med frm-v frm, sb blky-sb plty ctgs, v arg ls, sme ky lamn & incl, occ off wh c free chk, % MRLST: dk gy-dk gy brn, occ brn, tn-brn mot dk gy sh, quick HCL rxn, mky bl cut, fr bl flor resdl ring
7340-7400 60 % MRLST: dk gy-dk gy brn, frm-v frm, dk gy sh w/ tn-brn mrly incl, quick HCL rxn, mod calc, 40% CHK: pred lt gy, med frm-v frm, l-mod fis sb rd-sb blky-sb plty ctgs, v arg ls, sme pyr, abnt wh chky lamn & incl, occ off wh c free chk, mod-v calc, fr op mky bl cut, fr bl flor resdl ring
7400-7460 80% CHK 20% MRLST: pred med- dk gy, occ blk, lt gy mtx, sme mot, pred sl frm, pred sb blky, sme sb plty, pred mod- v arg ls, abnt cal incl, occ lse cal- frac fl cal, tr pyr, rr bent, v calc thru, fr- g lt bl flor cut, sl mky- stmg, lt bl resdl ring
7460-7520 80% CHK 20% MRLST: pred med- dk gy, occ blk, lt gy mtx, sme mot, pred sl frm, pred sb blky, sme sb plty, pred mod- v arg ls, abnt cal incl, occ lse cal- frac fl cal, tr pyr, rr bent, v calc thru, fr- g lt bl flor cut, sl mky- stmg, lt bl resdl ring
7600


3156u
2223u
2295u
Bit #: 3
Type: Smith SD611
Size: 8 3/4
Depth In: 6,892'
Depth Out: 7,585'
Hours: 9.5 hrs
Avg Ft/Hr: 73 '/hr
Jets: 6X18
S/N: JJ7385
Bit #: 4
Type: VS513DG
Size: 6 1/8
Depth In: 7,585'
Jets: 5*14
S/N: 4007606
3490u
4280u
ROP (min/ft)
GAMMA (units)
GAS (units)
DPHI (pu)
7,520
7,530
7,540
7,550
7,560
7,570
7,580
7,590
7,600
7,610
7,620
7,630
7,640
7,650
7,660
7,670
7,680
7,690
7,700
7,710
7,720
7,730
AVG BGG: 2120
AVG B
GAS (units)
C1-C4 (PPM)
TD Curve @ 0920hrs on 7-16-15
Resume 7-17-15
WOB: 17Klbs
Rotary: 50RPM
Strokes: 99SPM
Pump Rate: 350GPM
,520'
7,190.84'
ation: 86.8°
uth: 269.3°
67.5'
MD: 7,596'
TVD: 7,192.85'
Inclination: 90.2°
Azimuth: 271.2°
VS: 189.66'
MD: 7,691'
TVD: 7,192.68'
Inclination: 90°
Azimuth: 269.1°
VS: 284.52'
TVD (ft)
7520-7580 70% CHK 30% MRLST: pred dk gy- blk, ip lt gy mtx, mot tex, pred sl frm, pred sb blky, pred mod- v arg chk, abnt cal incl, occ lse cal- frac fl cal, tr pyr, abnt bent, v calc thru, fr- g lt bl flor cut, sl mky- stmg, lt bl resdl cut
7580-7640 60% CHK 30% Bent 10% MRLST: pred dk gy- blk, ip lt gy mtx, mot tex, pred sl frm, pred sb blky, pred mod- v arg chk, abnt cal incl, occ lse cal- frac fl cal, tr pyr, abnt bent, v calc thru, fr- g lt bl flor cut, sl mky- stmg, lt bl resdl cut
7640-7700 60% CHK 30% Bent 10% MRLST: pred dk gy- blk, ip lt gy mtx, mot tex, pred sl frm, pred sb blky, pred mod- v arg chk, abnt cal incl, occ lse cal- frac fl cal, sme pyr, abnt bent, v calc thru, fr- g lt bl flor cut, sl mky- stmg, lt bl resdl cut
7700-7760 60% CHK 30% Be pred dk gy- blk, ip lt gy mtx, m frm, pred sb blky, pred mod- v incl, occ lse cal- frac fl cal, sm v calc thru, fr- g lt bl flor cut, s resdl cut



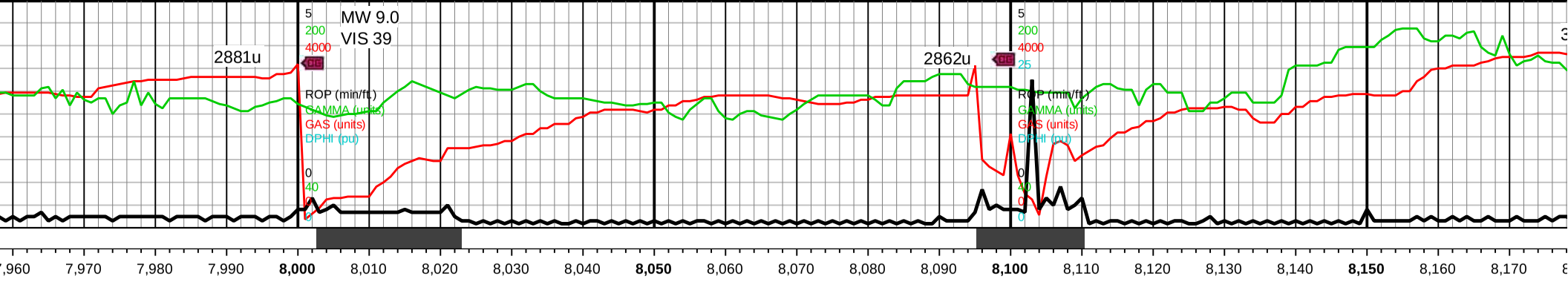
ent 10% MRLST: not tex, pred sl v arg chk, abnt cal he pyr, abnt bent, l mky- stmg, lt bl

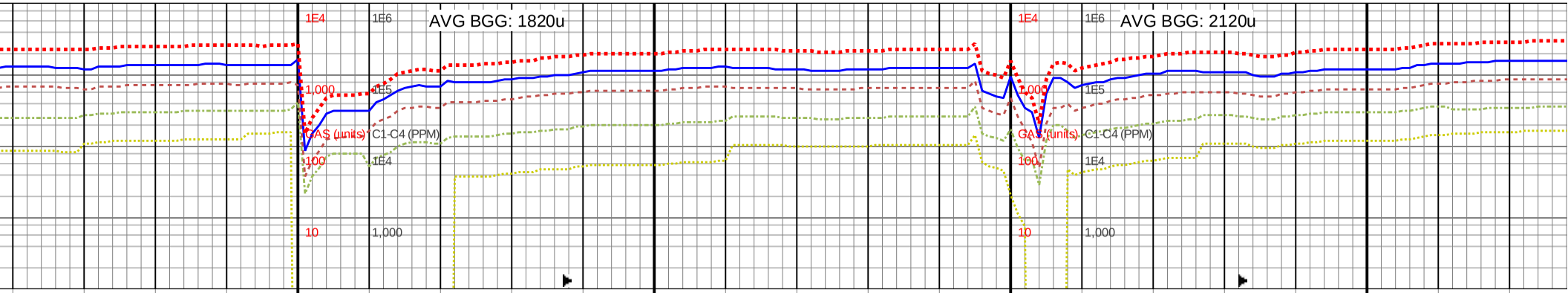
7760-7820 70% CHK: lt gy-dk gy, med frm-v frm, l-mod fis sb rd-sb blky-sb plty ctgs, v arg ls, sme pyr, abnt wh chky lamn & incl, occ off wh c free chk, mod-v calc wi cln HCL rxn, 15 % MRLST: dk gy-dk gy brn, frm-v frm, dk gy sh w/ tn-brn mrly incl, quick HCL rxn, mod calc, 15% BENT: gy-lt tn, splty, orng flor, non calc, mky cut, op yel wh flor resdl ring, fr vis cut

7820-7880 70% CHK: lt gy-dk gy, med frm-v frm v arg ls, l-mod fis sb rd-sb blky-sb plty ctgs, com wh chky lamn & incl, occ off wh c free chk, sme pyr, mod-v calc wi cln HCL rxn, MRLST (15%): dk gy-dk gy brn, frm-v frm, dk gy sh w/ tn-brn mrly incl, quick HCL rxn, mod calc, 15% BENT: gy-lt tn, splty, yel orng flor, non calc, mky cut, op yel wh flor resdl ring, fr vis cut

7880-7940 70% CHK: pred dk gy, sme lt gy, med frm-v frm v arg ls, l-mod fis sb rd-sb blky-sb plty ctgs, com wh chky lamn & incl, occ off wh c free chk, sme pyr, mod-v calc wi cln HCL rxn, BENT (20%): gy-lt tn, splty, yel orng flor, non calc, MRLST (10%): dk gy-dk gy brn, frm-v frm, dk gy sh w/ tn-brn mrly incl, mod calc, drty brn HCL rxn, mky cut, op yel wh flor resdl ring, fr vis cut

7940-8000 70% frm-v frm l-mod LS, com f-u f wh rr-occ vf pyr, mo (20%): gy-lt tn, (10%): dk gy-dk mrly incl, mod c yel wh flor resdl



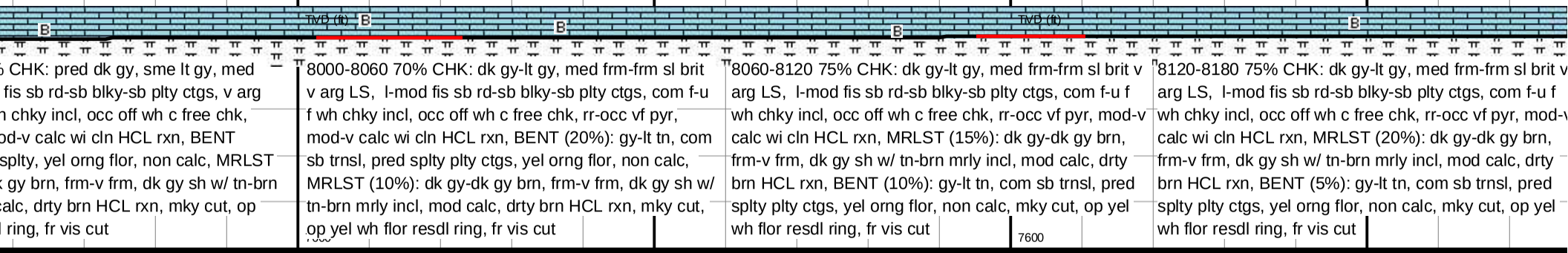


WOB: 25Klbs
Rotary: 70RPM
Strokes: 92SPM
Pump Rate: 322GPM

MD: 7,975'
TVD: 7,191.53'
Inclination: 90.8°
Azimuth: 267.5°
VS: 566.86'

MD: 8,069'
TVD: 7,189.48'
Inclination: 91.7°
Azimuth: 268.2°
VS: 660.41'

MD: 8,164'
TVD: 7,186.41'
Inclination: 92°
Azimuth: 268°
VS: 754.97'

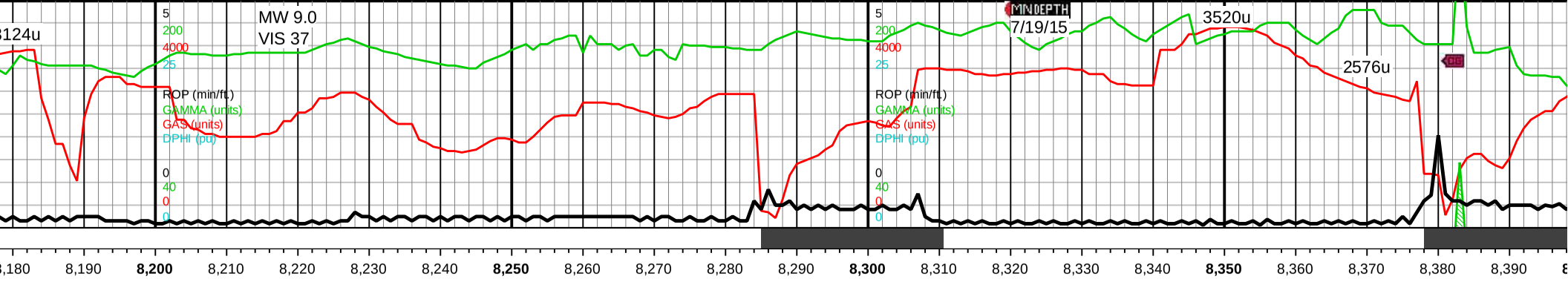


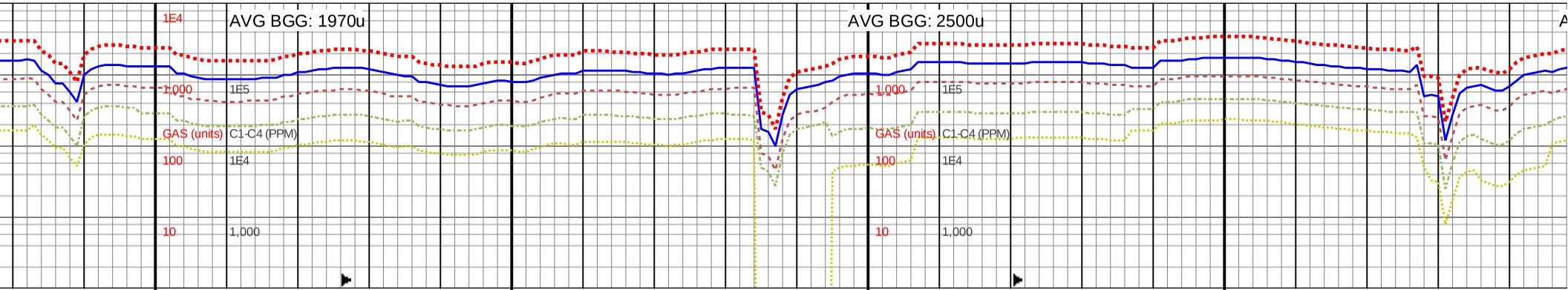
% CHK: pred dk gy, sme lt gy, med
fis sb rd-sb blky-sb plty ctgs, v arg
h chky incl, occ off wh c free chk,
od-v calc wi cln HCL rxn, BENT
splty, yel orng flor, non calc, MRLST
k gy brn, frm-v frm, dk gy sh w/ tn-brn
calc, drty brn HCL rxn, mky cut, op
l ring, fr vis cut

8000-8060 70% CHK: dk gy-lt gy, med frm-frm sl brit v arg LS, l-mod fis sb rd-sb blky-sb plty ctgs, com f-u f wh chky incl, occ off wh c free chk, rr-occ vf pyr, mod-v calc wi cln HCL rxn, BENT (20%): gy-lt tn, com sb trnsl, pred splty plty ctgs, yel orng flor, non calc, MRLST (10%): dk gy-dk gy brn, frm-v frm, dk gy sh w/ tn-brn mrly incl, mod calc, drty brn HCL rxn, mky cut, op yel wh flor resdl ring, fr vis cut

8060-8120 75% CHK: dk gy-lt gy, med frm-frm sl brit v arg LS, l-mod fis sb rd-sb blky-sb plty ctgs, com f-u f wh chky incl, occ off wh c free chk, rr-occ vf pyr, mod-v calc wi cln HCL rxn, MRLST (15%): dk gy-dk gy brn, frm-v frm, dk gy sh w/ tn-brn mrly incl, mod calc, drty brn HCL rxn, BENT (10%): gy-lt tn, com sb trnsl, pred splty plty ctgs, yel orng flor, non calc, mky cut, op yel wh flor resdl ring, fr vis cut

8120-8180 75% CHK: dk gy-lt gy, med frm-frm sl brit v arg LS, l-mod fis sb rd-sb blky-sb plty ctgs, com f-u f wh chky incl, occ off wh c free chk, rr-occ vf pyr, mod-v calc wi cln HCL rxn, MRLST (20%): dk gy-dk gy brn, frm-v frm, dk gy sh w/ tn-brn mrly incl, mod calc, drty brn HCL rxn, BENT (5%): gy-lt tn, com sb trnsl, pred splty plty ctgs, yel orng flor, non calc, mky cut, op yel wh flor resdl ring, fr vis cut





WOB: 34Klbs
Rotary: 70RPM
Strokes: 92SPM
Pump Rate: 322GPM

MD: 8,258'
TVD: 7,184.44'
Inclination: 90.4°
Azimuth: 268.7°
VS: 848.6'

MD: 8,354'
TVD: 7,183.1'
Inclination: 91.2°
Azimuth: 270.8°
VS: 944.4'

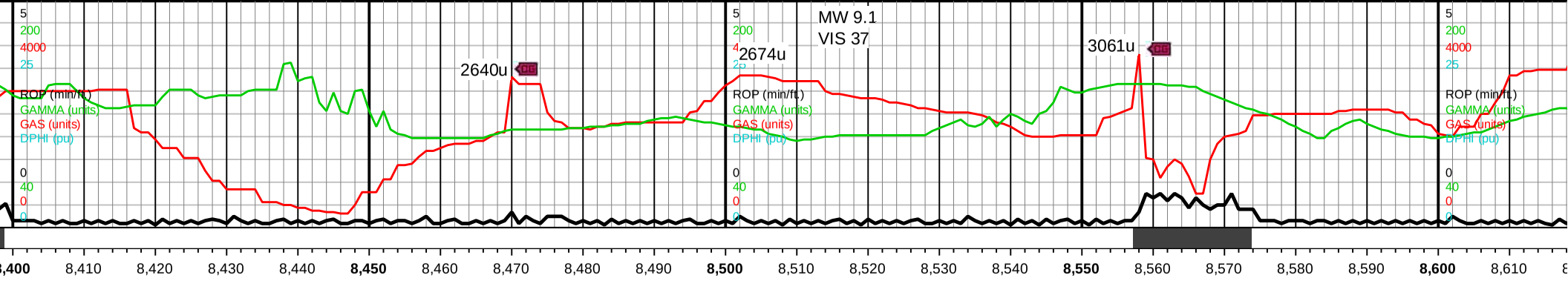
TVD (ft)

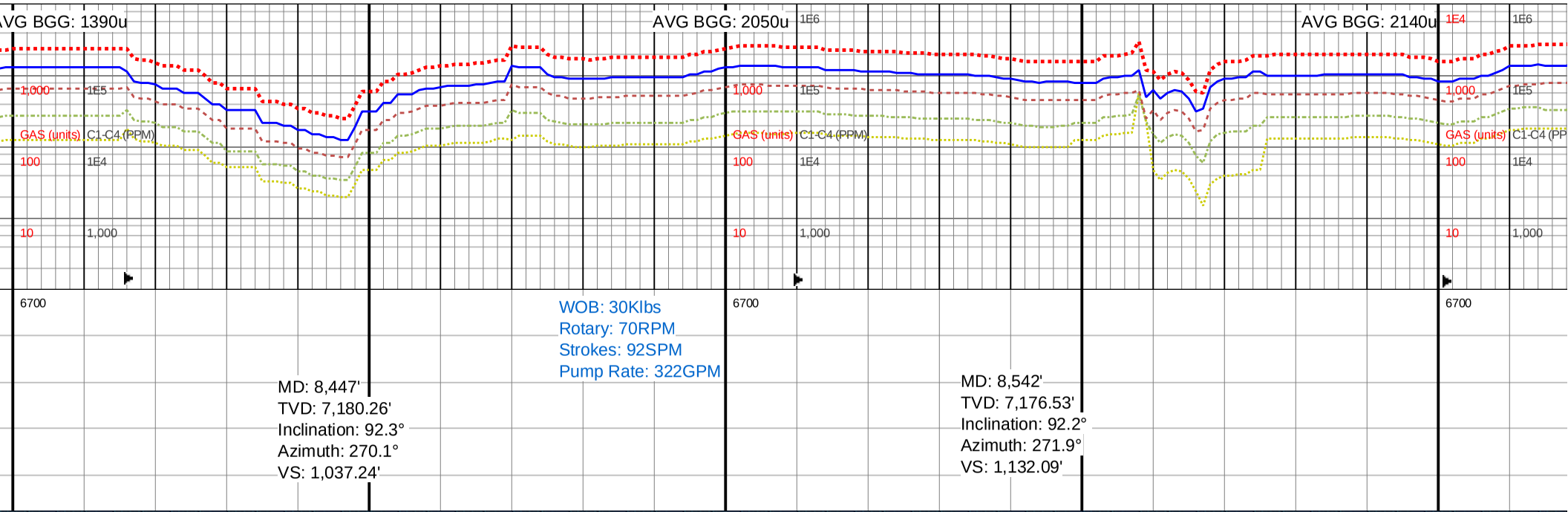
8180-8240 55% CHK: pred dk gy ctgs w/ off wh chky incl, occ lt gy ctgs, med frm-frm-brit, l-mod fis sb rd-sb blky-sb plty ctgs, v arg LS, com f-u f wh chky incl, occ off wh c free chk, com vf pyr, mod-v calc wi cln HCL rxn, MRLST (40%): dk gy, frm-v frm, com gy brn mrly incl, mod calc, drty brn HCL rxn, BENT (5%): gy-lt tn, com sb trnsl, pred splty plty ctgs, yel orng flor, non calc, mky cut, op yel wh flor resdl ring, fr vis cut

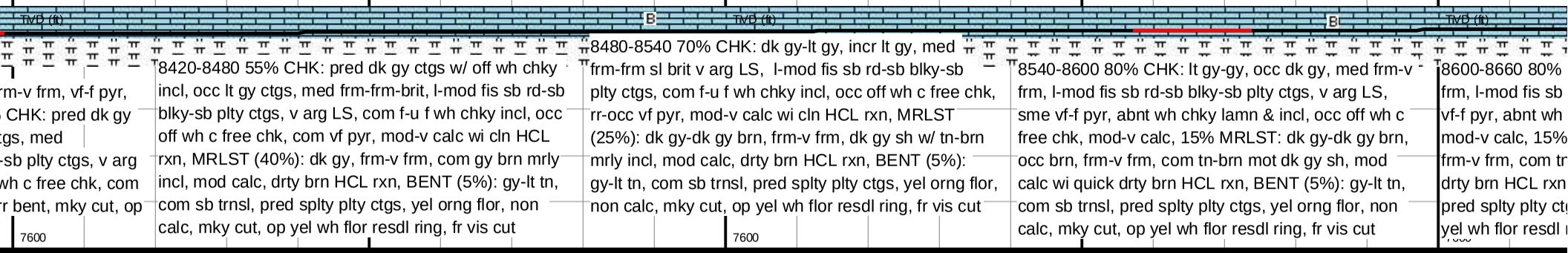
8240-8300 50% CHK: pred dk gy ctgs w/ off wh chky incl, occ lt gy ctgs, med frm-frm-brit, l-mod fis sb rd-sb blky-sb plty ctgs, v arg LS, com f-u f wh chky incl, occ off wh c free chk, com vf pyr, mod-v calc wi cln HCL rxn, MRLST (50%): dk gy, frm-v frm, com gy brn mrly incl, mod calc, drty brn HCL rxn, wi rr bent, mky cut, op yel wh flor resdl ring, fr vis cut

8300-8360 MRLST (60%): dk gy, frm-v frm, mod fis sb blky-sb plty ctgs, com gy brn mrly incl & vf-f pyr, mod calc wi drty brn HCL rxn, 40% CHK: pred dk gy ctgs w/ off wh chky incl, occ lt gy ctgs, med frm-frm-brit, l-mod fis sb rd-sb blky-sb plty ctgs, v arg LS, com f-u f wh chky incl, occ off wh c free chk, com vf pyr, mod-v calc wi cln HCL rxn, rr bent, mky cut, op yel wh flor resdl ring, fr vis cut

8360-8420 MRLST (50%): dk gy, f
mod calc wi drty brn HCL rxn, 50%
ctgs w/ off wh chky incl, occ lt gy c
frm-frm-brit, l-mod fis sb rd-sb blky
LS, com f-u f wh chky incl, occ off
vf pyr, mod-v calc wi cln HCL rxn,
yel wh flor resdl ring, fr vis cut







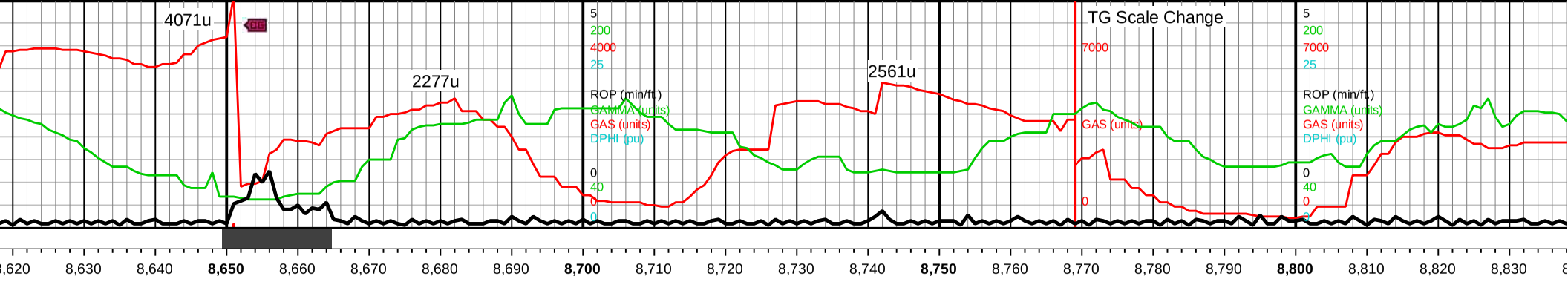
rm-v frm, vf-f pyr,
CHK: pred dk gy
tgs, med
-sb plty ctgs, v arg
wh c free chk, com
r bent, mky cut, op

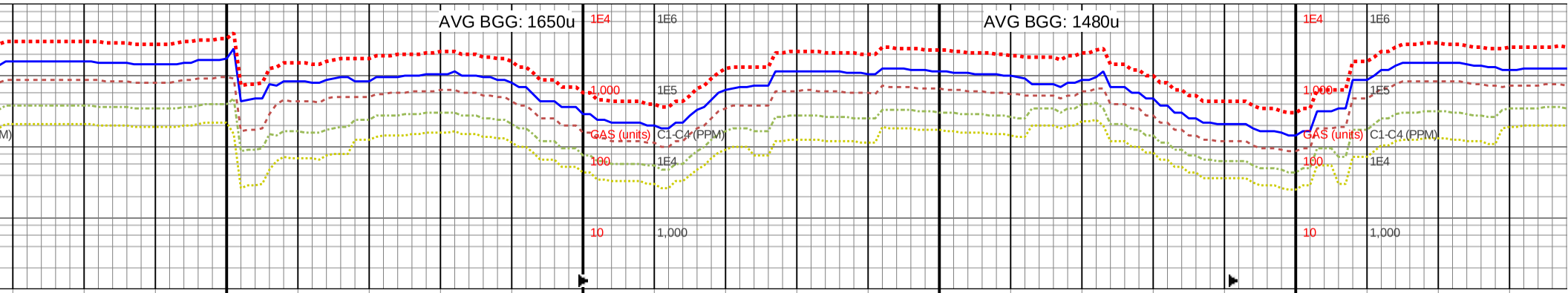
8420-8480 55% CHK: pred dk gy ctgs w/ off wh chky incl, occ lt gy ctgs, med frm-frm-brit, l-mod fis sb rd-sb blky-sb plty ctgs, v arg LS, com f-u f wh chky incl, occ off wh c free chk, com vf pyr, mod-v calc wi cln HCL rxn, MRLST (40%): dk gy, frm-v frm, com gy brn mrly incl, mod calc, drty brn HCL rxn, BENT (5%): gy-lt tn, com sb trnsl, pred splty plty ctgs, yel orng flor, non calc, mky cut, op yel wh flor resdl ring, fr vis cut

8480-8540 70% CHK: dk gy-lt gy, incr lt gy, med frm-frm sl brit v arg LS, l-mod fis sb rd-sb blky-sb plty ctgs, com f-u f wh chky incl, occ off wh c free chk, rr-occ vf pyr, mod-v calc wi cln HCL rxn, MRLST (25%): dk gy-dk gy brn, frm-v frm, dk gy sh w/ tn-brn mrly incl, mod calc, drty brn HCL rxn, BENT (5%): gy-lt tn, com sb trnsl, pred splty plty ctgs, yel orng flor, non calc, mky cut, op yel wh flor resdl ring, fr vis cut

8540-8600 80% CHK: lt gy-gy, occ dk gy, med frm-v frm, l-mod fis sb rd-sb blky-sb plty ctgs, v arg LS, sme vf-f pyr, abnt wh chky lamn & incl, occ off wh c free chk, mod-v calc, 15% MRLST: dk gy-dk gy brn, occ brn, frm-v frm, com tn-brn mot dk gy sh, mod calc wi quick drty brn HCL rxn, BENT (5%): gy-lt tn, com sb trnsl, pred splty plty ctgs, yel orng flor, non calc, mky cut, op yel wh flor resdl ring, fr vis cut

8600-8660 80%
frm, l-mod fis sb
vf-f pyr, abnt wh
mod-v calc, 15%
frm-v frm, com tr
drty brn HCL rxn
pred splty plty ct
yel wh flor resdl



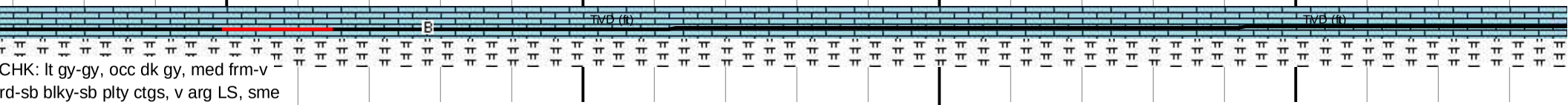


WOB: 27Klbs
Rotary: 70RPM
Strokes: 92SPM
Pump Rate: 322GPM

MD: 8,637'
TVD: 7,173.8'
Inclination: 91.1°
Azimuth: 272.8°
VS: 1,227.03'

MD: 8,731'
TVD: 7,171.75'
Inclination: 91.4°
Azimuth: 272.8°
VS: 1,321.01'

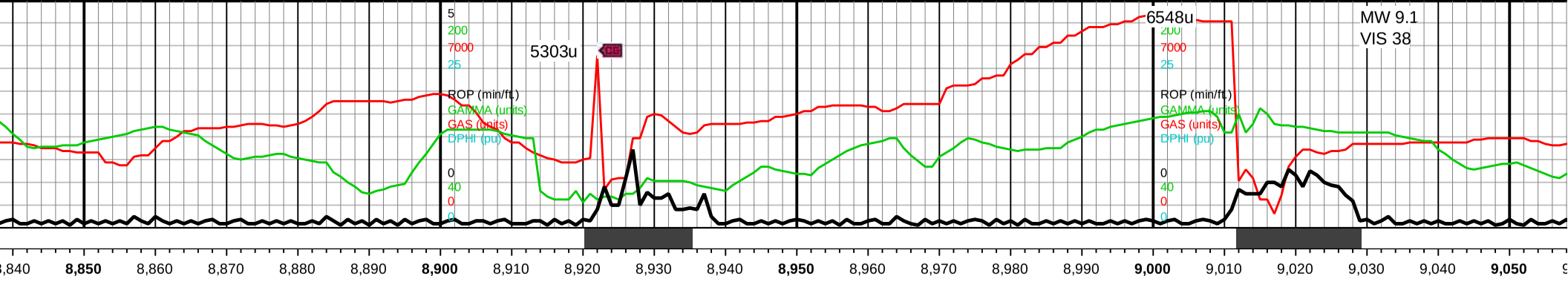
MD: 8,825'
TVD: 7,168.14'
Inclination: 93°
Azimuth: 273°
VS: 1,414.93'

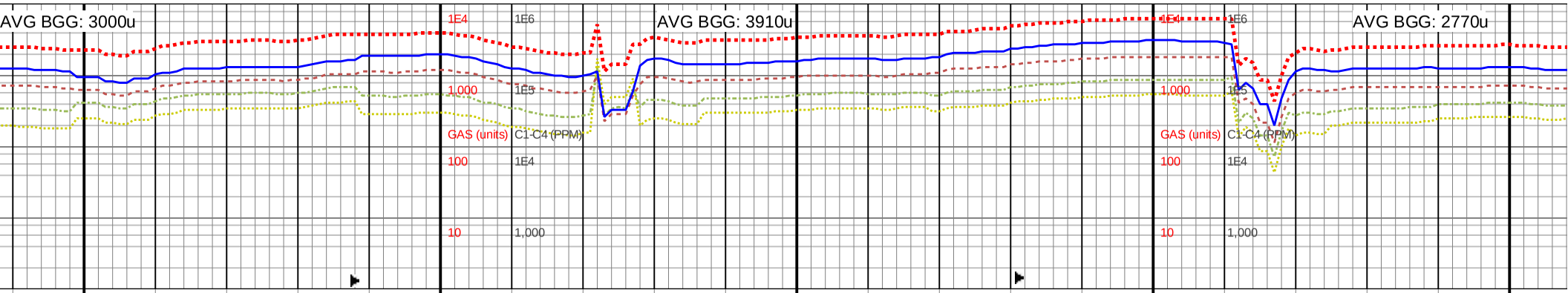


CHK: lt gy-gy, occ dk gy, med frm-v
rd-sb blky-sb plty ctgs, v arg LS, sme
chky lamn & incl, occ off wh c free chk,
MRLST: dk gy-dk gy brn, occ brn,
-brn mot dk gy sh, mod calc wi quick
, BENT (5%): gy-lt tn, com sb trnsl,
gs, yel orng flor, non calc, mky cut, op
ring, fr vis cut

8660-8750 80% CHK: lt gy-gy, occ dk gy, v arg LS, med frm-frm l-mod fis sb rd-sb blky-sb plty ctgs, sme vf-f pyr, abnt wh chky lamn & incl, rr off wh c free chk, mod-v calc wi cln HCL rxn, 15% MRLST: dk gy-dk gy brn, occ brn, frm-v frm, com tn-brn mot elong incl & lamn, mod calc wi quick drty brn HCL rxn, BENT (5%): gy-lt tn, com sb trnsl, pred splty plty ctgs, yel orng flor, non calc, mky cut, op yel wh flor resdl ring, fr vis cut

8750-8840 75% CHK: lt gy-gy, occ dk gy, v arg LS, med frm-frm l-mod fis sb rd-sb blky-sb plty ctgs, sme vf-f pyr, abnt wh chky lamn & incl, rr off wh c free chk, incr fos frags, mod-v calc wi cln HCL rxn, 20% MRLST: dk gy-dk gy brn, occ brn, frm-v frm, com tn-brn mot elong incl & lamn, mod calc wi quick drty brn HCL rxn, BENT (5%): gy-lt tn-olv, com sb trnsl, pred splty plty ctgs, yel orng flor, non calc, mky cut, op yel wh flor resdl ring, fr vis cut

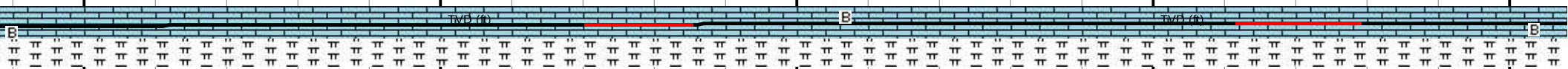




WOB: 25Klbs
Rotary: 0RPM
Strokes: 92SPM
Pump Rate: 322GPM

MD: 8,919'
TVD: 7,164.2'
Inclination: 91.8°
Azimuth: 272.4°
VS: 1,508.84'

MD: 9,013'
TVD: 7,162.31'
Inclination: 90.5°
Azimuth: 272.1°
VS: 1,602.81'

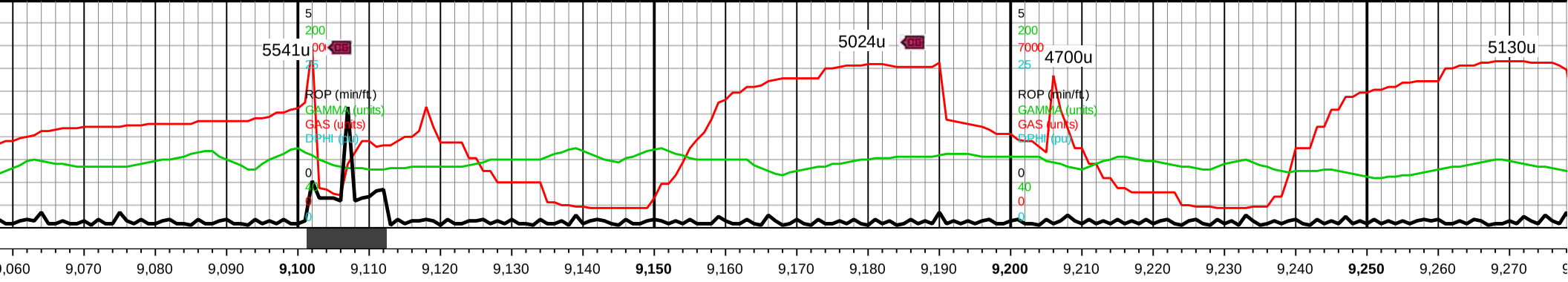


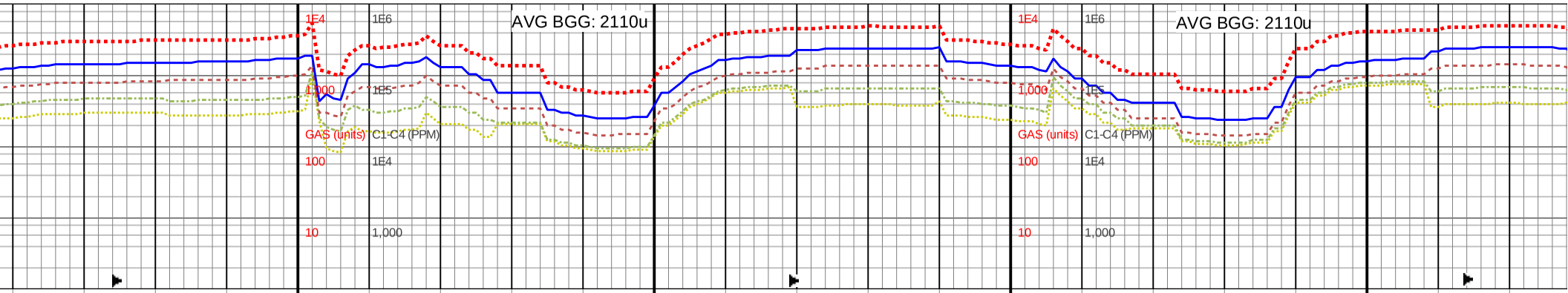
8840-8900 80% CHK: lt gy-gy, occ dk gy, v arg LS, med frm-frm l-mod fis sb rd-sb blky-sb plty ctgs, sme vf-f pyr, abnt wh chky lamn & incl, rr fos frags, rr off wh c free chk, mod-v calc wi cln HCL rxn, MRLST (20%): dk gy-dk gy brn, occ brn, frm-v frm, com tn-brn mot elong incl & lamn, mod calc wi quick drty brn HCL rxn, mky cut, op yel wh flor resdl ring, fr vis cut

8900-8960 75% CHK: lt gy-gy, occ dk gy, med frm-frm v arg LS, mod fis sb rd-sb blky-sb plty-plty ctgs, sme vf-f pyr, abnt wh chky lamn & incl, rr fos frags, rr off wh c free chk, mod-v calc wi cln HCL rxn, MRLST (25%): dk gy, occ gy brn-brn, frm-v frm, com tn-brn mot elong incl & lamn, mod calc wi quick drty brn HCL rxn, mky cut, op yel wh flor resdl ring, fr vis cut

8960-9020 CHK (75%): lt gy-gy, occ dk gy, thn off wh chky lamn & u f chky incl, med frm-frm v arg LS, mod fis sb rd-sb blky-sb plty-plty ctgs, sme vf-f pyr, rr fos frags, rr off wh c free chk, mod-v calc wi cln HCL rxn, MRLST (25%): dk gy, occ gy brn-brn, frm-v frm, com tn-brn mot elong incl & lamn, mod calc wi quick drty brn HCL rxn, mky cut, op yel wh flor resdl ring, fr vis cut

9020-9110 CHK (80%): lt gy-gy, oc
incl, med frm-frm v arg LS, mod fis
fos frags, rr off wh c free chk, mod-
gy brn-brn, frm-v frm, com tn-brn m
brn HCL rxn, mky cut, op yel wh flo





WOB: 32Klbs
Rotary: 70RPM
Strokes: 92SPM
Pump Rate: 322GPM

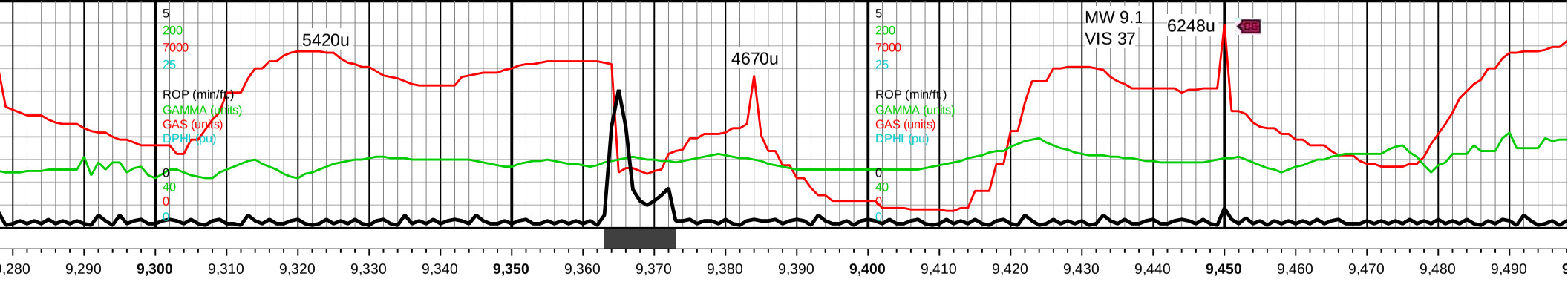
MD: 9,108'
TVD: 7,162.98'
Inclination: 88.7°
Azimuth: 273.5°
VS: 1,697.8'

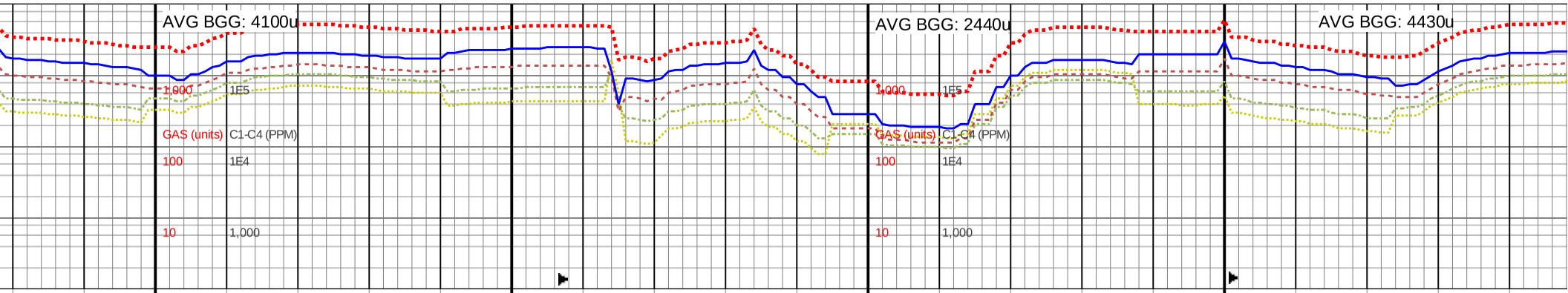
MD: 9,202'
TVD: 7,164.21'
Inclination: 89.8°
Azimuth: 274.9°
VS: 1,791.77'

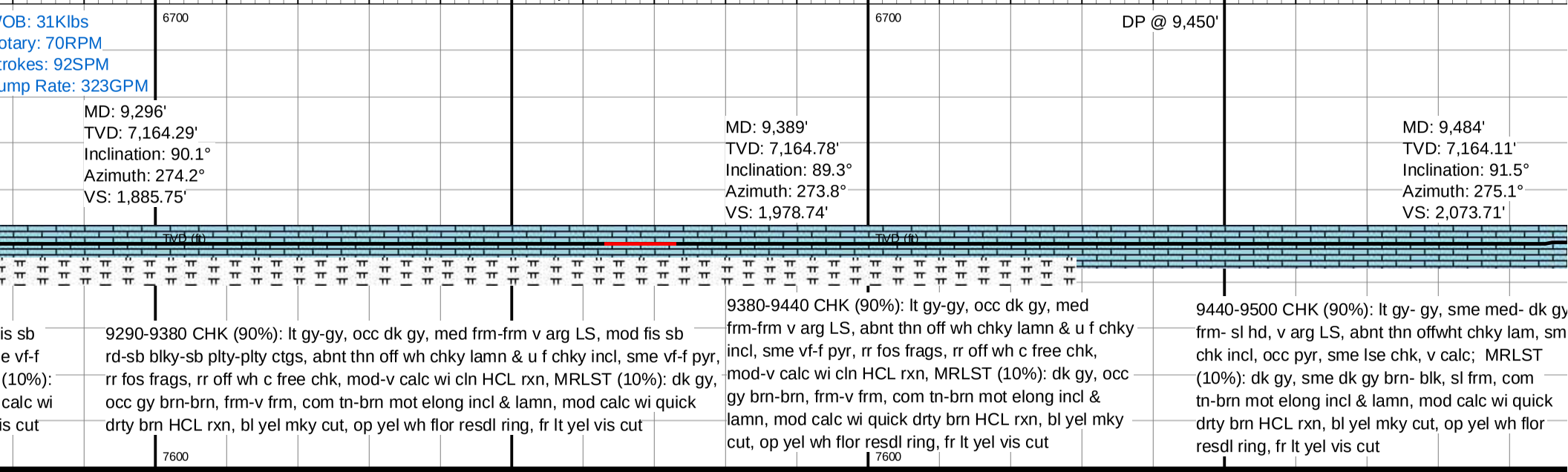
cc dk gy, abnt thn off wh chky lamn & u f chky
sb rd-sb blky-sb plty-plty ctgs, sme vf-f pyr, rr
-v calc wi cln HCL rxn, MRLST (20%): dk gy, occ
not elong incl & lamn, mod calc wi quick drty
or resdl ring, fr vis cut

9110-9200 CHK (90%): lt gy-gy, occ dk gy, abnt thn off wh chky lamn & u f chky incl, med frm-frm v arg LS, mod fis sb rd-sb blky-sb plty-plty ctgs, sme vf-f pyr, rr fos frags, rr off wh c free chk, mod-v calc wi cln HCL rxn, MRLST (10%): dk gy, occ gy brn-brn, frm-v frm, com tn-brn mot elong incl & lamn, mod calc wi quick drty brn HCL rxn, mky cut, op yel wh flor resdl ring, fr vis cut

9200-9290 CHK (90%): lt gy-gy, occ dk gy, med frm-frm v arg LS, mod f
rd-sb blky-sb plty-plty ctgs, abnt thn off wh chky lamn & u f chky incl, sm
pyr, rr fos frags, rr off wh c free chk, mod-v calc wi cln HCL rxn, MRLST
dk gy, occ gy brn-brn, frm-v frm, com tn-brn mot elong incl & lamn, mod
quick drty brn HCL rxn, bl yel mky cut, op yel wh flor resdl ring, fr lt yel v





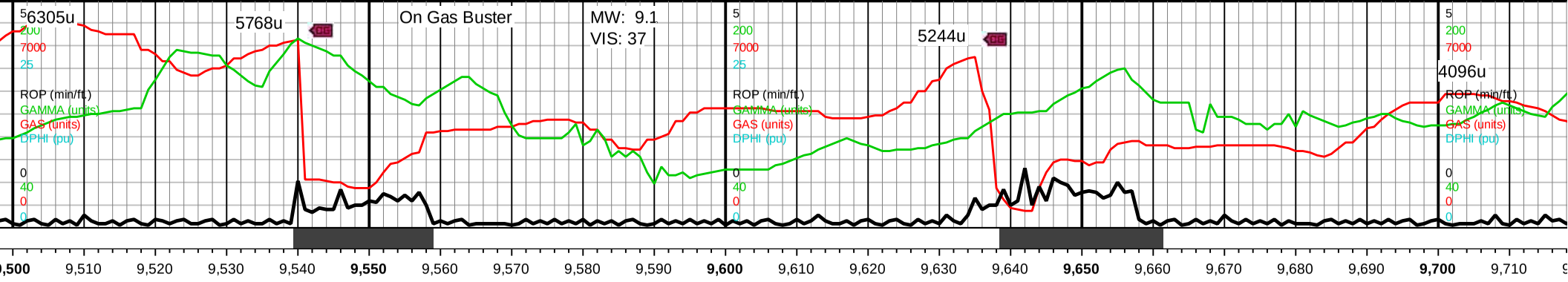


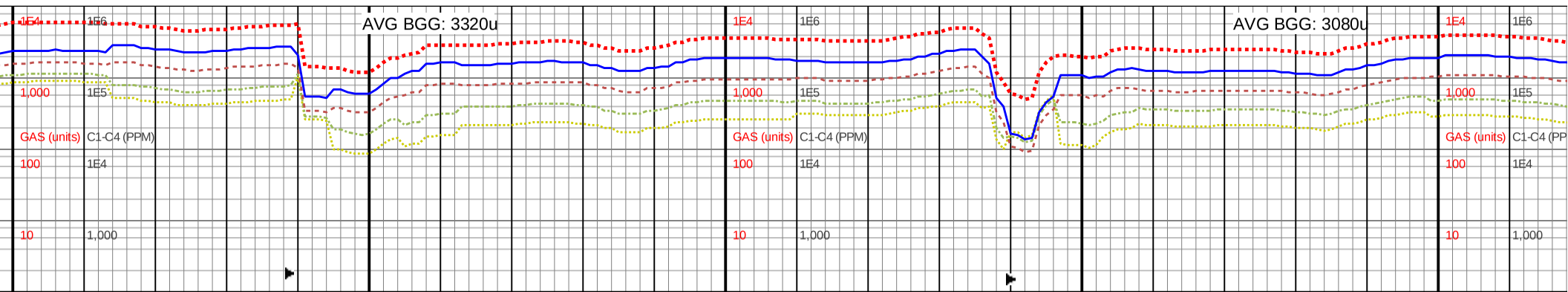
is sb
e vf-f
(10%):
calc wi
is cut

9290-9380 CHK (90%): lt gy-gy, occ dk gy, med frm-frm v arg LS, mod fis sb rd-sb blky-sb plty-plty ctgs, abnt thn off wh chky lamn & u f chky incl, sme vf-f pyr, rr fos frags, rr off wh c free chk, mod-v calc wi cln HCL rxn, MRLST (10%): dk gy, occ gy brn-brn, frm-v frm, com tn-brn mot elong incl & lamn, mod calc wi quick drty brn HCL rxn, bl yel mky cut, op yel wh flor resdl ring, fr lt yel vis cut

9380-9440 CHK (90%): lt gy-gy, occ dk gy, med frm-frm v arg LS, abnt thn off wh chky lamn & u f chky incl, sme vf-f pyr, rr fos frags, rr off wh c free chk, mod-v calc wi cln HCL rxn, MRLST (10%): dk gy, occ gy brn-brn, frm-v frm, com tn-brn mot elong incl & lamn, mod calc wi quick drty brn HCL rxn, bl yel mky cut, op yel wh flor resdl ring, fr lt yel vis cut

9440-9500 CHK (90%): lt gy- gy, sme med- dk gy frm- sl hd, v arg LS, abnt thn offwht chky lam, sm chk incl, occ pyr, sme lse chk, v calc; MRLST (10%): dk gy, sme dk gy brn- blk, sl frm, com tn-brn mot elong incl & lamn, mod calc wi quick drty brn HCL rxn, bl yel mky cut, op yel wh flor resdl ring, fr lt yel vis cut





WOB: 31Klbs
Rotary: 70RPM
Strokes: 92SPM
Pump Rate: 322GPM

MD: 9,578'
TVD: 7,161.9'
Inclination: 91.2°
Azimuth: 274°
VS: 2,167.66'

MD: 9,672'
TVD: 7,160.67'
Inclination: 90.3°
Azimuth: 271.7°
VS: 2,261.64'

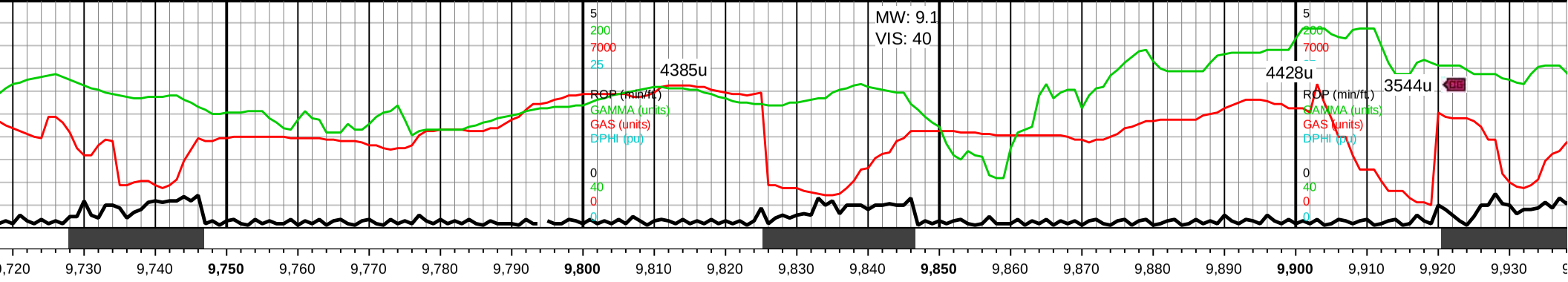
WOB: 26Klbs
Rotary: 55RPM
Strokes: 93SPM
Pump Rate: 328

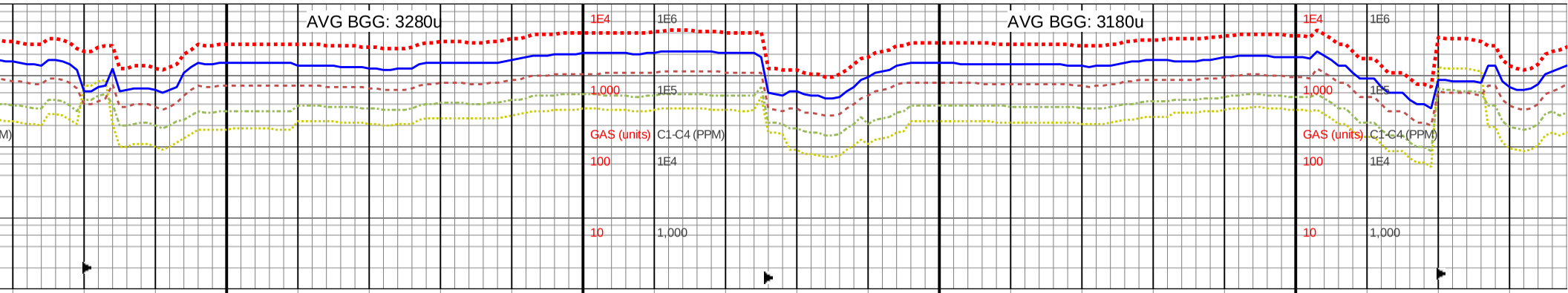
9500-9560 CHK (90%): lt gy- gy, sme med- dk gy, frm- sl hd, v arg LS, abnt thn offwht chky lam, sme chk incl, occ pyr, sme lse chk, v calc; MRLST (10%): dk gy, sme dk gy brn- blk, sl frm, chk incl & lamn, mod calc , v bri lt bl- yel flor cut, sl mky, v bri lt bl- yel flor resdl cut, fr lt brn o stn

9560-9620 CHK (80%): lt gy- gy, sme med- dk gy, frm- sl hd, v arg LS, abnt thn offwht chky lam, sme chk incl, occ pyr, sme lse chk, v calc; MRLST (20%): dk gy, sme dk gy brn- blk, sl frm, chk incl & lamn, mod calc , v bri lt bl- yel flor cut, sl mky, v bri lt bl- yel flor resdl cut, fr lt brn o stn

9620-9680 CHK (80%): pred gy, sme med- dk gy, frm- sl hd, v arg LS, abnt thn offwht chky lam, sme chk incl, occ pyr, sme lse chk, v calc; MRLST (20%): dk gy, sme dk gy brn- blk, sl frm, chk incl & lamn, mod calc , v bri lt bl- yel flor cut, sl mky, v bri lt bl- yel flor resdl cut, fr lt brn o stn

9680-9740 CHK (80%): pre
gy brn, frm- sl hd, v arg LS,
chky lam, sme chk incl, occ
v calc; MRLST (20%): dk g
blk, sl frm, chk incl & lamn,
bl- yel flor cut, sl mky, v bri
cut





GPM

WOB: 30Klbs
Rotary: 55RPM
Strokes: 94SPM
Pump Rate: 329GPM

MD: 9,765'
TVD: 7,160.51'
Inclination: 89.9°
Azimuth: 271°
VS: 2,354.59'

MD: 9,859'
TVD: 7,162.39'
Inclination: 87.8°
Azimuth: 270.5°
VS: 2,448.47'

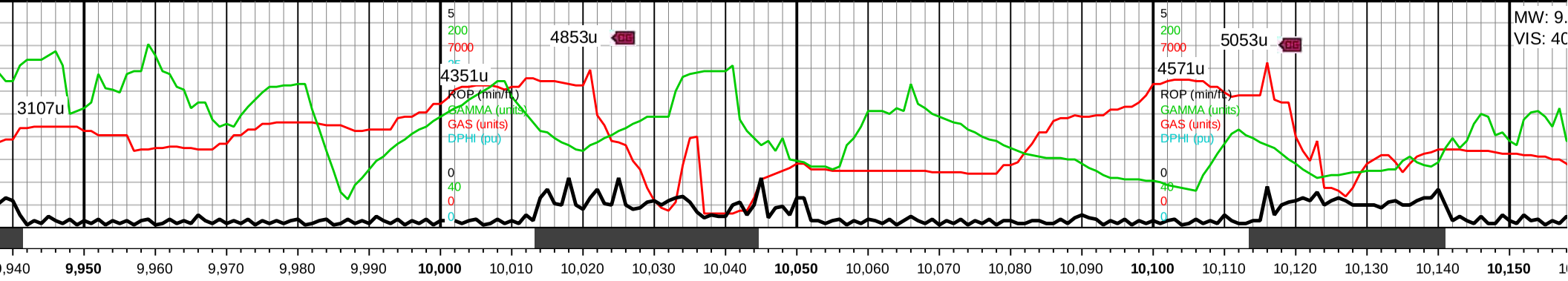
d med gy, sme dk
abnt thn offwht
pyr, sme lse chk,
y, sme dk gy brn-
mod calc , v bri lt
lt bl- yel flor resdl

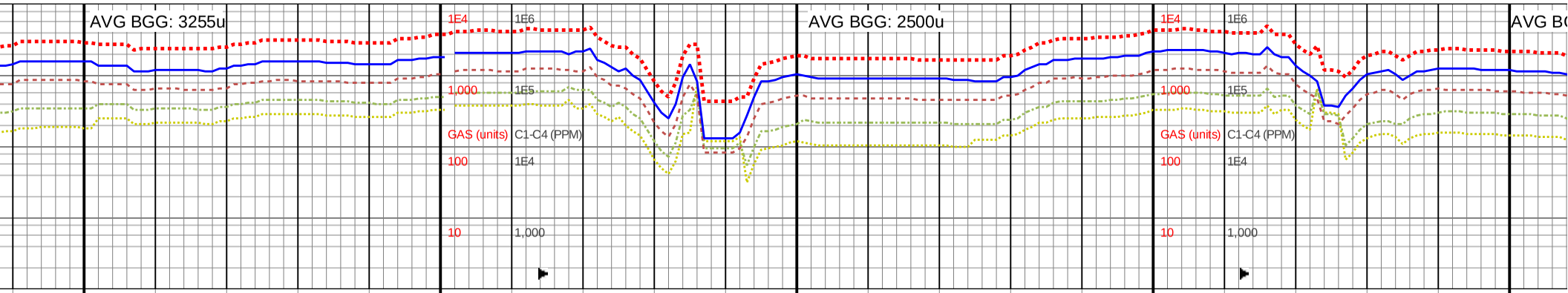
9740-9800 CHK (80%): pred med- dk gy, sme dk gy brn, frm- sl hd, v arg LS, sme thn offwht chky lam- gy mtx, occ chk incl, occ pyr, tr lse chk, v calc; MRLST (20%): dk gy, sme dk gy brn- blk, sl frm, chk incl & lamn, mod calc , v bri lt bl- yel flor cut, sl mky, v bri lt bl- yel flor resdl cut

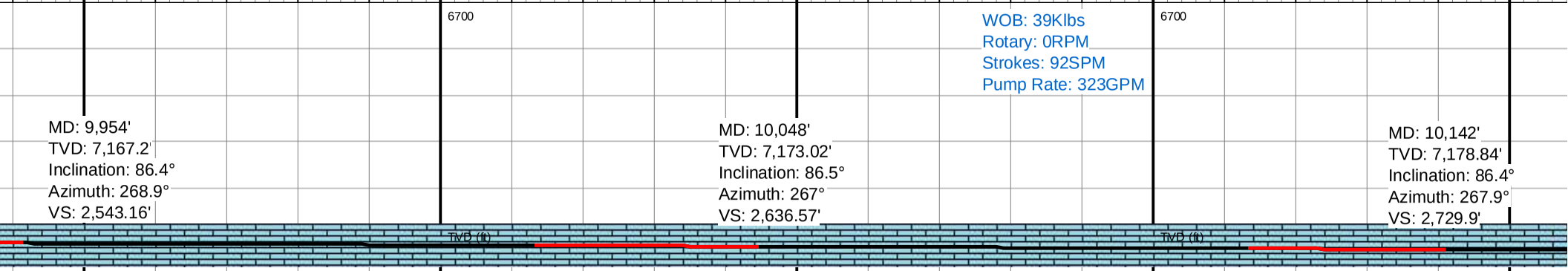
9800-9860 CHK (80%): pred med- dk gy, sme dk gy brn, frm- sl hd, v arg LS, sme thn offwht chky lam- gy mtx, occ chk incl, occ pyr, tr lse chk, v calc; MRLST (20%): dk gy, sme dk gy brn- blk, sl frm, chk incl & lamn, mod calc , v bri lt bl- yel flor cut, sl mky, v bri lt bl- yel flor resdl cut

9860-9920 CHK (80%): pred lt- med gy, sme dk gy- gy brn, pred frm- sl hd, v arg chk w occ intbd mrlst, sme thn chky lam- gy mtx, occ cal incl, occ pyr, tr lse chk, v calc; MRLST (20%): dk gy, sme dk gy brn- blk, sl frm, chk incl & lamn, mod calc , bri lt bl- yel flor cut, sl mky, bri lt bl- yel flor resdl cut

9920-9980 CH
gy brn, pred fr
sme thn chky
chk, v calc; M
blk, sl frm, chk
flor cut, sl mky







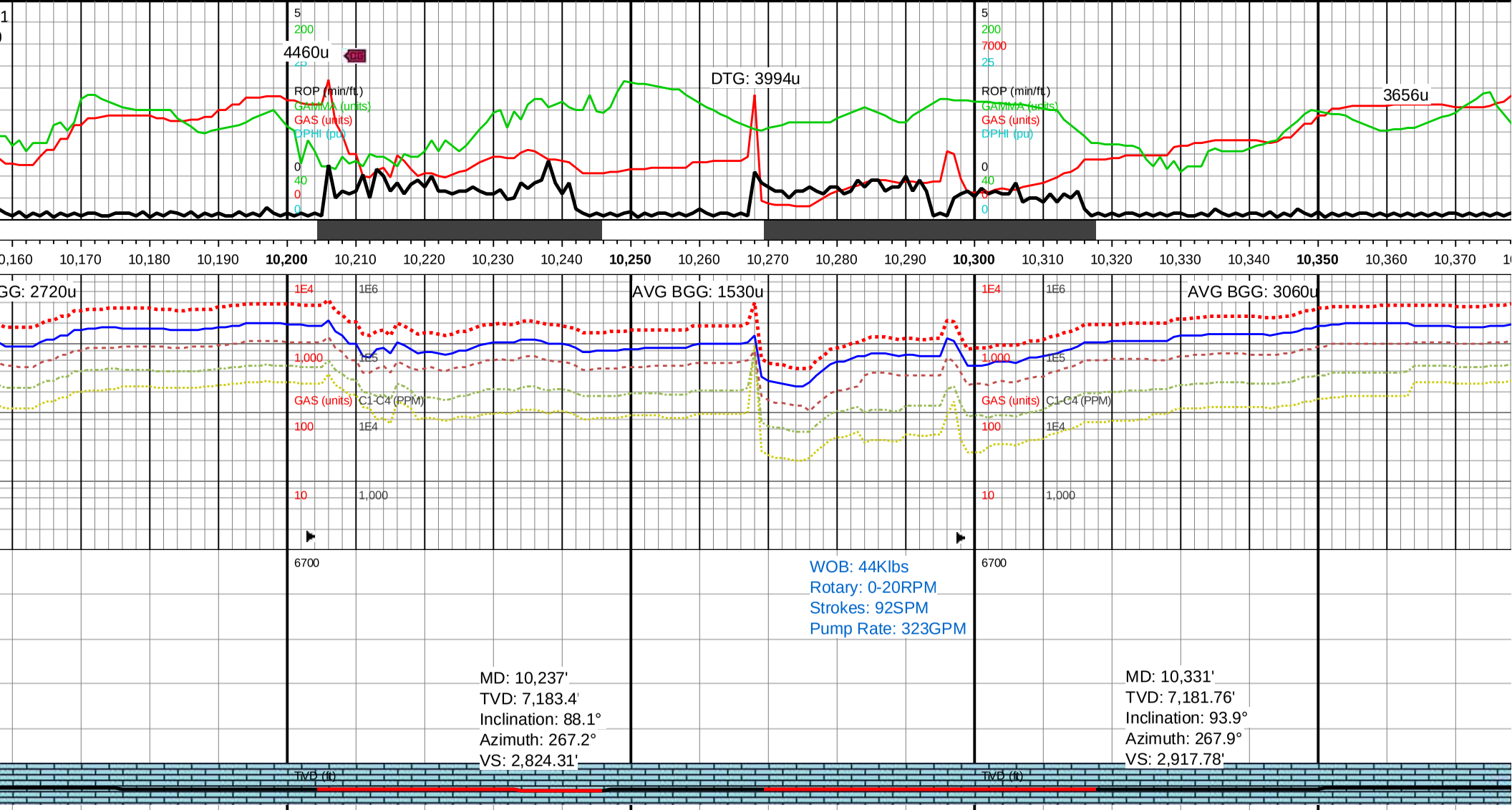
HK (80%): pred lt- med gy, sme dk gy- rm- sl hd, v arg chk w occ intbd mrlst, lam- gy mtx, occ cal incl, occ pyr, tr lse IRLST (20%): dk gy, sme dk gy brn- k incl & lamn, mod calc , bri lt bl- yel y, bri lt bl- yel flor resdl cut

9980-10040 CHK (80%): pred lt- med gy, sme dk gy- gy brn, pred frm- sl hd, v arg chk w occ intbd mrlst, sme thn chky lam- gy mtx, occ cal incl, occ pyr, tr lse chk, v calc; MRLST (20%): dk gy, sme dk gy brn- blk, sl frm, chk incl & lamn, mod calc , bri lt bl- yel flor cut, sl mky, bri lt bl- yel flor resdl cut

10040-10100 CHK (90%): pred lt- med gy, sme dk gy- lt gy brn, pred frm- sl hd, v arg chk w occ intbd mrlst, sme thn chky lam- gy mtx, sme cal incl, occ pyr, tr lse chk, v calc; MRLST (10%): dk gy- blk, sme dk gy brn- blk, sl frm, chk incl & lamn, mod calc, g lt bl- yel flor cut, sl stmg, bri lt bl- yel flor resdl cut

10100-10160 CHK (90%): pred lt- med gy, sme dk gy- lt gy brn, pred frm- sl hd, v arg chk w occ intbd mrlst, sme thn chky lam- gy mtx, sme cal incl, occ pyr, tr lse chk, v calc; MRLST (10%): dk gy- blk, sme dk gy brn- blk, sl frm, chk incl & lamn, mod calc, g lt bl- yel flor cut, sl stmg, bri lt bl- yel flor resdl cut



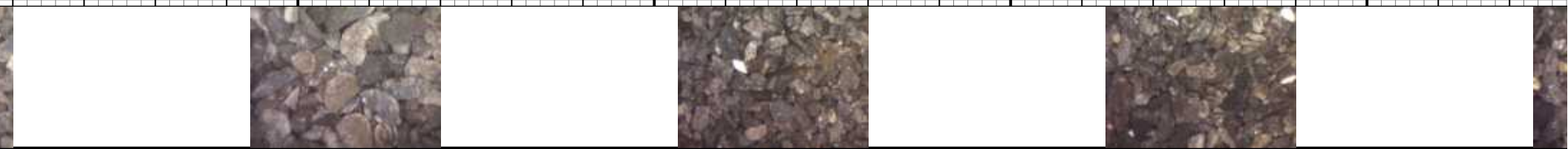



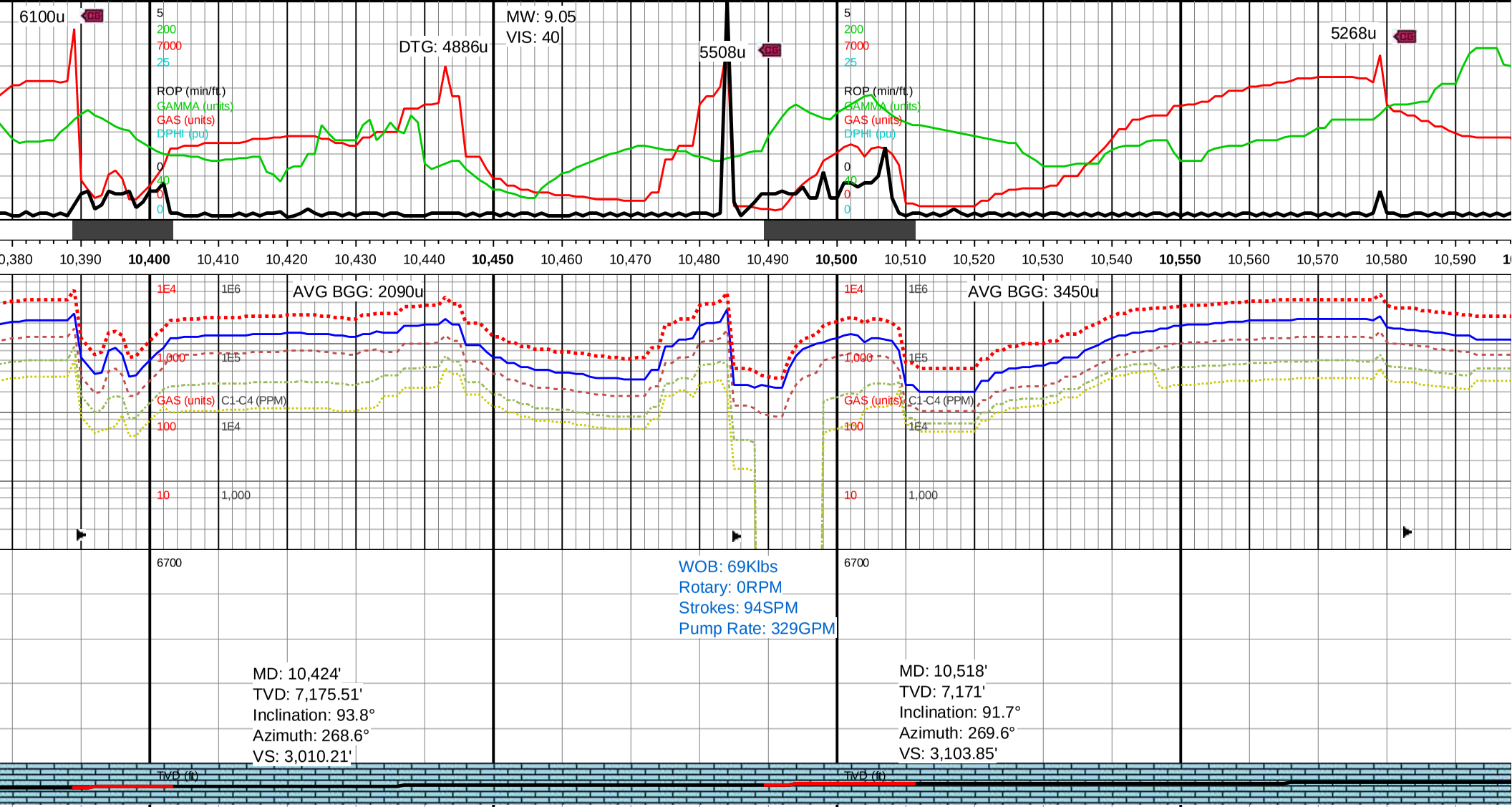
10160-10220 CHK (90%): pred lt- med gy, sme dk gy- lt gy brn, pred frm- sl hd, v arg chk w occ intbd mrlst, sme thn chky lam- gy mtx, sme cal incl, occ pyr, tr lse chk, v calc; MRLST (10%): dk gy- blk, sme dk gy brn- blk, sl frm, chk incl & lamn, mod calc, g lt bl- yel flor cut, sl stmg, bri lt bl- yel flor resdl cut

10220-10280 CHK: pred gy- med gy, sme dk gy w mot brn, pred frm- sl hd, v arg chk w occ intbd mrlst, sme thn chky lam- gy mtx, sme cal incl, occ pyr, tr lse chk, v calc, p lt bl flor cut, sl stmgw irid, p- fr lt bl- yel flor resdl cut

10280-10340 CHK: pred gy- med gy, sme dk gy w mot brn, pred frm- sl hd, v arg chk w occ intbd mrlst, sme thn chky lam- gy mtx, sme cal incl, occ pyr, tr lse chk, v calc, p lt bl flor cut, sl stmgw irid, p- fr lt bl- yel flor resdl cut

10340-10400 CHK: pred gy gy w mot brn, pred frm- sl h intbd mrlst, sme thn chky la incl, occ pyr, tr lse chk, v ca stmgw irid, p- fr lt bl- yel flo





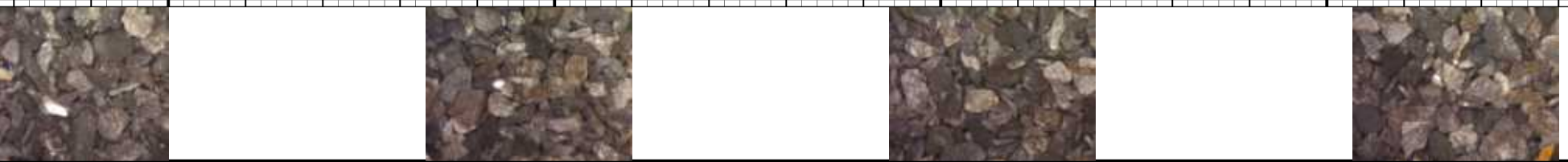
v- med gy, sme dk
hd, v arg chk w occ
am- gy mtx, sme cal
alc, p lt bl flor cut, sl
r resdl cut

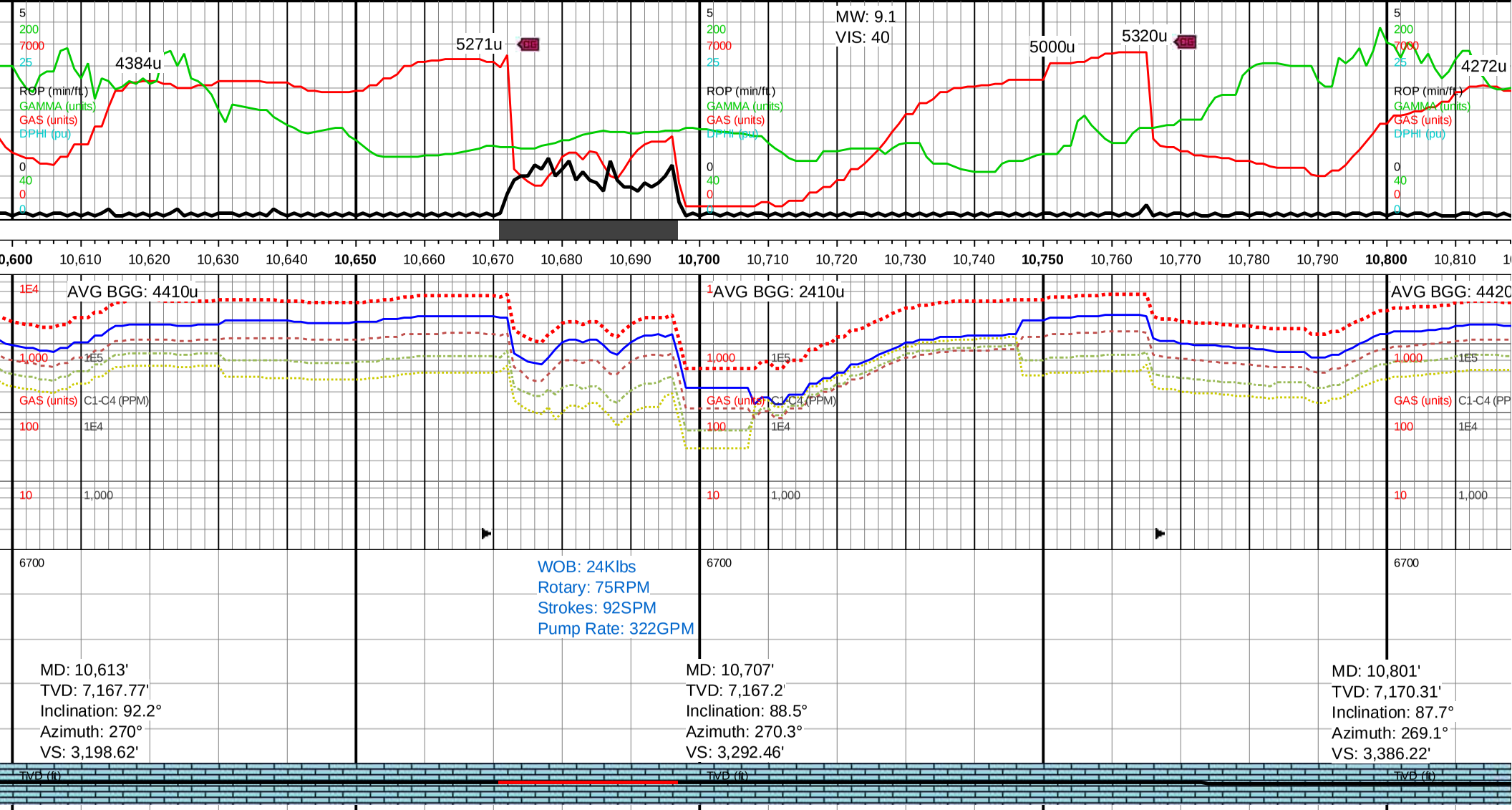
10400-10460 CHK (90%): pred gy- med gy, occ dk gy- lt gy brn, pred frm- sl hd, pred blky- sb plty, v arg chk w occ intbd mrlst, sme thn chky lam- gy mtx, sme cal incl- lse cal, occ pyr, tr bent, tr lse chk, v calc; MRLST (10%): dk gy- blk, sme dk gy brn- blk, sl frm, chk incl & lamn, mod calc, sme f lam, g lt bl- yel flor cut, sl stmg- mky, bri lt bl- yel flor resdl cut

10460-10520 CHK (90%): pred gy- med gy, occ dk gy- lt gy brn, pred frm- sl hd, pred blky- sb plty, v arg chk w occ intbd mrlst, sme thn chky lam- gy mtx, sme cal incl- lse cal, occ pyr, tr bent, tr lse chk, v calc; MRLST (10%): dk gy- blk, sft- sl frm, chk incl & lamn, mod calc, sme f lam, g lt bl- yel flor cut, sl stmg- mky, bri lt bl- yel flor resdl cut

10520-10580 CHK (90%): pred gy- med gy, occ dk gy- lt gy brn, pred frm- sl hd, pred blky- sb plty, v arg chk w occ intbd mrlst, sme thn chky lam- gy mtx, sme cal incl- lse cal, occ pyr, tr bent, tr lse chk, v calc; MRLST (10%): dk gy- blk, sft- sl frm, chk incl & lamn, mod calc, sme f lam, g lt bl- yel flor cut, sl stmg- mky, bri lt bl- yel flor resdl cut

10580-10640 CH
gy brn, pred frm-
occ intbd mrlst, s
lse cal, occ pyr, t
dk gy- blk, sft- sl
lam, g lt bl- yel flo
resdl cut





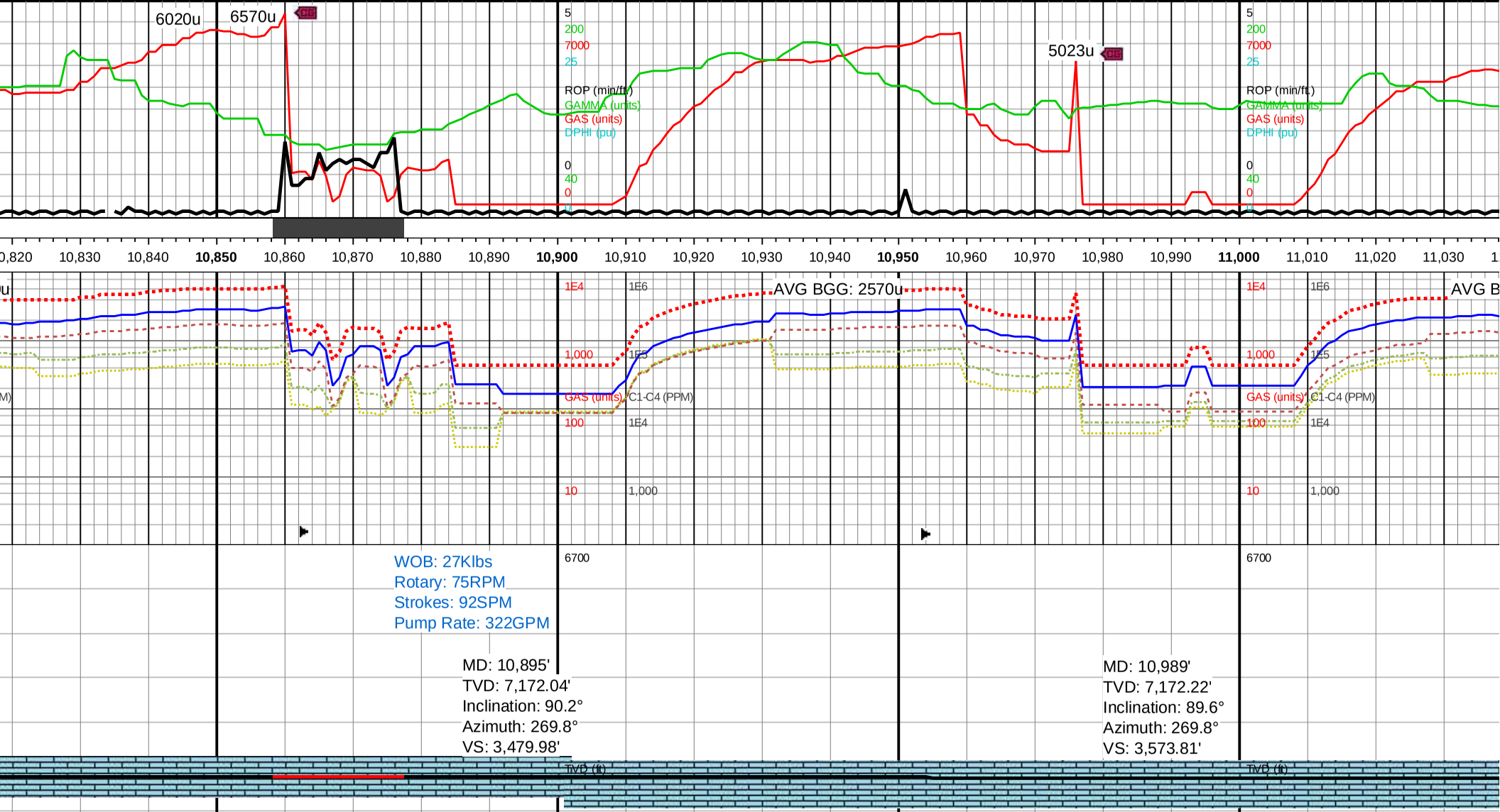
K (90%): pred gy- med gy, occ dk gy- lt
sl hd, pred blky- sb plty, v arg chk w
me thn chky lam- gy mtx, sme cal incl-
r bent, tr lse chk, v calc; MRLST (10%):
frm, chk incl & lamn, mod calc, sme f
r cut, sl stmg- mky, bri lt bl- yel flor

10640-10700 CHK (90%): pred gy- med gy, occ dk gy- lt gy brn, pred frm- sl hd, pred blky- sb plty, v arg chk w occ intbd mrlst, sme thn chky lam- gy mtx, sme cal incl- lse cal, tr frac fl cal, occ pyr, v calc; MRLST (10%): dk gy- blk, sft- sl frm, chk incl & lamn, mod calc, sme f lam, g lt bl- yel flor cut, sl stmg- mky, bri lt bl- yel flor resdl cut

10700-10760 CHK (90%): pred gy- med gy, occ dk gy- lt gy brn, pred frm- sl hd, pred blky- sb plty, v arg chk w occ intbd mrlst, sme thn chky lam- gy mtx, sme cal incl- lse cal, tr frac fl cal, occ pyr, v calc; MRLST (10%): dk gy- blk, sft- sl frm, chk incl & lamn, mod calc, sme f lam, g lt bl- yel flor cut, sl stmg- mky, bri lt bl- yel flor resdl cut

10760-10820 CHK (90%): pred gy- med gy, occ dk gy- lt gy brn, pred frm- sl hd, pred blky- sb plty, v arg chk w occ intbd mrlst, sme thn chky lam- gy mtx, sme cal incl- lse cal, tr frac fl cal, occ pyr, v calc; MRLST (10%): dk gy- blk, sft- sl frm, chk in & lamn, mod calc, sme f lam, g lt bl- yel flor cut, s stmg- mky, bri lt bl- yel flor resdl cut



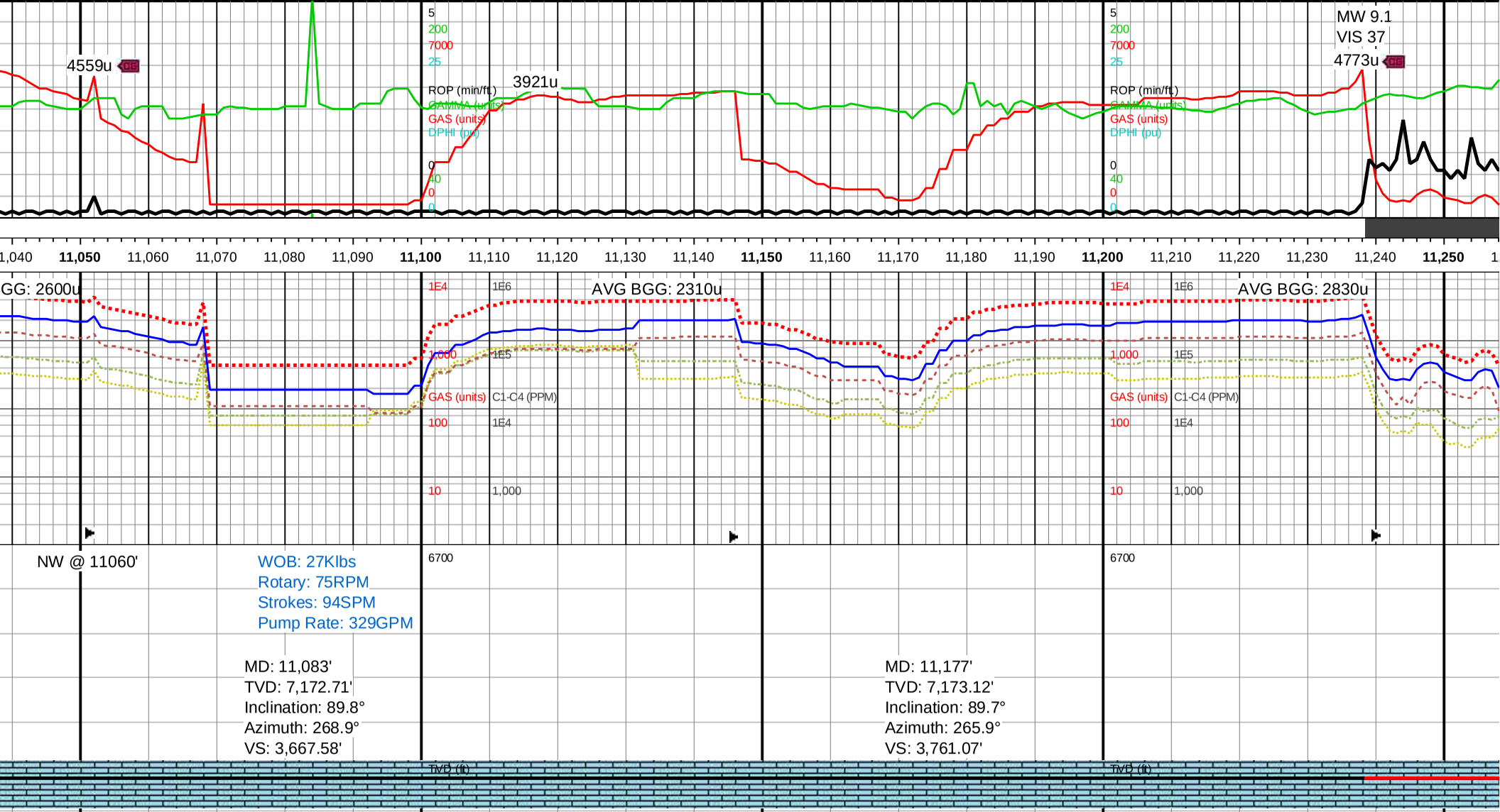



10820-10880 CHK (90%): pred gy- med gy, occ dk gy- lt gy brn, pred frm- sl hd, pred blky- sb plty, v arg chk w occ intbd mrlst, sme thn chky lam- gy mtx, sme cal incl- lse cal, tr frac fl cal, occ pyr, v calc; MRLST (10%): dk gy- blk, sft- sl frm, chk incl & lamn, mod calc, sme f lam, g lt bl- yel flor cut, sl stmg- mky, bri lt bl- yel flor resdl cut

10880-10940 CHK (90%): pred gy- med gy, sme dk gy- lt gy brn, pred frm- sl hd, pred blky- sb plty, v arg chk w occ intbd mrlst, sme thn chky lam- gy mtx, sme cal incl- lse cal, tr frac fl cal, occ pyr, rr bent v calc; MRLST (10%): dk gy- blk, occ dk gy brn, sft- sl frm, chk incl & lamn, mod calc, sme f lam, g- fr lt bl- lt gn flor cut, sl stmg- mky, bri lt bl- yel flor resdl cut

10940-11000 CHK (90%): pred gy- med gy, sme dk gy- lt gy brn, pred frm- sl hd, pred blky- sb plty, v arg chk w occ intbd mrlst, sme thn chky lam- gy mtx, sme cal incl- lse cal, tr frac fl cal, occ pyr, rr bent v calc; MRLST (10%): dk gy- blk, occ dk gy brn, sft- sl frm, chk incl & lamn, mod calc, sme f lam, g- fr lt bl- lt gn flor cut, sl stmg- mky, bri lt bl- yel flor resdl cut

11000-11060 CHK (90%): pred gy- lt gy brn, pred frm- sl hd, pred chk w occ intbd mrlst, sme thn chk cal incl- lse cal, tr frac fl cal, occ py MRLST (10%): dk gy- blk, occ dk g chk incl & lamn, mod calc, sme f la flor cut, sl stmg- mky, bri lt bl- yel f



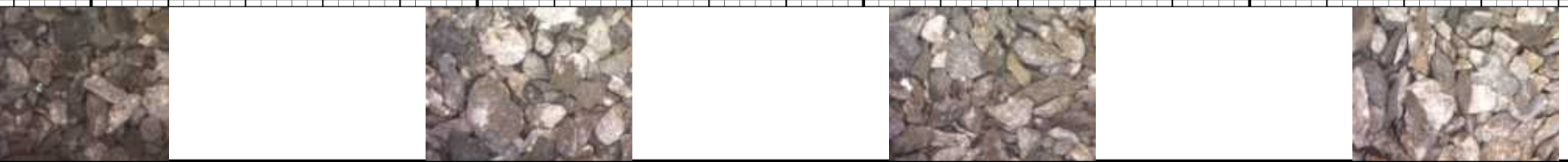
- med gy, sme dk
blky- sb plty, v arg
y lam- gy mtx, sme
yr, rr bent v calc;
gy brn, sft- sl frm,
am, g- fr lt bl- lt gn
lor resdl cut

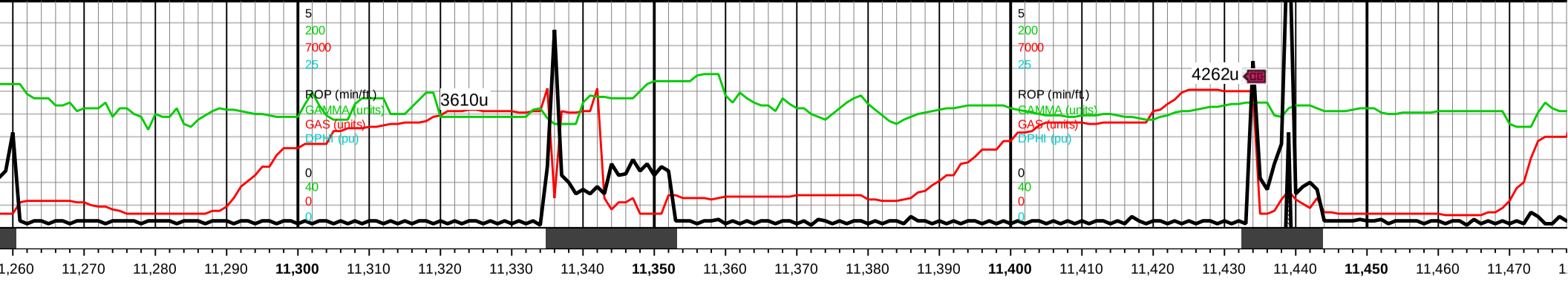
11060-11120 CHK (90%): lt gy-gy, occ dk gy, med frm-frm v arg LS, abnt thn off wh chky lamn & u f chky incl, sme vf-f pyr, rr fos frags, rr off wh c free chk, mod-v calc wi cln HCL rxn, MRLST (10%): dk gy, occ gy brn-brn, frm-v frm, com tn-brn mrly lamn & incl wi SH, mod calc wi quick drty brn HCL rxn, bl yel mky cut, op yel wh flor resdl ring, fr lt yel vis cut

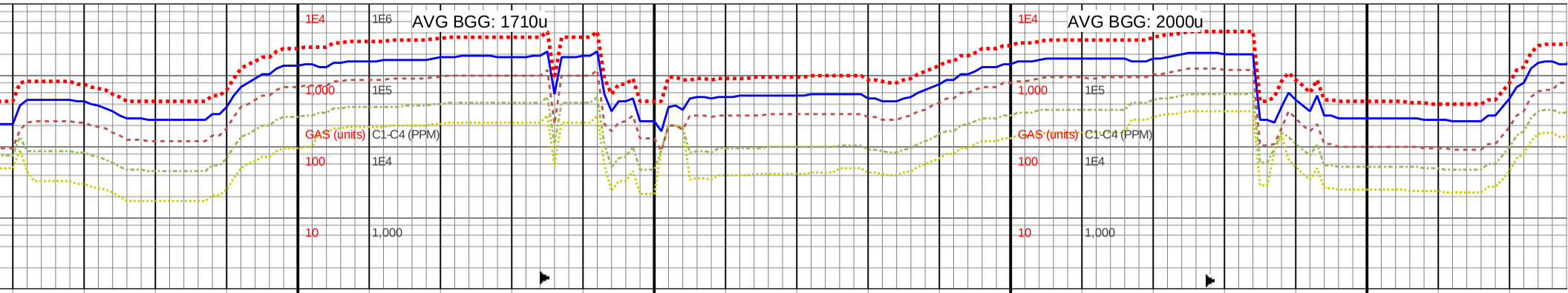
11120-11180 CHK (85%): lt gy-gy, occ dk gy, abnt thn off wh chky lamn & u f chky incl, med frm-frm v arg LS, l-mod fis, sme vf-f pyr, rr fos frags, rr off wh c free chk, mod-v calc wi cln HCL rxn, MRLST (15%): dk gy, occ gy brn-brn, frm-v frm, com tn-brn mrly lamn & incl, mod calc wi quick drty brn HCL rxn, bl yel mky cut, op yel wh flor resdl ring, fr lt yel vis cut

11180-11240 CHK (85%): pred lt gy-gy, occ dk gy-v lt gy wi abnt thn off wh chky lamn & u f chky incl, l-mod fis, med frm-frm v arg LS, sme vf-f pyr, rr fos frags, rr off wh c free chk, mod-v calc wi cln HCL rxn, MRLST (15%): dk gy, occ gy brn-brn, frm-v frm, com tn-brn mrly lamn & incl, mod calc wi quick drty brn HCL rxn, bl yel mky cut, op yel wh flor resdl ring, fr lt yel vis cut

11240-11300 C
thn off wh chky
arg LS, l-mod fis
free chk, mod-v
dk gy, occ gy br
lamn & incl, mod
yel mky cut, op







WOB: 28Klbs
Rotary: 75RPM
Strokes: 94SPM
Pump Rate: 329GPM

6700

6700

MD: 11,272'
TVD: 7,174.11'
Inclination: 89.1°
Azimuth: 267.2°
VS: 3,855.41'

MD: 11,366'
TVD: 7,175.43'
Inclination: 89.3°
Azimuth: 270°
VS: 3,949.08'

MD: 11,459'
TVD: 7,176.48'
Inclination: 89.4°
Azimuth: 270.7°
VS: 4,041.95'

HK (90%): lt gy-gy, occ dk gy, abnt
lamn & u f chky incl, med frm-frm v
s, sme vf-f pyr, rr fos frags, rr off wh c
calc wi cln HCL rxn, MRLST (10%):
n-brn, frm-v frm, com tn-brn mrly
d calc wi quick drty brn HCL rxn, bl
yel wh flor resdl ring, fr lt yel vis cut

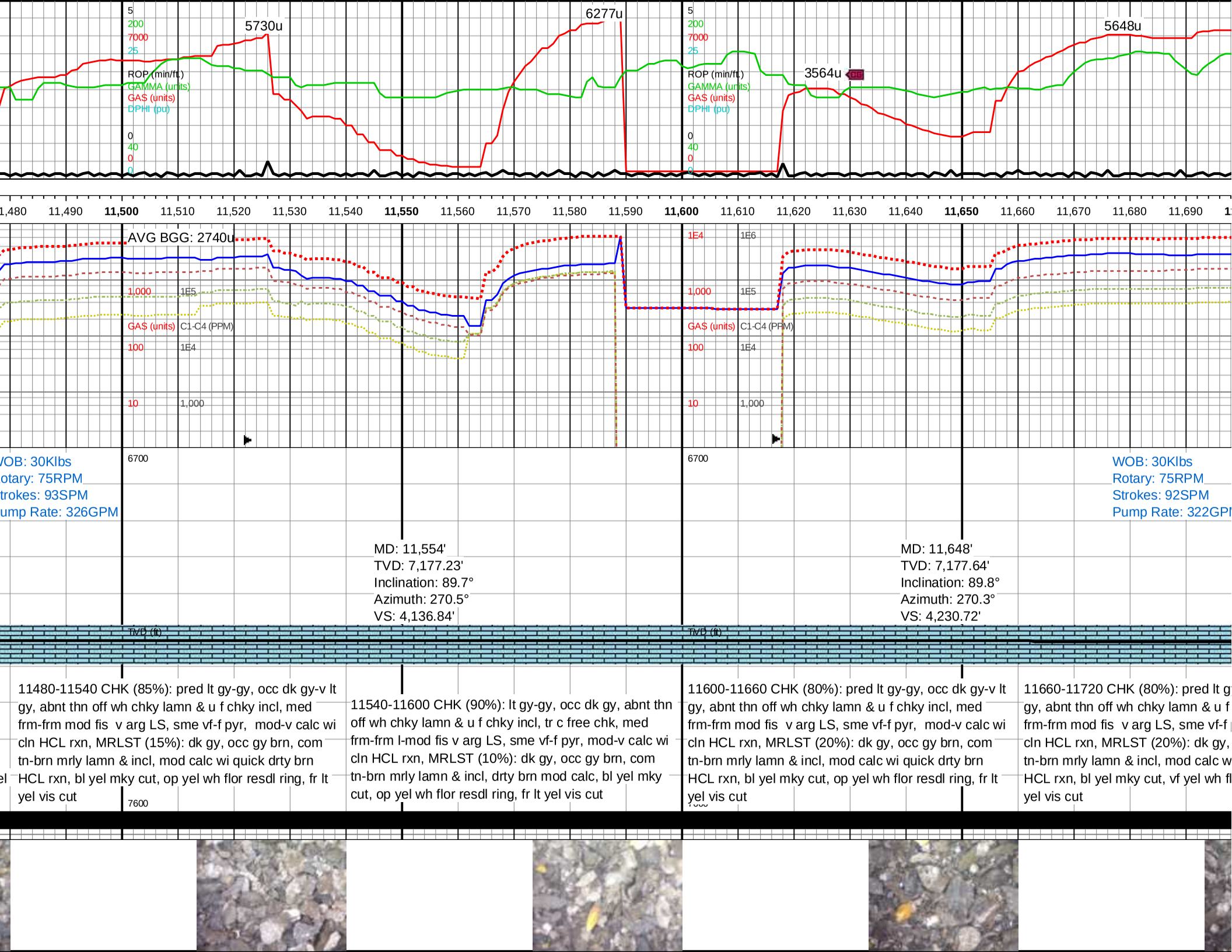
11300-11360 CHK (85%): pred lt gy-gy, occ dk gy-v lt gy, abnt thn off wh chky lamn & u f chky incl, med frm-frm mod fis v arg LS, sme vf-f pyr, mod-v calc wi cln HCL rxn, MRLST (15%): dk gy, occ gy brn-brn, frm-v frm, com tn-brn mrly lamn & incl, mod calc wi quick drty brn HCL rxn, bl yel mky cut, op yel wh flor resdl ring, fr lt yel vis cut

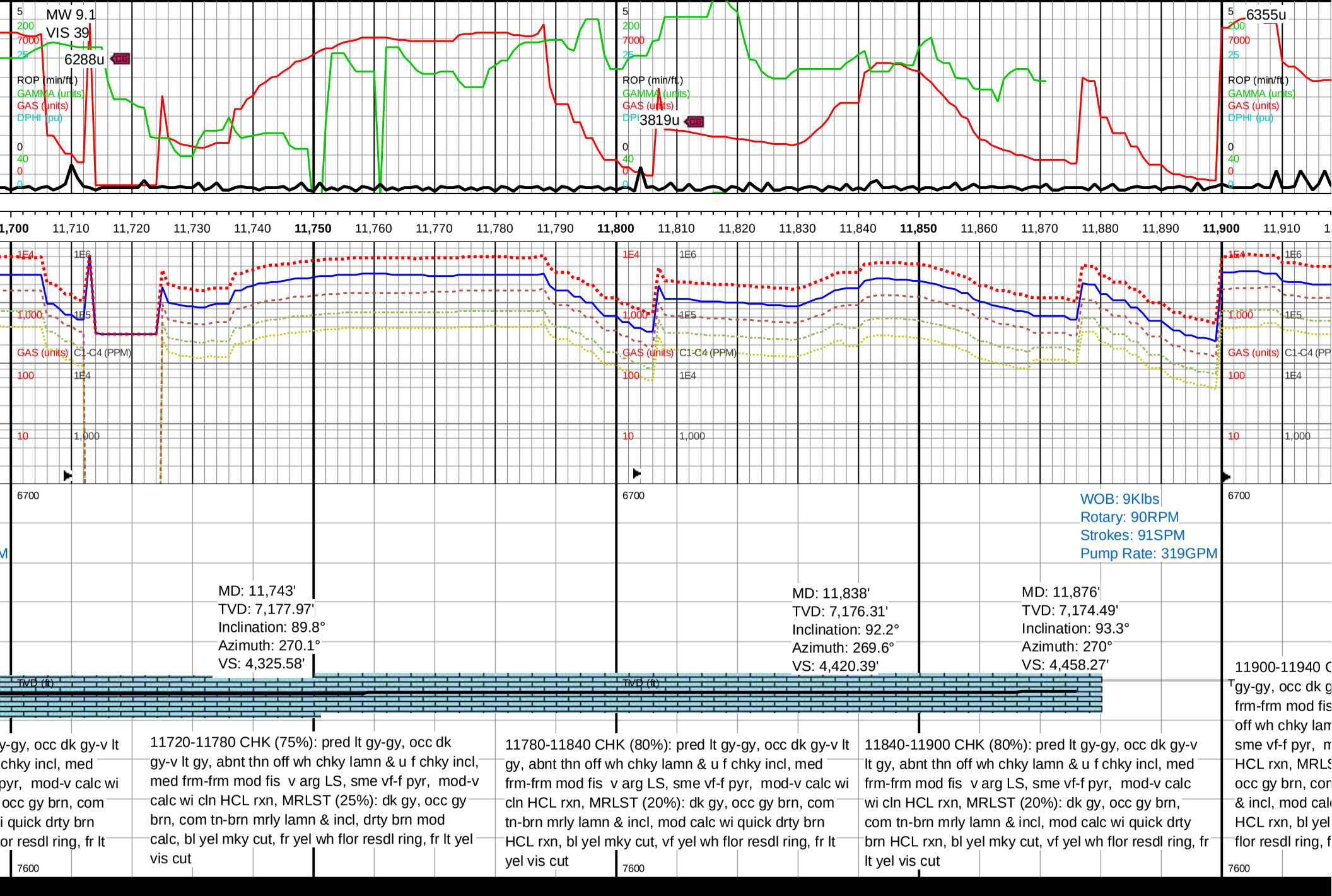
11360-11420 CHK (90%): lt gy-gy, occ dk gy, abnt thn off wh chky lamn & u f chky incl, tr c free chk, med frm-frm l-mod fis v arg LS, sme vf-f pyr, mod-v calc wi cln HCL rxn, MRLST (10%): dk gy, occ gy brn, com tn-brn mrly lamn & incl, mod calc wi quick drty brn HCL rxn, bl yel mky cut, op yel wh flor resdl ring, fr lt yel vis cut

7600

11420-11480 CHK (90%): lt gy-gy, occ dk gy, abnt thn off wh chky lamn & u f chky incl, tr c free chk, med frm-frm l-mod fis v arg LS, sme vf-f pyr, mod-v calc wi cln HCL rxn, MRLST (10%): dk gy, occ gy brn, com tn-brn mrly lamn & incl, mod calc wi quick drty brn HCL rxn, bl yel mky cut, op yel wh flor resdl ring, fr lt ye vis cut





5730u
6277u
5648u
3564u
ROP (min/ft)
GAMMA (units)
GAS (units)
DPHI (pu)
11,480 11,490 11,500 11,510 11,520 11,530 11,540 11,550 11,560 11,570 11,580 11,590 11,600 11,610 11,620 11,630 11,640 11,650 11,660 11,670 11,680 11,690
AVG BGG: 2740u
GAS (units)
C1-C4 (PPM)
WOB: 30Klbs
Rotary: 75RPM
Strokes: 93SPM
Pump Rate: 326GPM
WOB: 30Klbs
Rotary: 75RPM
Strokes: 92SPM
Pump Rate: 322GPM
MD: 11,554'
TVD: 7,177.23'
Inclination: 89.7°
Azimuth: 270.5°
VS: 4,136.84'
MD: 11,648'
TVD: 7,177.64'
Inclination: 89.8°
Azimuth: 270.3°
VS: 4,230.72'
TVD (ft)
11480-11540 CHK (85%): pred lt gy-gy, occ dk gy-v lt gy, abnt thn off wh chky lamn & u f chky incl, med frm-frm mod fis v arg LS, sme vf-f pyr, mod-v calc wi cln HCL rxn, MRLST (15%): dk gy, occ gy brn, com tn-brn mrly lamn & incl, mod calc wi quick drty brn HCL rxn, bl yel mky cut, op yel wh flor resdl ring, fr lt yel vis cut
11540-11600 CHK (90%): lt gy-gy, occ dk gy, abnt thn off wh chky lamn & u f chky incl, tr c free chk, med frm-frm l-mod fis v arg LS, sme vf-f pyr, mod-v calc wi cln HCL rxn, MRLST (10%): dk gy, occ gy brn, com tn-brn mrly lamn & incl, drty brn mod calc, bl yel mky cut, op yel wh flor resdl ring, fr lt yel vis cut
11600-11660 CHK (80%): pred lt gy-gy, occ dk gy-v lt gy, abnt thn off wh chky lamn & u f chky incl, med frm-frm mod fis v arg LS, sme vf-f pyr, mod-v calc wi cln HCL rxn, MRLST (20%): dk gy, occ gy brn, com tn-brn mrly lamn & incl, mod calc wi quick drty brn HCL rxn, bl yel mky cut, op yel wh flor resdl ring, fr lt yel vis cut
11660-11720 CHK (80%): pred lt g
gy, abnt thn off wh chky lamn & u f
frm-frm mod fis v arg LS, sme vf-f
cln HCL rxn, MRLST (20%): dk gy,
tn-brn mrly lamn & incl, mod calc w
HCL rxn, bl yel mky cut, vf yel wh fl
yel vis cut


MW 9.1
VIS 39
6288u
3819u
6355u
ROP (min/ft)
GAMMA (units)
GAS (units)
DPHI (pu)
11,700
11,710
11,720
11,730
11,740
11,750
11,760
11,770
11,780
11,790
11,800
11,810
11,820
11,830
11,840
11,850
11,860
11,870
11,880
11,890
11,900
11,910
GAS (units)
C1-C4 (PPM)
6700
7600
WOB: 9Klbs
Rotary: 90RPM
Strokes: 91SPM
Pump Rate: 319GPM
MD: 11,743'
TVD: 7,177.97'
Inclination: 89.8°
Azimuth: 270.1°
VS: 4,325.58'
MD: 11,838'
TVD: 7,176.31'
Inclination: 92.2°
Azimuth: 269.6°
VS: 4,420.39'
MD: 11,876'
TVD: 7,174.49'
Inclination: 93.3°
Azimuth: 270°
VS: 4,458.27'
TVD (ft)
11720-11780 CHK (75%): pred lt gy-gy, occ dk gy-v lt gy, abnt thn off wh chky lamn & u f chky incl, med frm-frm mod fis v arg LS, sme vf-f pyr, mod-v calc wi cln HCL rxn, MRLST (25%): dk gy, occ gy brn, com tn-brn mrly lamn & incl, drty brn mod calc, bl yel mky cut, fr yel wh flor resdl ring, fr lt yel vis cut
11780-11840 CHK (80%): pred lt gy-gy, occ dk gy-v lt gy, abnt thn off wh chky lamn & u f chky incl, med frm-frm mod fis v arg LS, sme vf-f pyr, mod-v calc wi cln HCL rxn, MRLST (20%): dk gy, occ gy brn, com tn-brn mrly lamn & incl, mod calc wi quick drty brn HCL rxn, bl yel mky cut, vf yel wh flor resdl ring, fr lt yel vis cut
11840-11900 CHK (80%): pred lt gy-gy, occ dk gy-v lt gy, abnt thn off wh chky lamn & u f chky incl, med frm-frm mod fis v arg LS, sme vf-f pyr, mod-v calc wi cln HCL rxn, MRLST (20%): dk gy, occ gy brn, com tn-brn mrly lamn & incl, mod calc wi quick drty brn HCL rxn, bl yel mky cut, vf yel wh flor resdl ring, fr lt yel vis cut
11900-11940 C
gy-gy, occ dk g
frm-frm mod fis
off wh chky lam
sme vf-f pyr, m
HCL rxn, MRLS
occ gy brn, com
& incl, mod calc
HCL rxn, bl yel
flor resdl ring, f

Bit #: 4
Type: VS513DG
Size: 6 1/8
Depth In: 7,585'
Depth Out: 11,939'
Hours: 16.2 hrs
Avg Ft/Hr: 268 '/hr
Jets: 5X14s
S/N: 4007606

1,920 11,930 11,940 **11,950** 11,960 11,970 11,980 11,990 **12,(**

M)

TD @ 11,939' on 7/19/15

CHK (80%): lt
y-v lt gy, med
s v arg LS, abnt thn
nn & u f chky incl,
nod-v calc wi cln
ST (20%): dk gy,
n tn-brn mrly lamn
c wi quick drty brn
mky cut, vf yel wh
r lt yel vis cut