RESERVOIR GROUP

Scale: 5" / 100'
Measured Depth Log

Well Name	Flaschenriem 2		
Location	Section 3, Township 4N, Range 68W		
State	Colorado	**County**	Weld
Country	USA	**Rig Number**	Ensign 140
API Number	05-123-49817	**AFE #**	N/A
Geographic Region	Rockies	**Field**	Wattenberg
Spud Date	3/22/2019	**Drilling Completed**	4/27/2019
Surface Coordinates	1,848'FNL & 2,180'FWL, Sec:3 T:4N R:68W Latitude: 40.34413, Longitude: -104.99154		
Bottom Hole Coordinates	1,994'FSL & 460'FEL, Sec:35 T:5N R:68W Latitude: 40.35499 Longitude: -104.96611		
Ground Elevation	5,068'	**K.B. Elevation**	5,091'
Logged Interval	8,150' **To** 15,889'	**Total Depth**	15,889'
Formation	Codell		
Type of Drilling Fluid	Oil Based Mud		

Operator

Company Petro Operating Company, LLC

Address 9033 East Easter Place, Suite 112
Centennial, CO 80112-2105

Petro Operatin
Company, LLC

Geologist

Name Michael Domenick

Company Petro Operating Company, LLC

Address 9033 East Easter Place, Suite 112
Centennial, CO 80112-2105

Petro Operatin
Company, LLC

Other

Loggers: Byron Pitulski/Greg Diefenbach

Services Provided: 2 Man Logging, Geosteering

Equipment: ML-585

Start Date 04/25/2019

Release Date: 04/27/2019

Job #: 2073RK1904

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	CHALK	CONGLOMERATE	METAMORPHIC
LIMESTONE	SHALE	BRECCIA	CEMENT

Acc

Fossils

F FOSSIL		– ARGILLACEOU
GASTROPOD		ARGILLITE GR
ALGAE	OOLITE	B BENTONITE
AMPHIPORA	OSTRACOD	BITUMENOUS
BELEMNITE	PELECYPOD	BRECCIA FRA
BIOCLASTIC	PELLET	CALCAREOUS
BRACHOIPOD	PISOLITE	CARBONACEO
BRYOZOA	PLANT REMAINS	CHTDK
CEPHALOPOD	PLANT SPORES	CHTLT
CORAL	SCAPHOPOD	COAL - THIN BE
CRINOID	STROMATOPOROID	DOLOMITIC
ECHINOID		FELDSPAR
FISH		FERRUGINOUS
FORAMINIFERA		FERRUGINOUS

Minerals

ANHYDRITIC

Other

Oil Show

D DEAD
EVEN
QUESTIONABLE
SPOTTED STAINING

Porosity

E EARTHY
FENESTRAL
F FRACTURE
INTERCRYSTALLINE
INTEROOLITIC
MOLDIC

O ORGANIC
P PINPOINT
VUGGY

Engineering

BIT
CASING
CONNECTION (LEFT)
CONNECTION (RIGHT)
CONNECTION GAS
CORE - LOST
CORE - RECOVERED
DST INTERVAL
FAULT

essories

S
AIN
SUBSTANCE
GMENTS
US FLAKES
EDS
S PELLET
S

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

r Symbols

FORMATION TOP
AS SHOW
EPTH MN DEPTH
ORMAL FAULT
L SHOW
VERTURNED STRATA
EVERSE FAULT
DEWALL CORE (LEFT)
DEWALL CORE (RIGHT)
DE
SURVEY
TRIP GAS
RELINE TESTED - LEFT
RELINE TESTED - RT

Rounding

ANGULAR
ROUNDED
SUBANG
SUBRND

Textures

BOUNDSTONE
CHALKY
CRYPTOXLN
EARTHY
FINELYXLN
GRAINSTONE
LITHOGRAPHIC
MICROXLN
MUDSTONE
PACKSTONE
WACKESTONE

Sorting

MODERATE
POOR
WELL

Curves
ROP
GAMMA

1000
200
ROP (ft/hr)
GAMMA (API)
0
0

Bit #: 2
Type: ATD505T
Size: 8.5
Depth In: 1,580'
Depth Out: 15,889'
Hours: 54.2 hrs
Avg Ft/Hr: 264 '/hr
Jets: 5x15

Slide/Rotate

Depth Labels

8,110 8,120 8,130 8,140 **8,150** 8,160 8,170 8,180 8,190 **8,200** 8,210 8,220 8,230 8,240 **8,250** 8,260 8,270 8,280 8,290 **8,300**

Notes

GD

MD: 8,190'
INC: 47.01°
AZM: 48.38°
TVD: 6,995.15'
VS: 1,390.64'

Niobrara B
8,192'MD / 6,996'TVD

WOB: 17.5klbs
RPM: 101
SPM: 202
SPP: 3,647psi

MW IN: 9.5
VIS IN: 59
MW OUT: 9.5+
VIS OUT: 56

MD: 8,285'
INC: 51.49°
AZM: 58.23°
TVD: 7,057.24'
VS: 1,461.85'

Total Gas
GAS
C1
C2
C3
C4
C5

1E4
2E6
1,000
2E5
GAS (units)
C1-C5 (PPM)
100
2E4
10
2E3

Loggers
BP - Byron Pitulski
GD - Greg Diefenbach

System Calibrated
1% Methane = 100 units
100% Methane = 10000 units

282u

Screen Up
Shaker #2

Well Bore
TVD

Petro Operating Co.
Flaschenriem 2

9 5/8" Surface Casing @ 1,567'

Spud Date:
03/22/2019

Logging Began:
04/25/2019
05:59

All Depths Correspond to Driller's Pipe Tally

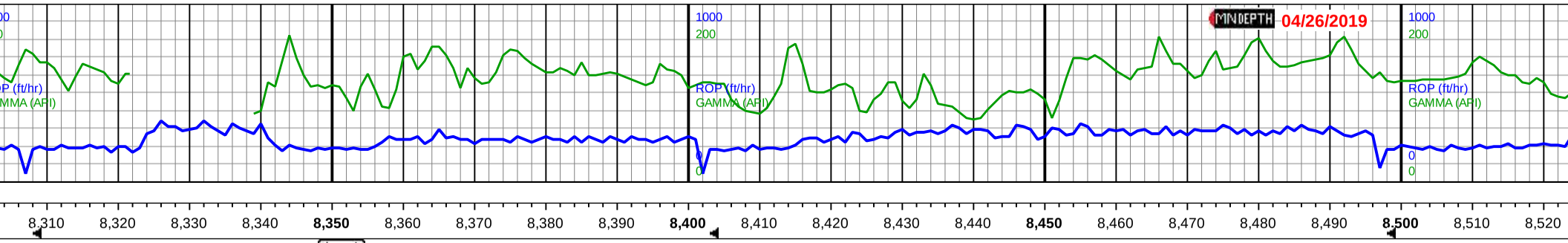
Continued from Vertical Log

6250
TVD (ft)
8250

60% MRLST: v dk gy, gy ip, mot, frm-sl hd, tab-blky, slty tex, tr cal incl, vf CHK lam, hi calc; 40% CHK: lt brn-offwht, gyshbn ip, fri-sme frm, sb blky-sb ang-sb rnd, rthy tex, vugy, com intbdd MRLST

60% CHK: lt brn-offwht, gyshbn ip, fri-sme frm, sb blky-sb ang-sb rnd, rthy tex, vugy, com intbdd MRLST; 40% MRLST: v dk gy, gy ip, mot, frm-sl hd, tab-blky, slty tex, tr cal incl, vf CHK lam, hi calc

Images



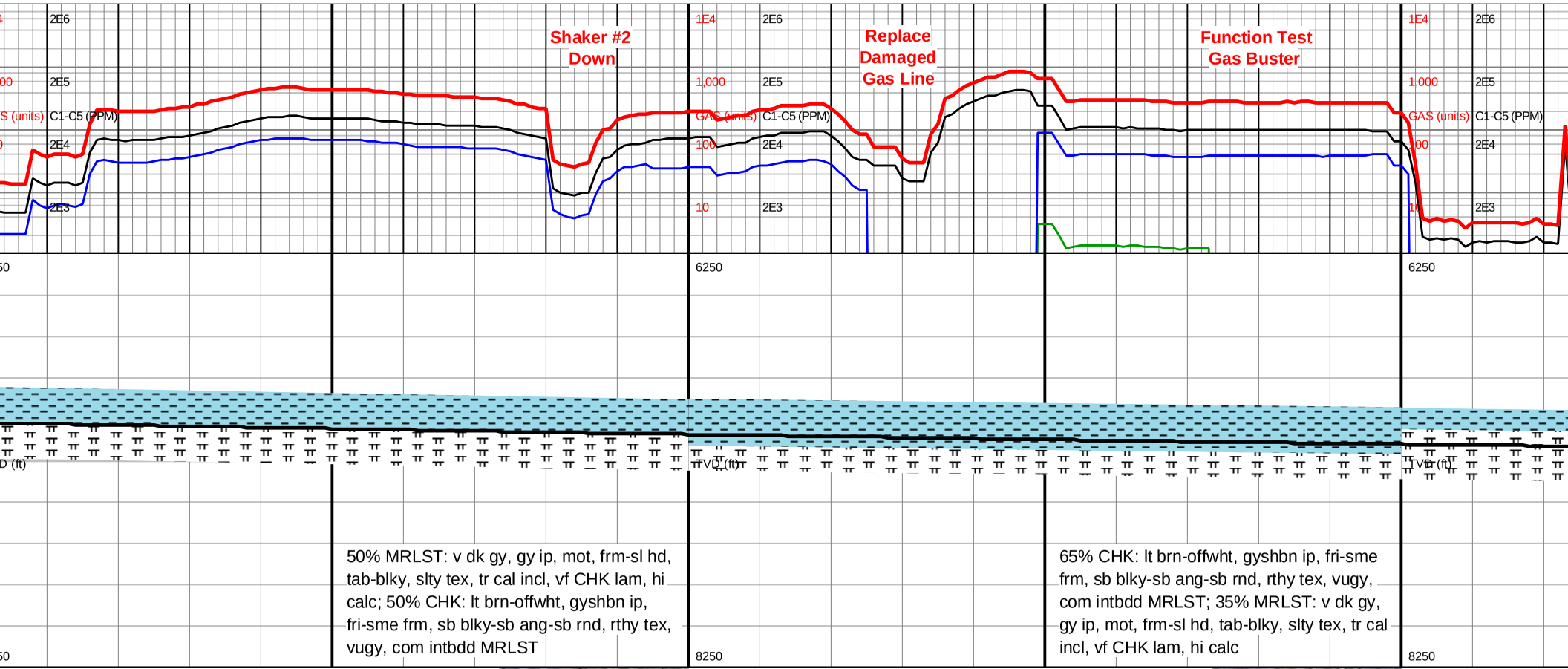
Niobrara C
8,351'MD / 7,096'TVD

MD: 8,379'
INC: 57.11°
AZM: 64.31°
TVD: 7,112.1'
VS: 1,538.09'

WOB: 14.7klbs
RPM: 100
SPM: 202
SPP: 3,693psi

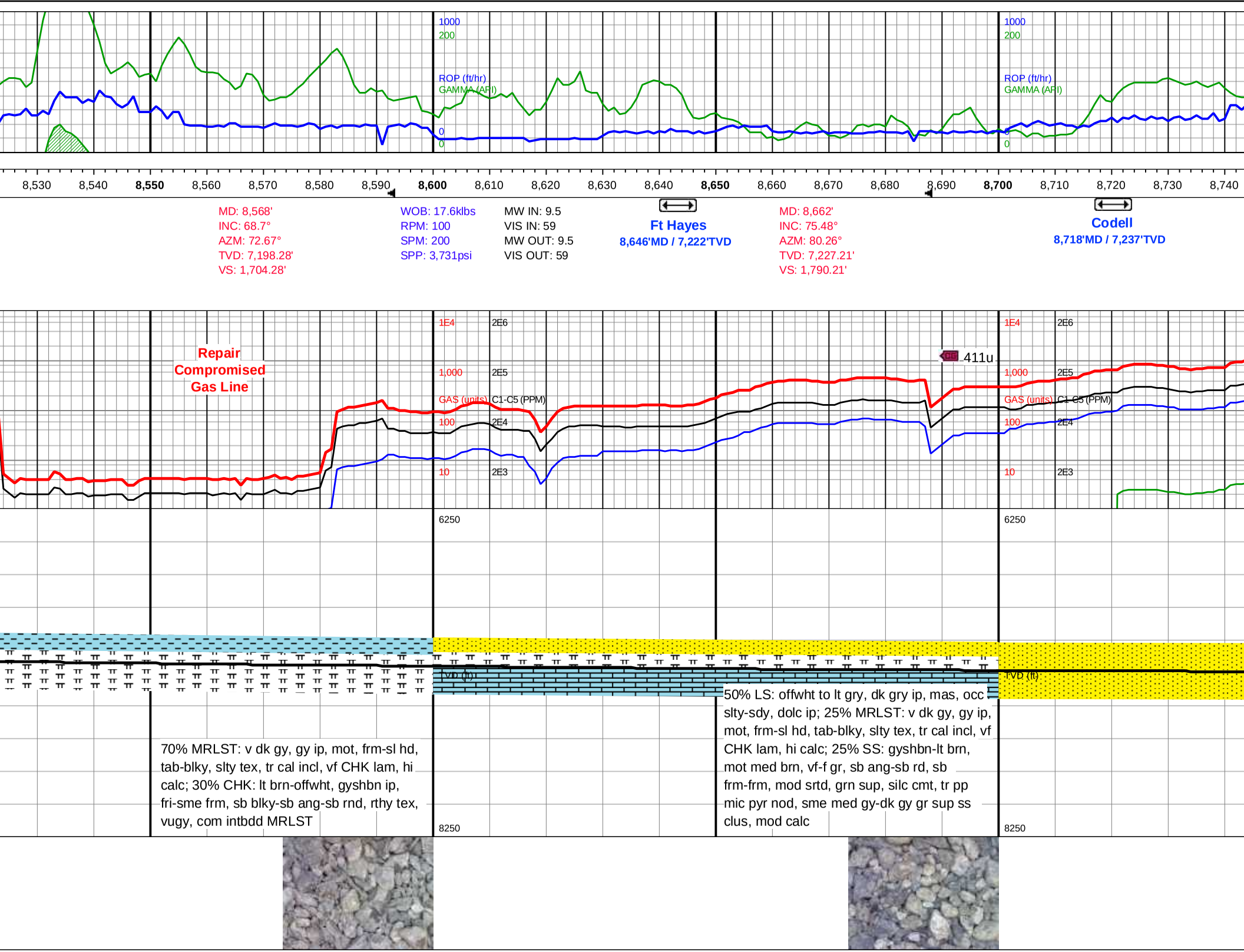
MD: 8,474'
INC: 62.79°
AZM: 68.14°
TVD: 7,159.67'
VS: 1,619.88'

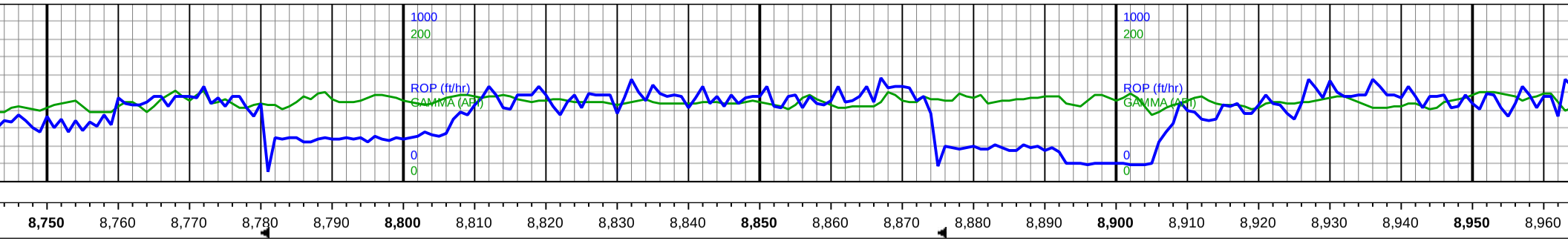
MW IN: 9.5
VIS IN: 61
MW OUT: 9.5+
VIS OUT: 61



50% MRLST: v dk gy, gy ip, mot, frm-sl hd, tab-blky, slty tex, tr cal incl, vf CHK lam, hi calc; 50% CHK: lt brn-offwht, gyshbn ip, fri-sme frm, sb blky-sb ang-sb rnd, rthy tex, vugy, com intbdd MRLST

65% CHK: lt brn-offwht, gyshbn ip, fri-sme frm, sb blky-sb ang-sb rnd, rthy tex, vugy, com intbdd MRLST; 35% MRLST: v dk gy, gy ip, mot, frm-sl hd, tab-blky, slty tex, tr cal incl, vf CHK lam, hi calc


1000
200
ROP (ft/hr)
GAMMA (API)
0
0
8,530
8,540
8,550
8,560
8,570
8,580
8,590
8,600
8,610
8,620
8,630
8,640
8,650
8,660
8,670
8,680
8,690
8,700
8,710
8,720
8,730
8,740
MD: 8,568'
INC: 68.7°
AZM: 72.67°
TVD: 7,198.28'
VS: 1,704.28'
WOB: 17.6klbs
RPM: 100
SPM: 200
SPP: 3,731psi
MW IN: 9.5
VIS IN: 59
MW OUT: 9.5
VIS OUT: 59
Ft Hayes
8,646'MD / 7,222'TVD
MD: 8,662'
INC: 75.48°
AZM: 80.26°
TVD: 7,227.21'
VS: 1,790.21'
Codell
8,718'MD / 7,237'TVD
Repair
Compromised
Gas Line
1E4
2E6
1,000
2E5
GAS (units)
C1-C5 (PPM)
100
2E4
10
2E3
411u
6250
8250
TVD (ft)
70% MRLST: v dk gy, gy ip, mot, frm-sl hd, tab-blky, slty tex, tr cal incl, vf CHK lam, hi calc; 30% CHK: lt brn-offwht, gyshbn ip, fri-sme frm, sb blky-sb ang-sb rnd, rthy tex, vugy, com intbdd MRLST
50% LS: offwht to lt gry, dk gry ip, mas, occ slty-sdy, dolc ip; 25% MRLST: v dk gy, gy ip, mot, frm-sl hd, tab-blky, slty tex, tr cal incl, vf CHK lam, hi calc; 25% SS: gyshbn-lt brn, mot med brn, vf-f gr, sb ang-sb rd, sb frm-frm, mod srtd, grn sup, silc cmt, tr pp mic pyr nod, sme med gy-dk gy gr sup ss clus, mod calc



MD: 8,757'
INC: 84.55°
AZM: 88.92°
TVD: 7,243.69'
VS: 1,875.54'

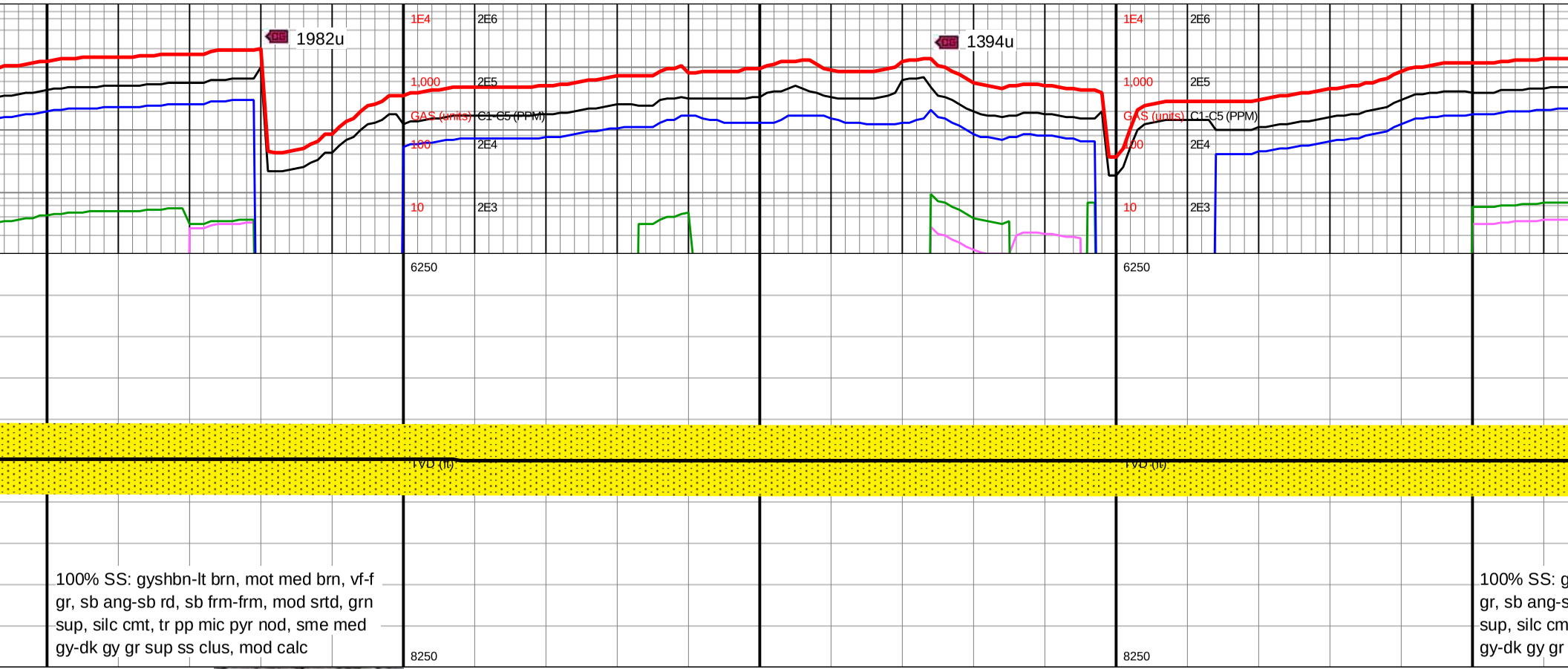
WOB: 18.9klbs
RPM: 100
SPM: 200
SPP: 3,782psi

MW IN: 9.5
VIS IN: 59
MW OUT: 9.4+
VIS OUT: 58

MD: 8,851'
INC: 88.98°
AZM: 90.04°
TVD: 7,249'
VS: 1,957.78'

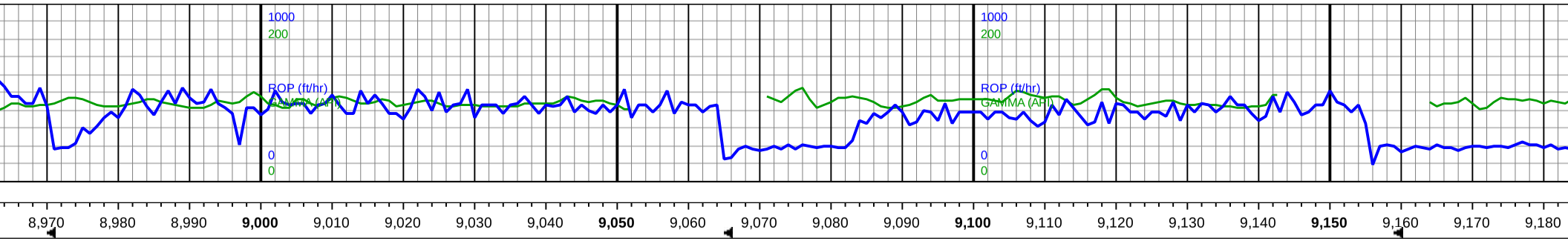
Land Curve
8,870'MD / 7,249'TVD

MD: 8,945'
INC: 90.12°
AZM: 89.31°
TVD: 7,249.74'
VS: 2,040.02'



100% SS: gyshbn-lt brn, mot med brn, vf-f gr, sb ang-sb rd, sb frm-frm, mod srtd, grn sup, silc cmt, tr pp mic pyr nod, sme med gy-dk gy gr sup ss clus, mod calc

100% SS: g
gr, sb ang-s
sup, silc cm
gy-dk gy gr

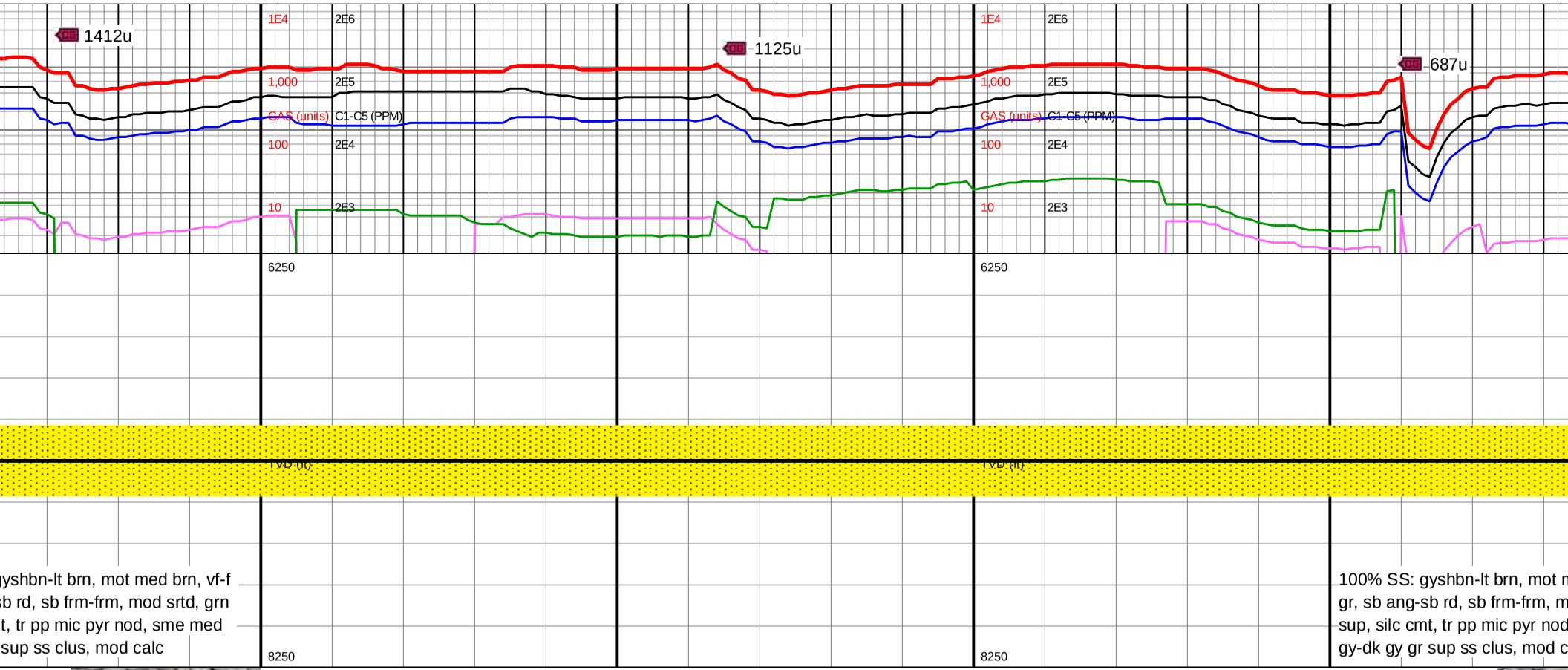


WOB: 20.6klbs
RPM: 100
SPM: 201
SPP: 3,940psi

MD: 9,040'
INC: 90.03°
AZM: 87.86°
TVD: 7,249.61'
VS: 2,124'

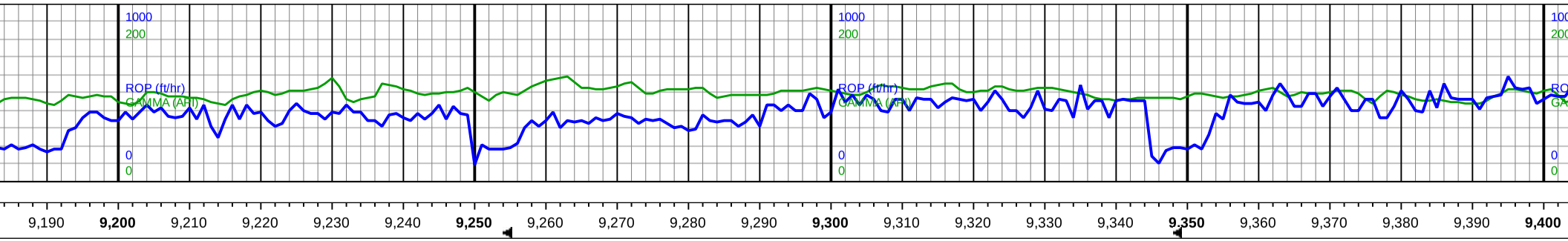
MW IN: 9.5+
VIS IN: 62
MW OUT: 9.6
VIS OUT: 59

MD: 9,134'
INC: 89.78°
AZM: 86.35°
TVD: 7,249.77'
VS: 2,208.19'



yshbn-lt brn, mot med brn, vf-f
sb rd, sb frm-frm, mod srtd, grn
t, tr pp mic pyr nod, sme med
sup ss clus, mod calc

100% SS: gyshbn-lt brn, mot m
gr, sb ang-sb rd, sb frm-frm, m
sup, silc cmt, tr pp mic pyr nod
gy-dk gy gr sup ss clus, mod c

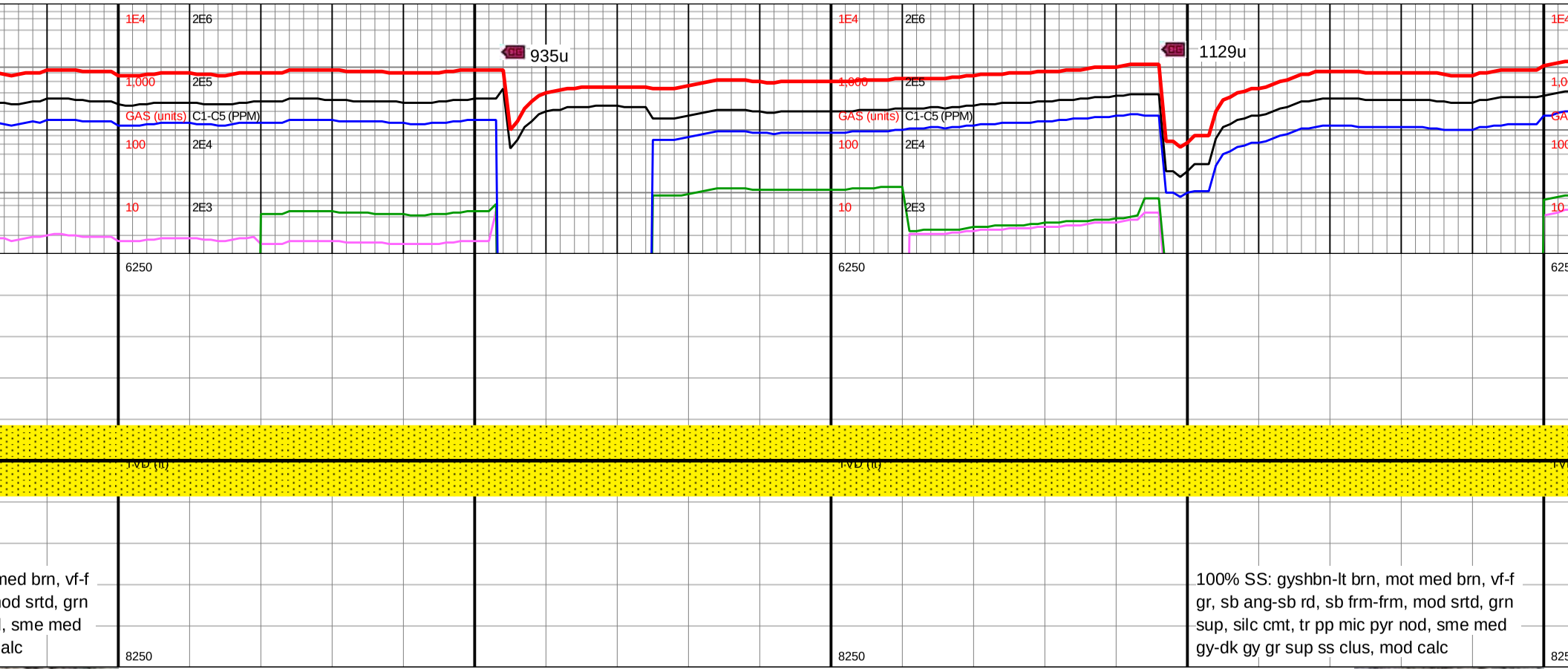


WOB: 13.2klbs
RPM: 100
SPM: 202
SPP: 3,965psi

MD: 9,229'
INC: 90.03°
AZM: 86.62°
TVD: 7,249.93'
VS: 2,293.74'

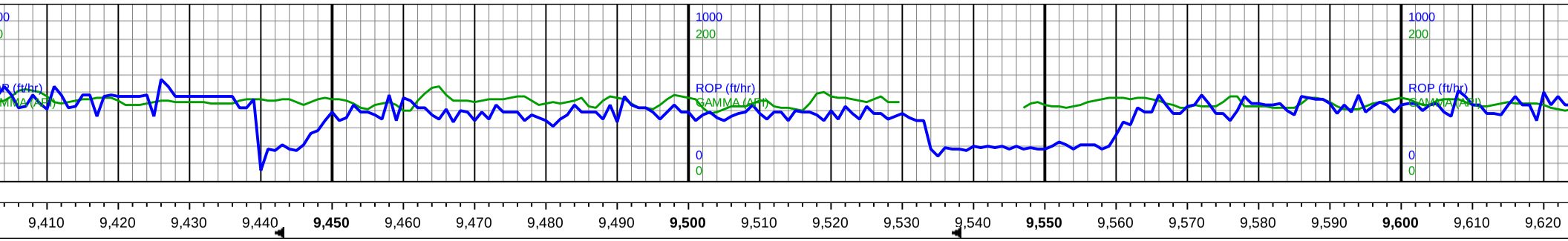
MD: 9,324'
INC: 89.78°
AZM: 87.87°
TVD: 7,250.08'
VS: 2,378.73'

WOB: 15.9klb
RPM: 100
SPM: 200
SPP: 3,955ps



med brn, vf-f
od srtd, grn
, sme med
alc

100% SS: gyshbn-lt brn, mot med brn, vf-f gr, sb ang-sb rd, sb frm-frm, mod srtd, grn sup, silc cmt, tr pp mic pyr nod, sme med gy-dk gy gr sup ss clus, mod calc

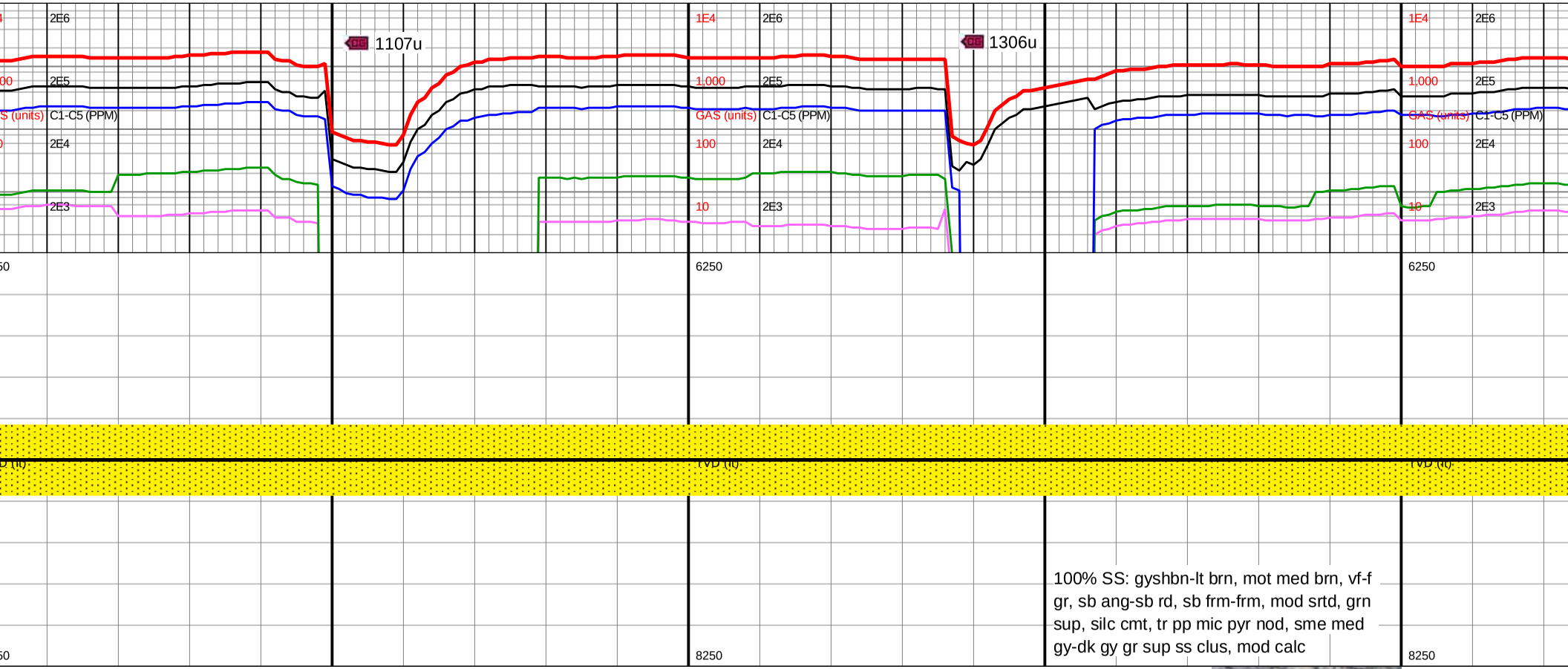


MD: 9,418'
INC: 89.75°
AZM: 88.65°
TVD: 7,250.47'
VS: 2,462.07'

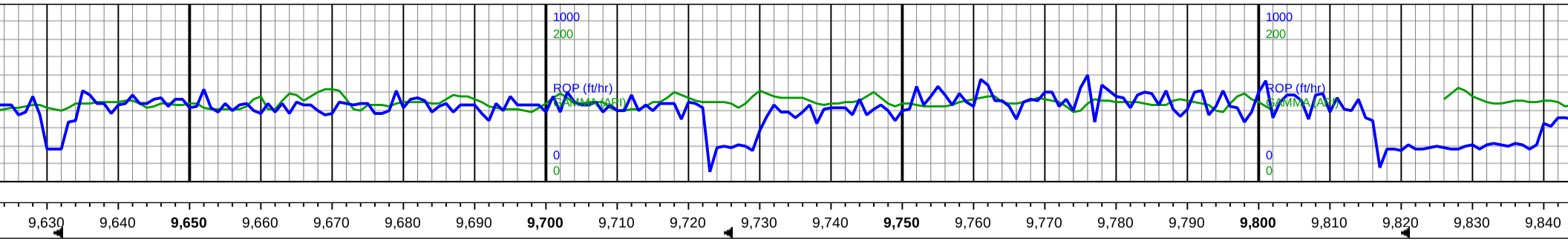
MW IN: 9.5+
VIS IN: 61
MW OUT: 9.5+
VIS OUT: 58

MD: 9,512'
INC: 89.82°
AZM: 88.84°
TVD: 7,250.82'
VS: 2,545.04'

WOB: 14.9klbs
RPM: 100
SPM: 202
SPP: 4,083psi



100% SS: gyshbn-lt brn, mot med brn, vf-f gr, sb ang-sb rd, sb frm-frm, mod srtd, grn sup, silc cmt, tr pp mic pyr nod, sme med gy-dk gy gr sup ss clus, mod calc



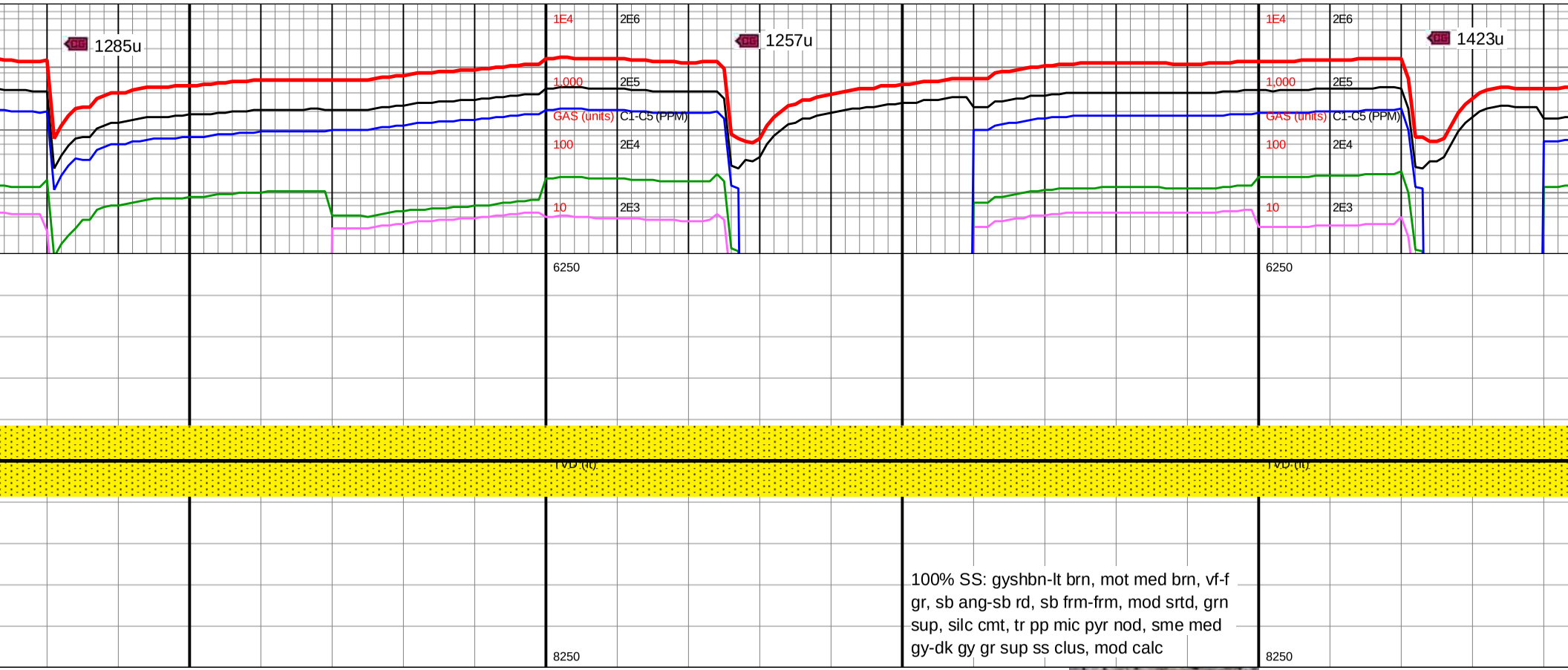
,606'
90.03°
89.71°
7,250.94'
,627.6'

MW IN: 9.6
VIS IN: 62
MW OUT: 9.6
VIS OUT: 61

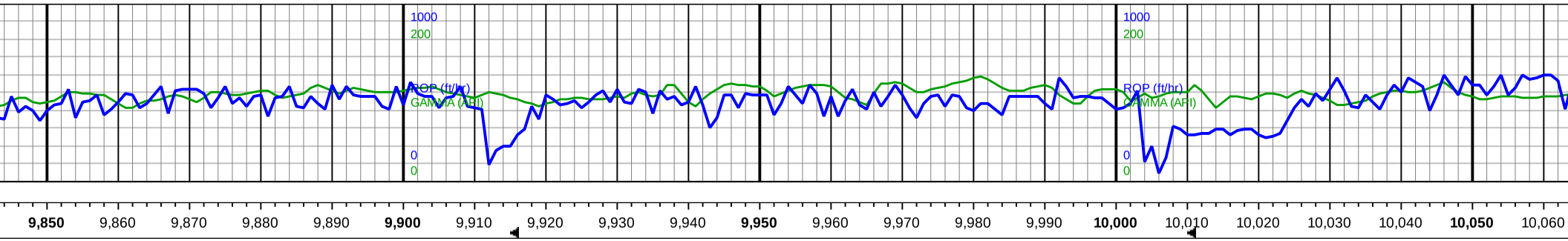
MD: 9,701'
INC: 90.12°
AZM: 90.99°
TVD: 7,250.82'
VS: 2,710.17'

MD: 9,795'
INC: 90.06°
AZM: 91.78°
TVD: 7,250.67'
VS: 2,791.01'

WOB: 18.3klbs
RPM: 100
SPM: 202
SPP: 4,176psi



100% SS: gyshbn-lt brn, mot med brn, vf-f gr, sb ang-sb rd, sb frm-frm, mod srtd, grn sup, silc cmt, tr pp mic pyr nod, sme med gy-dk gy gr sup ss clus, mod calc

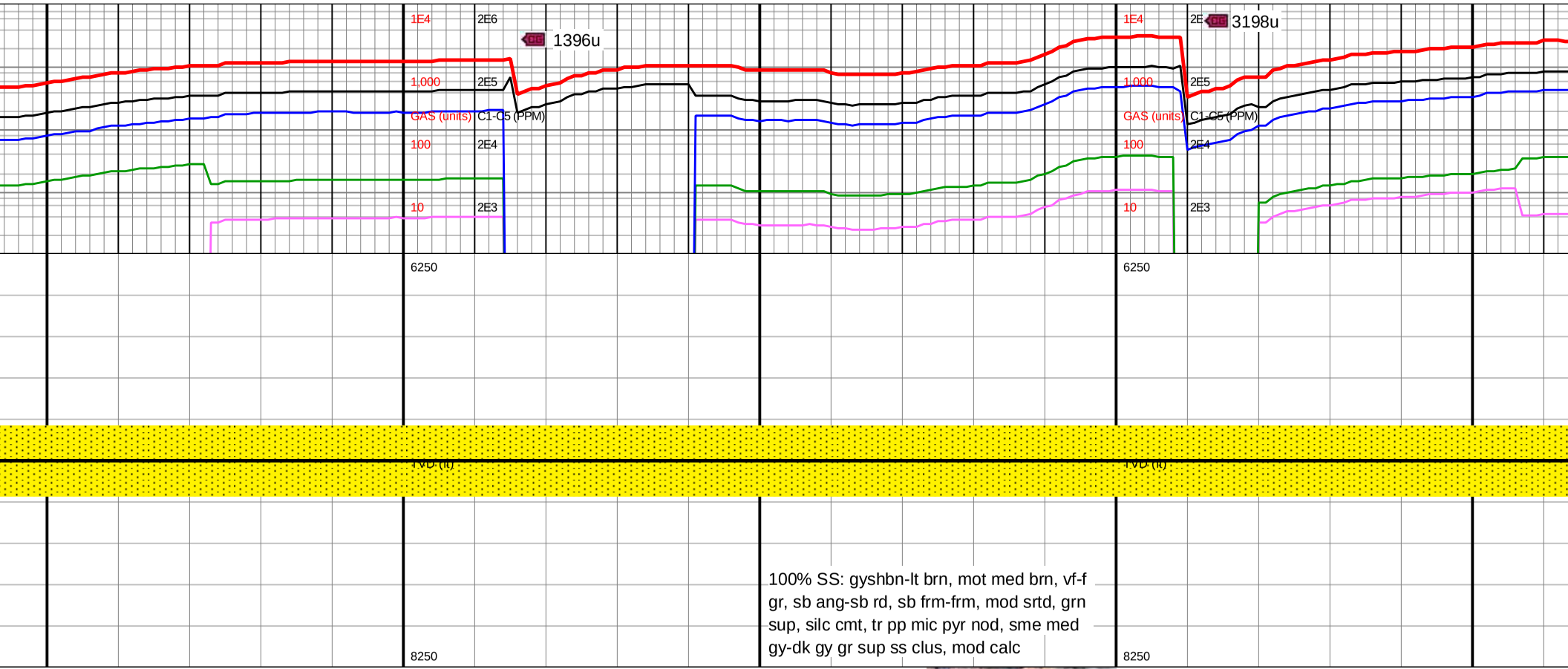


MD: 9,890'
INC: 90.15°
AZM: 92.61°
TVD: 7,250.5'
VS: 2,872.03'

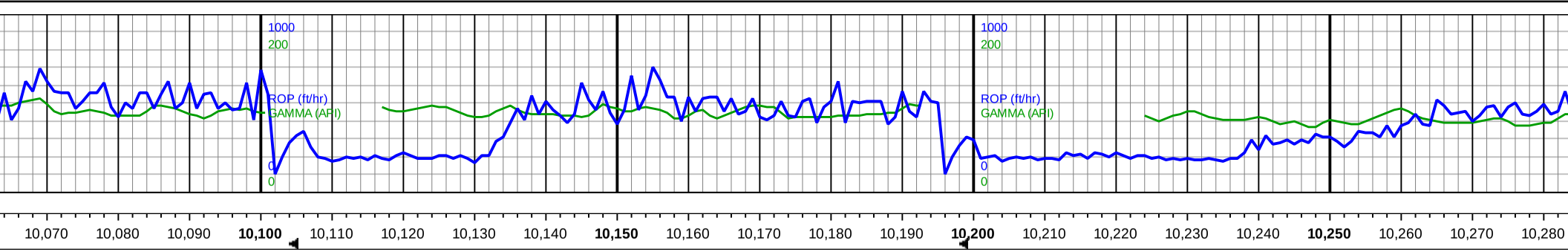
MW IN: 9.6
VIS IN: 65
MW OUT: 9.6+
VIS OUT: 60

MD: 9,985'
INC: 90.06°
AZM: 92.67°
TVD: 7,250.32'
VS: 2,952.65'

WOB: 13.3klbs
RPM: 100
SPM: 201
SPP: 3,971psi



100% SS: gyshbn-lt brn, mot med brn, vf-f gr, sb ang-sb rd, sb frm-frm, mod srtd, grn sup, silc cmt, tr pp mic pyr nod, sme med gy-dk gy gr sup ss clus, mod calc



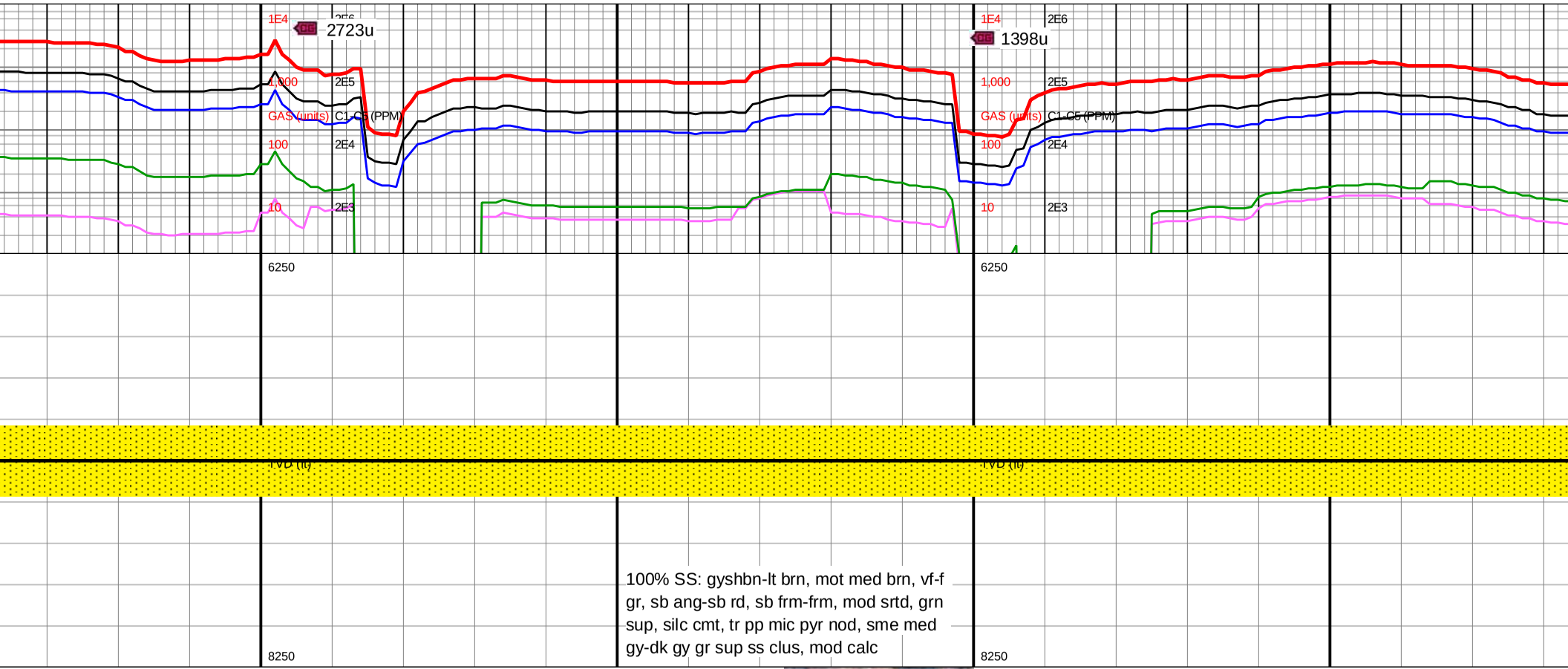
MD: 10,079'
INC: 90.09°
AZM: 93.08°
TVD: 7,250.2'
VS: 3,032.23'

MD: 10,173'
INC: 90.18°
AZM: 91.96°
TVD: 7,249.98'
VS: 3,112.1'

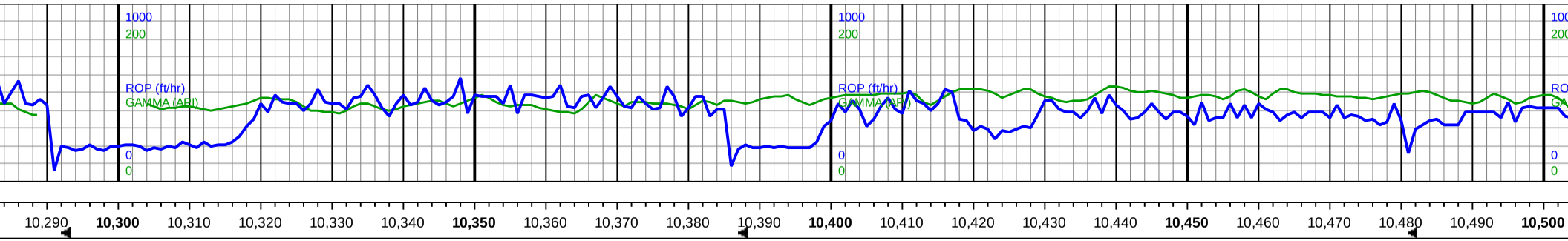
WOB: 19.1klbs
RPM: 100
SPM: 200
SPP: 4,161psi

MW IN: 9.6
VIS IN: 64
MW OUT: 9.6+
VIS OUT: 63

MD: 10,268'
INC: 90.06°
AZM: 90.08°
TVD: 7,249.78'
VS: 3,194.12'



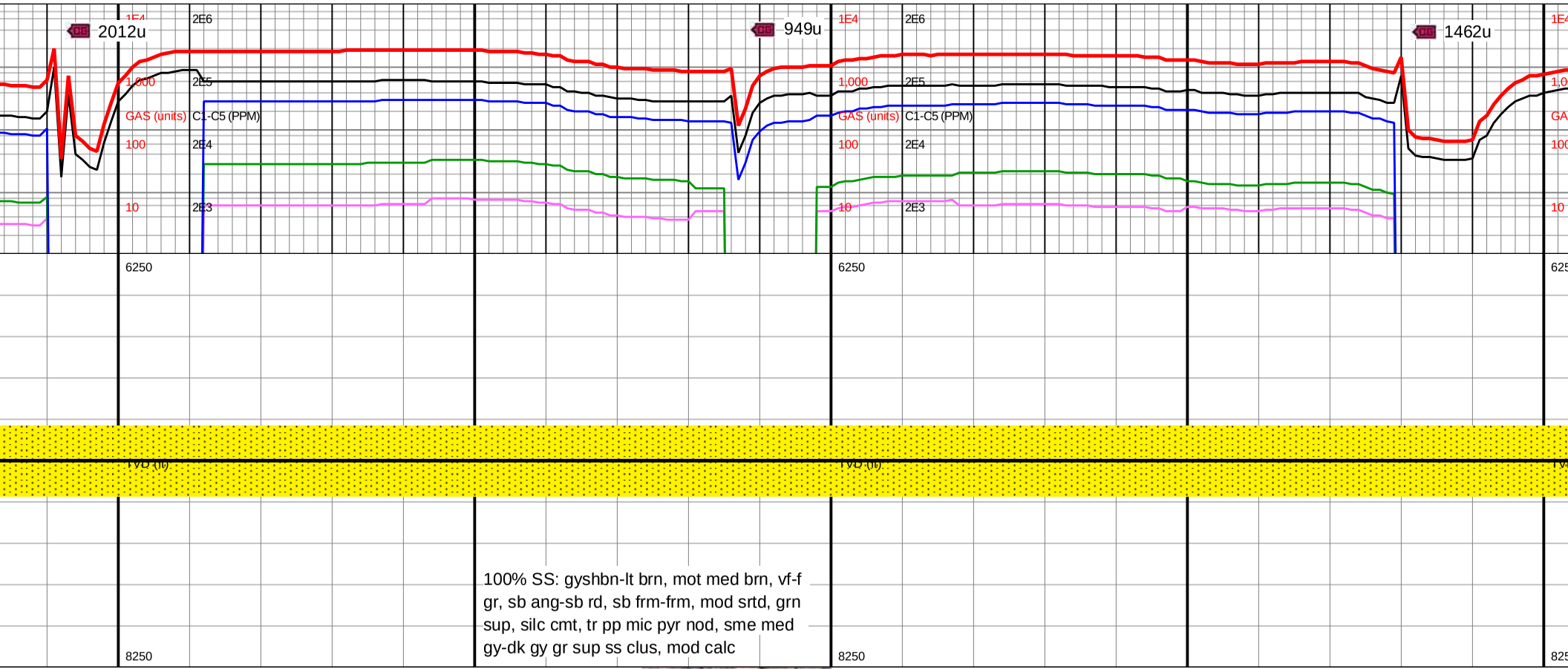
100% SS: gyshbn-lt brn, mot med brn, vf-f gr, sb ang-sb rd, sb frm-frm, mod srtd, grn sup, silc cmt, tr pp mic pyr nod, sme med gy-dk gy gr sup ss clus, mod calc



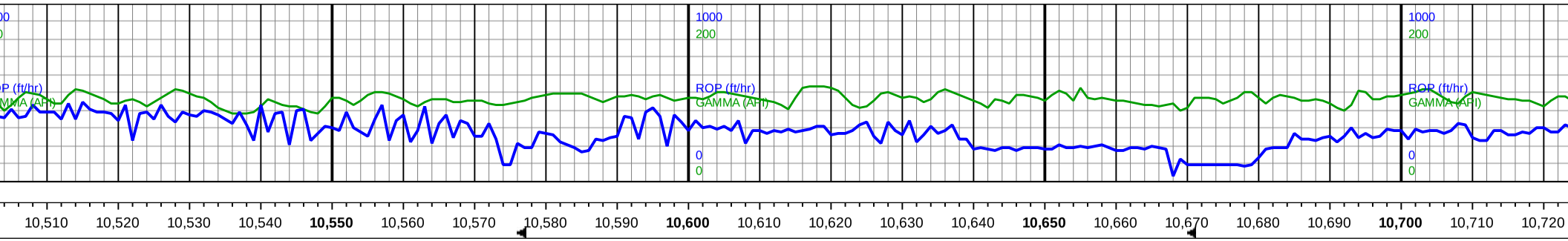
MD: 10,362'
INC: 89.91°
AZM: 89.47°
TVD: 7,249.8'
VS: 3,276.28'

WOB: 15.4klbs
RPM: 100
SPM: 185
SPP: 3,563psi

MD: 10,457'
INC: 89.82°
AZM: 89.23°
TVD: 7,250.03'
VS: 3,359.65'



100% SS: gyshbn-lt brn, mot med brn, vf-f gr, sb ang-sb rd, sb frm-frm, mod srtd, grn sup, silc cmt, tr pp mic pyr nod, sme med gy-dk gy gr sup ss clus, mod calc



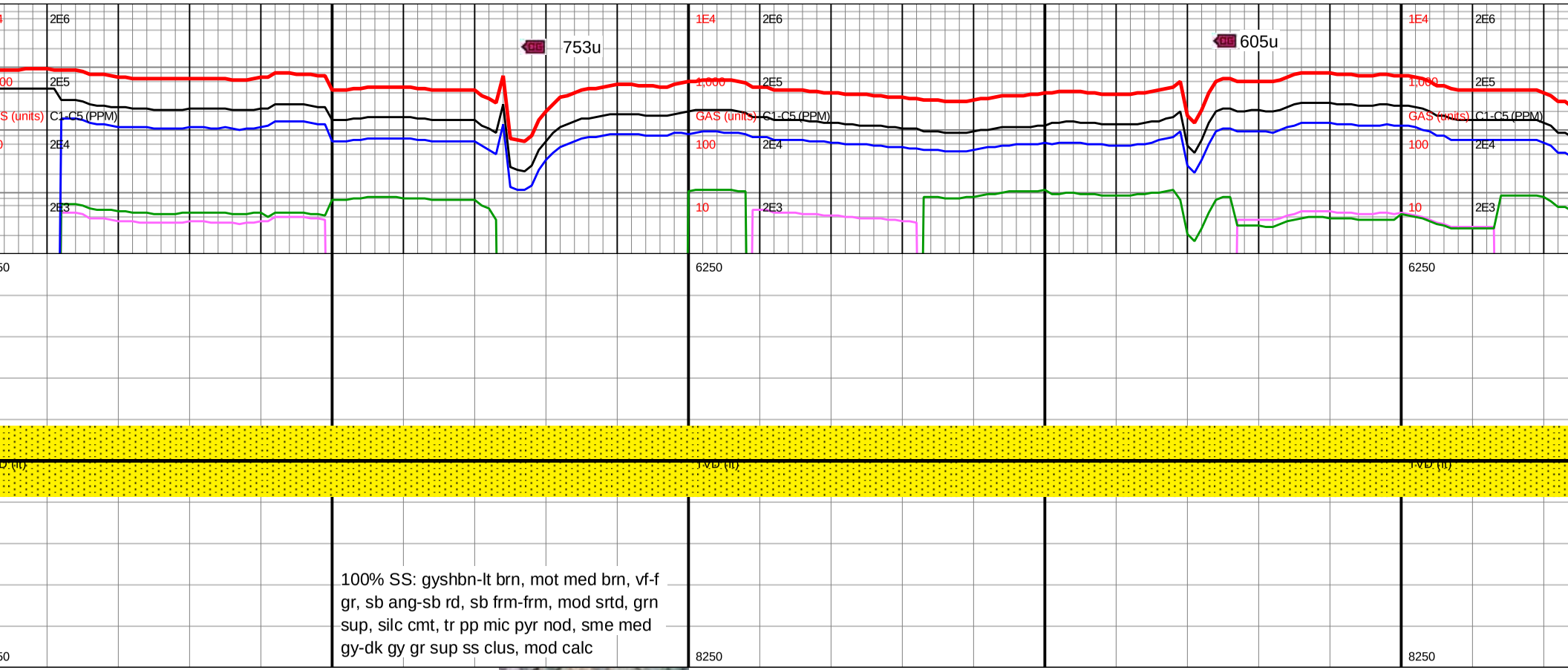
MD: 10,551'
INC: 89.97°
AZM: 89.67°
TVD: 7,250.2'
VS: 3,442.07'

WOB: 17.7klbs
RPM: 99
SPM: 188
SPP: 3,933psi

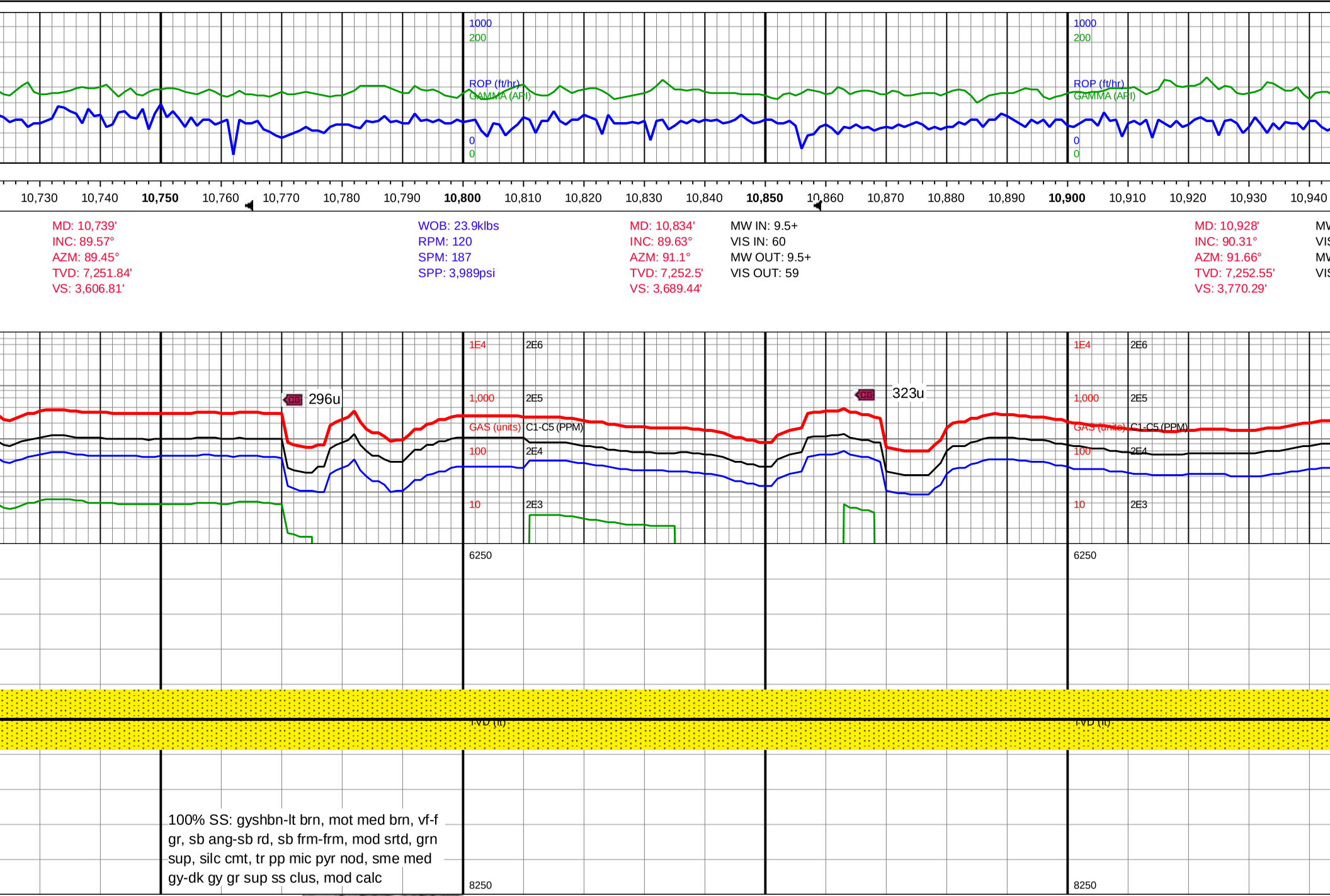
MW IN: 9.5
VIS IN: 69
MW OUT: 9.5
VIS OUT: 68

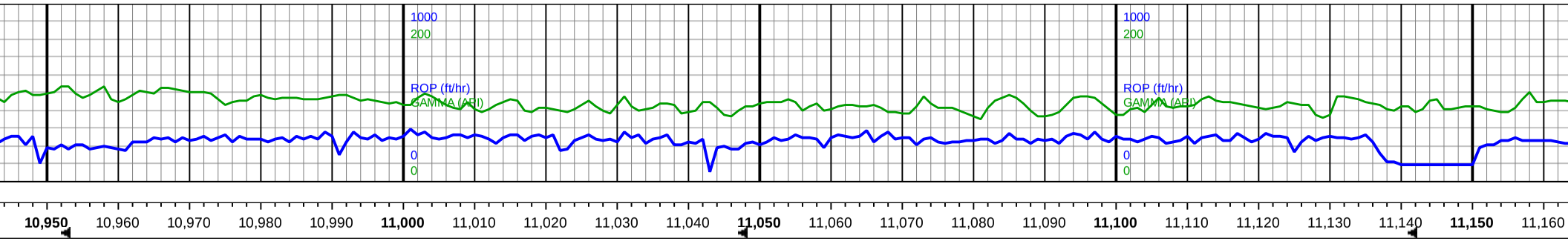
MD: 10,645'
INC: 89.23°
AZM: 89.46°
TVD: 7,250.86'
VS: 3,524.4'

BP



100% SS: gyshbn-lt brn, mot med brn, vf-f gr, sb ang-sb rd, sb frm-frm, mod srtd, grn sup, silc cmt, tr pp mic pyr nod, sme med gy-dk gy gr sup ss clus, mod calc


1000
200
ROP (ft/hr)
GAMMA (API)
0
0
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
MD: 10,739'
INC: 89.57°
AZM: 89.45°
TVD: 7,251.84'
VS: 3,606.81'
WOB: 23.9klbs
RPM: 120
SPM: 187
SPP: 3,989psi
MD: 10,834'
INC: 89.63°
AZM: 91.1°
TVD: 7,252.5'
VS: 3,689.44'
MW IN: 9.5+
VIS IN: 60
MW OUT: 9.5+
VIS OUT: 59
MD: 10,928'
INC: 90.31°
AZM: 91.66°
TVD: 7,252.55'
VS: 3,770.29'
1E4
2E6
1,000
2E5
GAS (units)
C1-C5 (PPM)
100
2E4
10
2E3
296u
323u
6250
8250
TVD (ft)
100% SS: gyshbn-lt brn, mot med brn, vf-f gr, sb ang-sb rd, sb frm-frm, mod srtd, grn sup, silc cmt, tr pp mic pyr nod, sme med gy-dk gy gr sup ss clus, 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

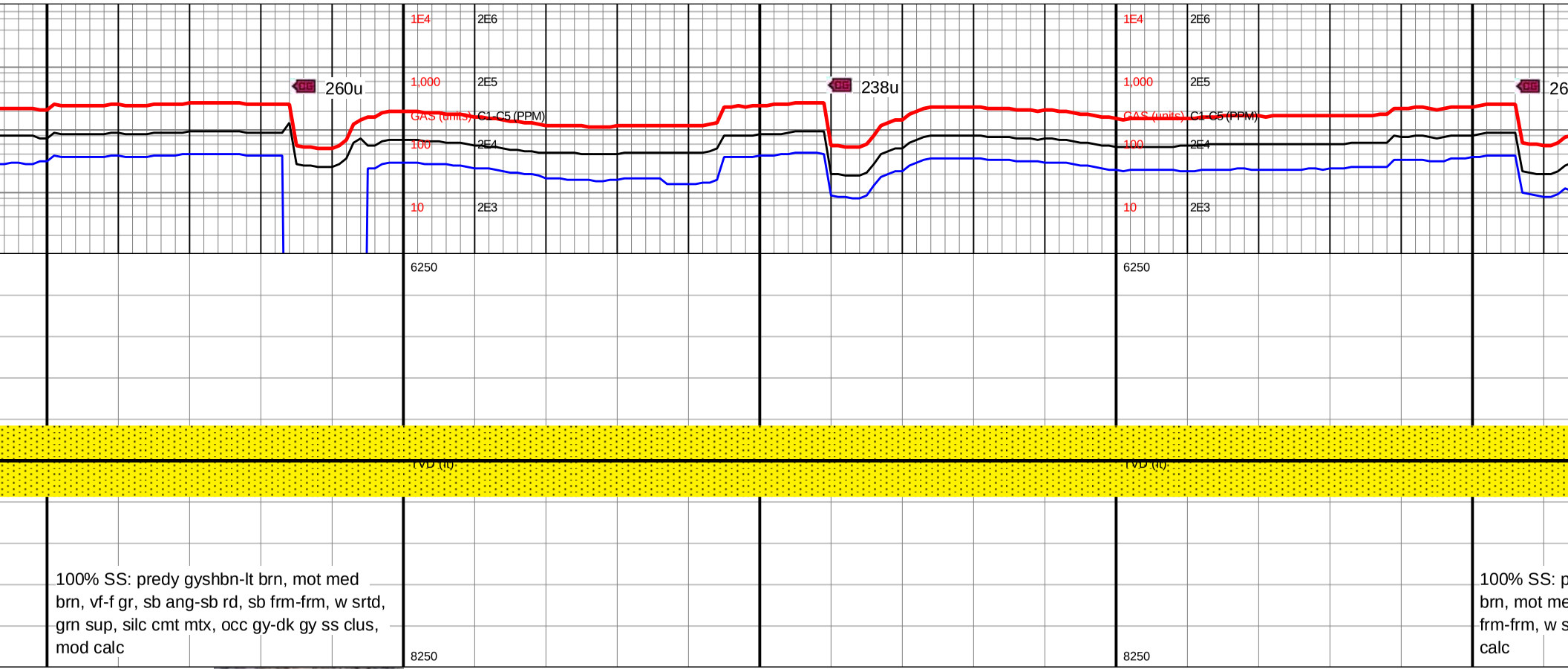
W IN: 9.6
S IN: 62
W OUT: 9.6+
S OUT: 62

WOB: 120klbs
RPM: 187
SPM: 97
SPP: 3,896psi

MD: 11,022'
INC: 90.58°
AZM: 92.89°
TVD: 7,251.82'
VS: 3,850.38'

MW IN: 9.5+
VIS IN: 60
MW OUT: 9.6
VIS OUT: 58

MD: 11,116'
INC: 89.85°
AZM: 93.8°
TVD: 7,251.47'
VS: 3,929.53'



100% SS: predy gyshbn-lt brn, mot med brn, vf-f gr, sb ang-sb rd, sb frm-frm, w srtd, grn sup, silc cmt mtx, occ gy-dk gy ss clus, mod calc

1000
200
ROP (ft/hr)
GAMMA (API)
0
0

11,170 11,180 11,190 **11,200** 11,210 11,220 11,230 11,240 **11,250** 11,260 11,270 11,280 11,290 **11,300** 11,310 11,320 11,330 11,340 **11,350** 11,360 11,370 11,380

WOB: 24klbs
RPM: 121
SPM: 202
SPP: 4,393psi

MD: 11,211'
INC: 89.45°
AZM: 92.51°
TVD: 7,252.05'
VS: 4,009.7'

MW IN: 9.5+
VIS IN: 59
MW OUT: 9.6
VIS OUT: 59

MD: 11,305'
INC: 89.45°
AZM: 90.05°
TVD: 7,252.95'
VS: 4,090.63'

MW IN: 9.5
VIS IN: 58
MW OUT: 9.5+
VIS OUT: 56

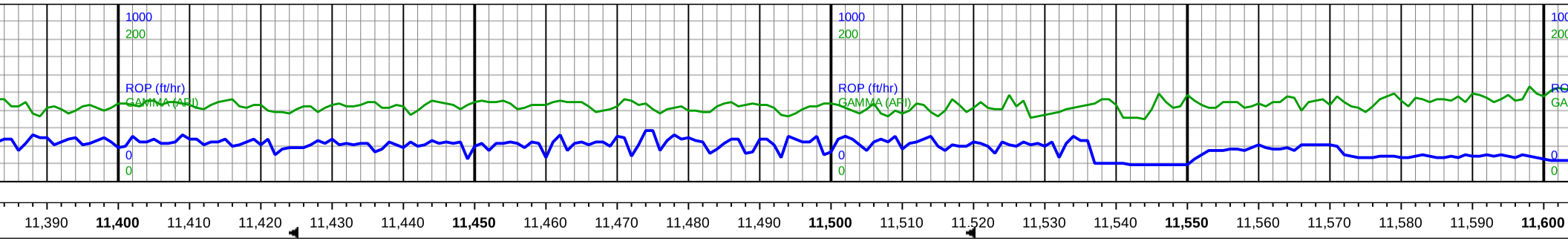
1E4
2E6
1,000
2E5
GAS (units)
C1-C5 (PPM)
100
2E4
10
2E3

0u
263u
233u

6250
TVD (ft)
8250

predy gy ss clus, sme gyshbn-lt
ed brn, vf-f gr, sb ang-sb rd, sb
srtd, grn sup, silc cmt mtx, mod

100% SS: predy gy ss clus, gy
mot med brn, vf-f gr, sb ang-sl
frm-frm, w srtd, grn sup silc cm
calc



MD: 11,399'
INC: 89.51°
AZM: 88.66°
TVD: 7,253.81'
VS: 4,173.12'

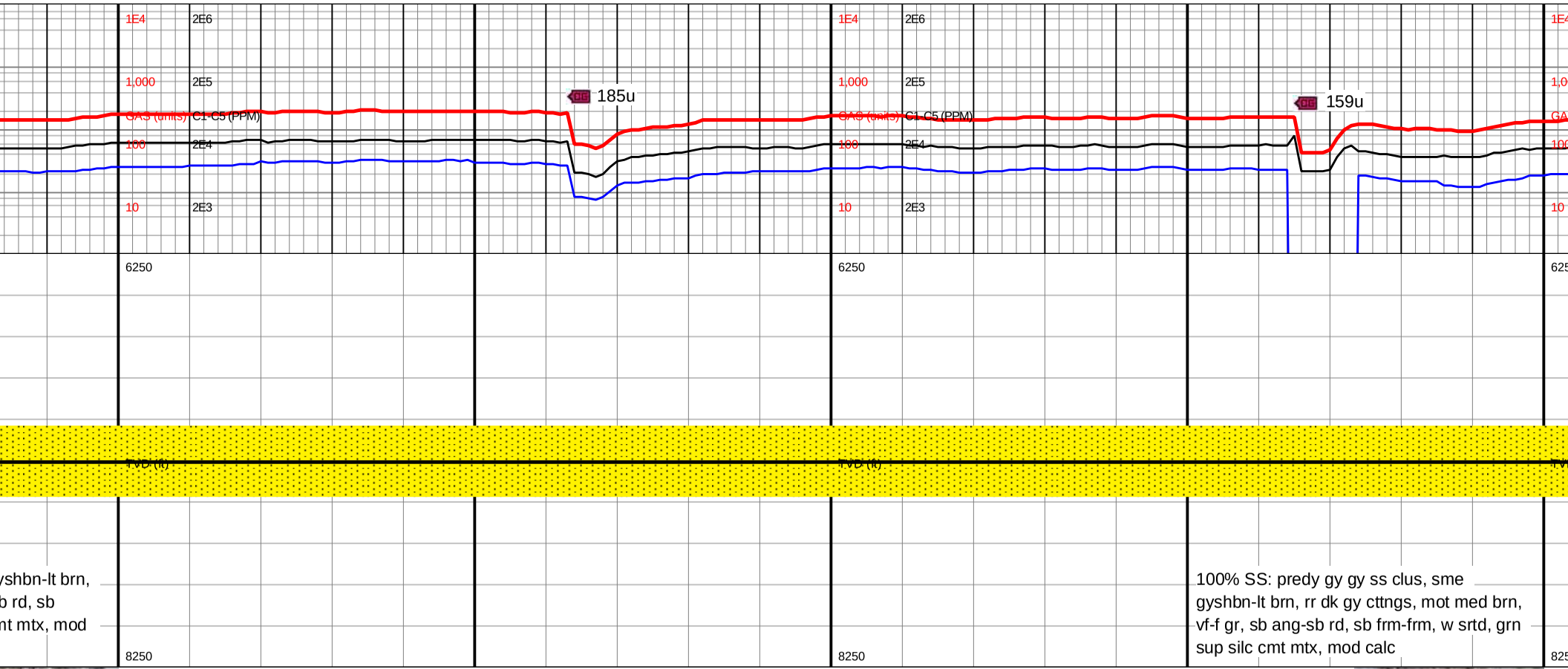
WOB: 32klbs
RPM: 120
SPM: 202
SPP: 4,334psi

MD: 11,494'
INC: 89.69°
AZM: 88.75°
TVD: 7,254.47'
VS: 4,257'

MW IN: 9.5
VIS IN: 57
MW OUT: 9.5+
VIS OUT: 55

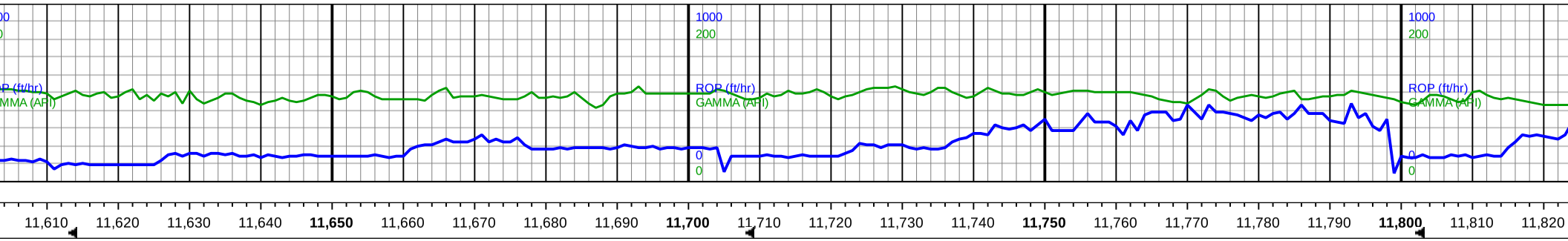
MD: 11,588'
INC: 89.42°
AZM: 89.51°
TVD: 7,255.2'
VS: 4,339.67'

WOB: 17klb
RPM: 100
SPM: 186
SPP: 3,694



yshbn-lt brn,
b rd, sb
nt mtx, mod

100% SS: predy gy gy ss clus, sme gyshbn-lt brn, rr dk gy cttngs, mot med brn, vf-f gr, sb ang-sb rd, sb frm-frm, w srtd, grn sup silc cmt mtx, mod calc



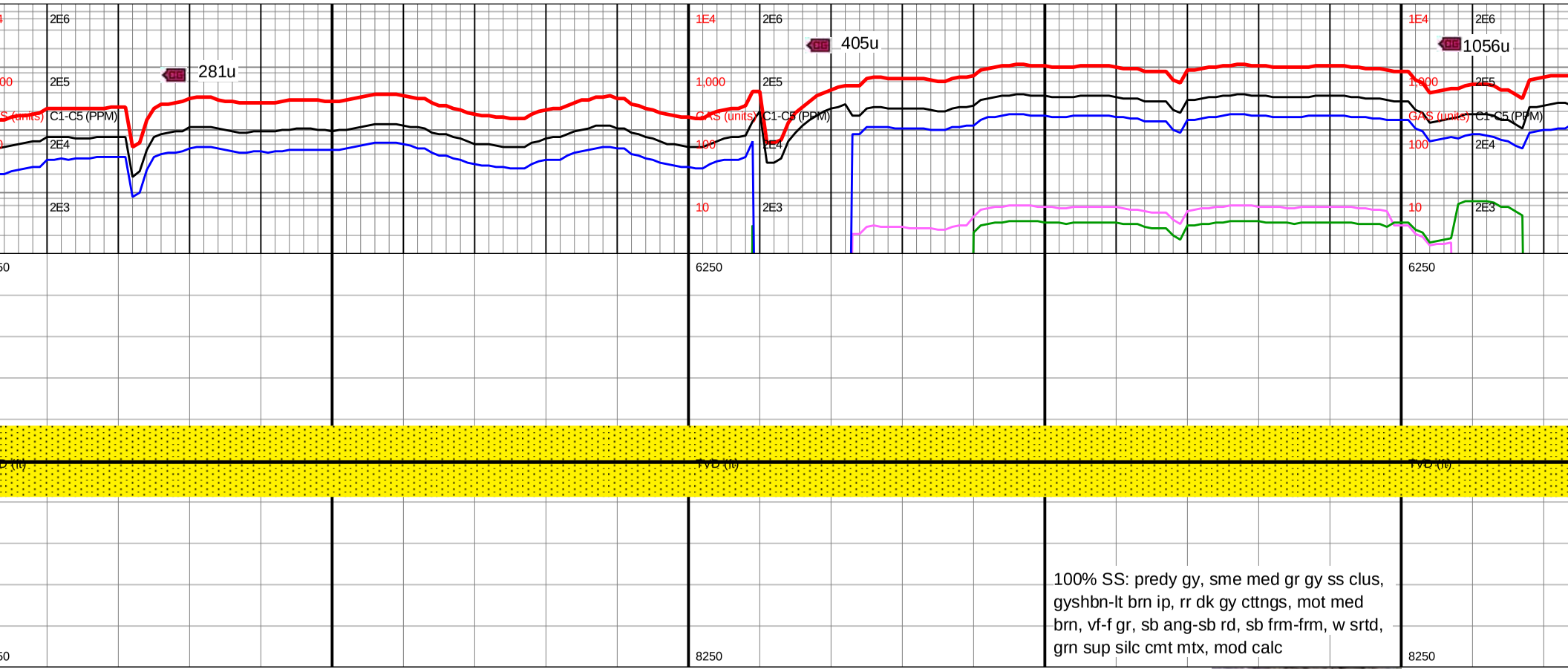
MD: 11,683'
INC: 88.8°
AZM: 88.88°
TVD: 7,256.68'
VS: 4,423.15'

GD

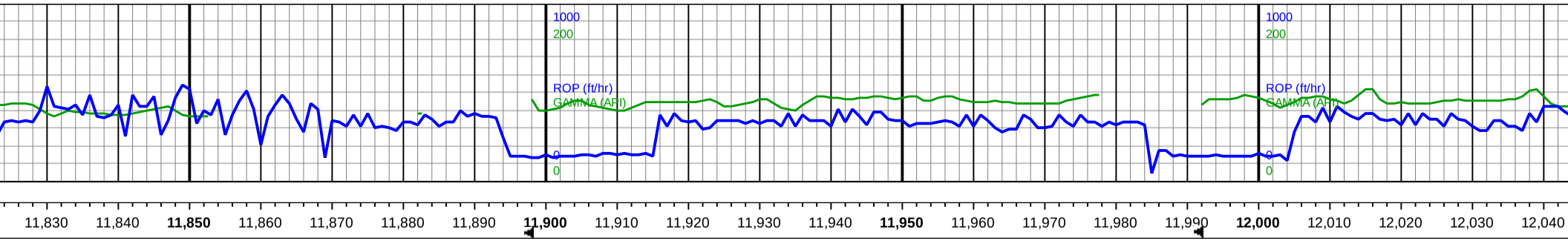
MW IN: 9.5
VIS IN: 55
MW OUT: 9.5+
VIS OUT: 53

MD: 11,777'
INC: 88.98°
AZM: 88.67°
TVD: 7,258.5'
VS: 4,506.09'

WOB: 19.4klbs
RPM: 120
SPM: 186
SPP: 4,019psi



100% SS: predy gy, sme med gr gy ss clus, gyshbn-lt brn ip, rr dk gy cttngs, mot med brn, vf-f gr, sb ang-sb rd, sb frm-frm, w srtd, grn sup silc cmt mtx, mod calc

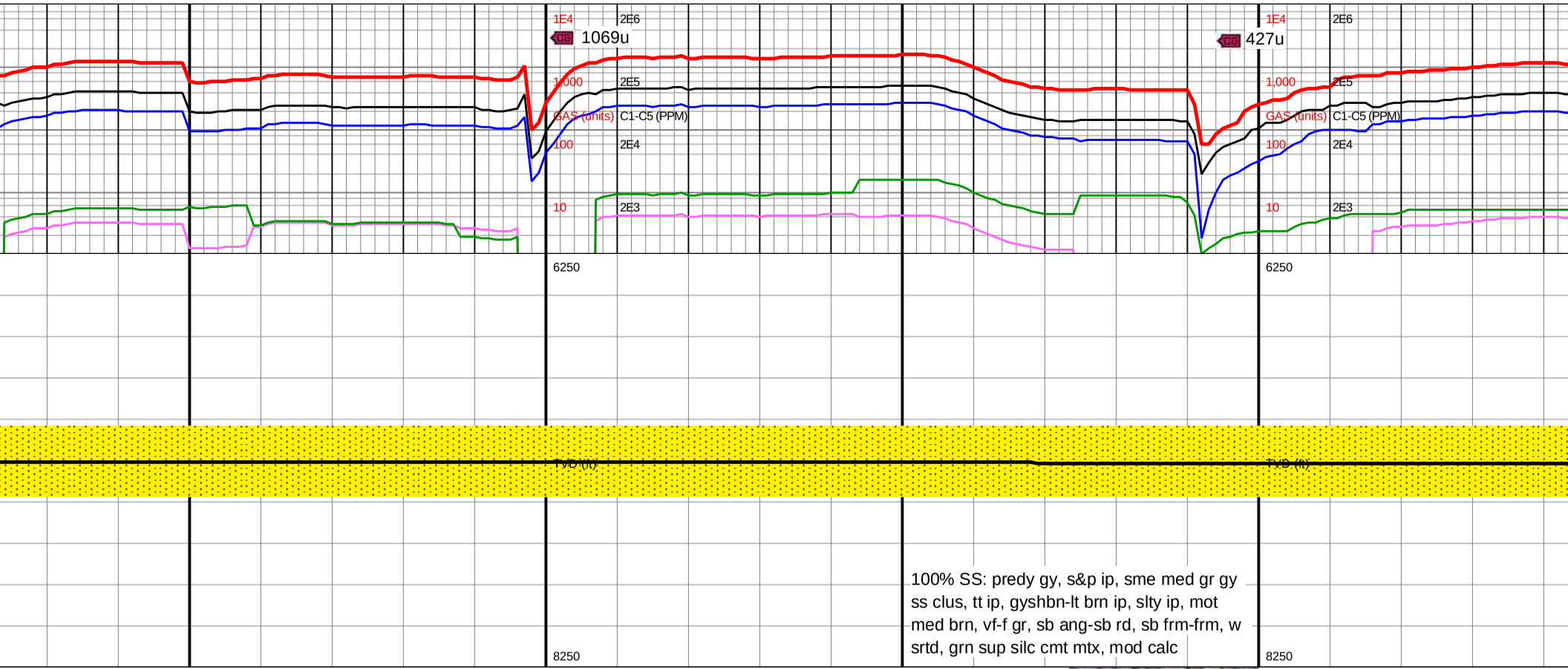


MW IN: 9.5+
VIS IN: 58
MW OUT: 9.5+
VIS OUT: 56

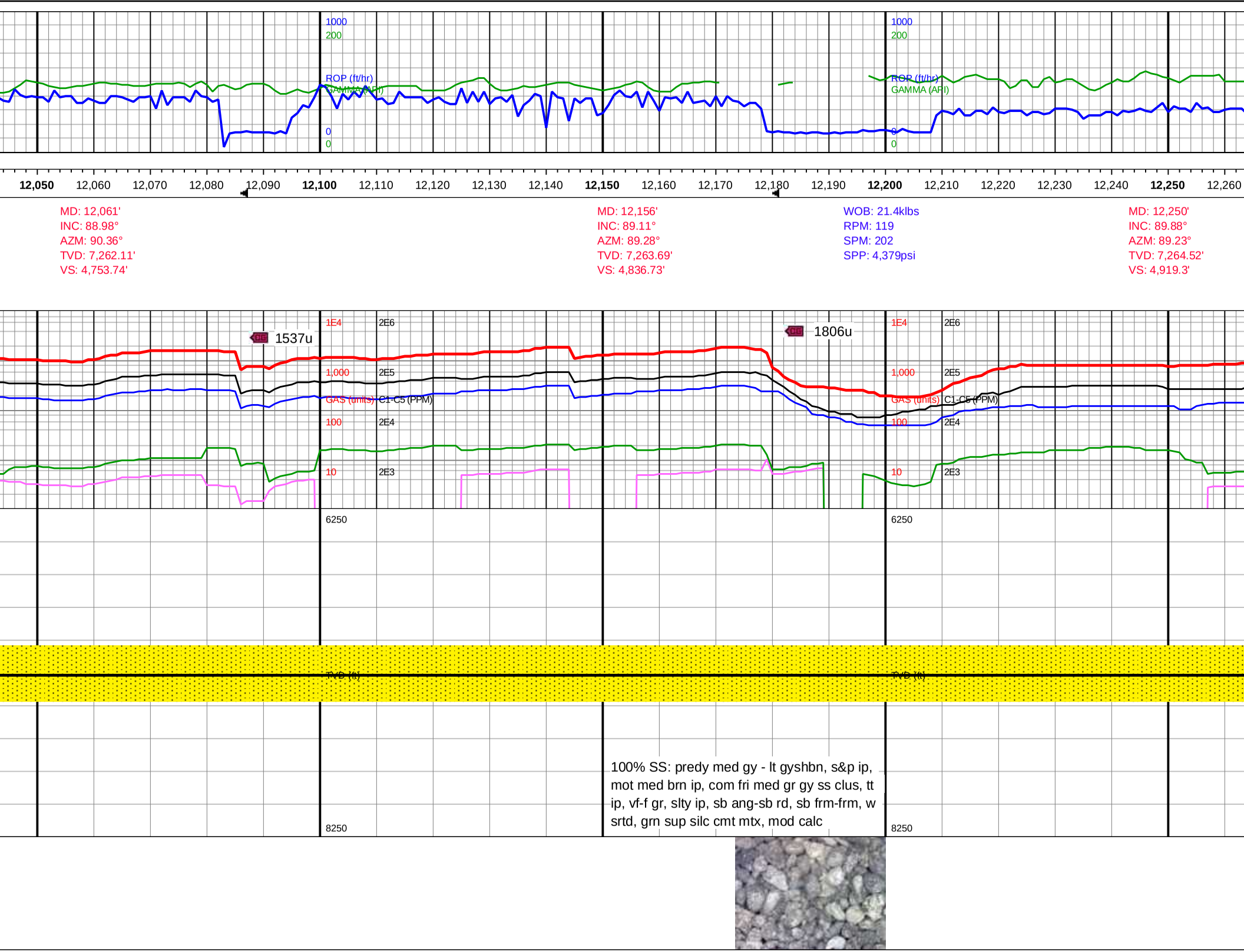
MD: 11,872'
INC: 90°
AZM: 89.85°
TVD: 7,259.34'
VS: 4,589.53'

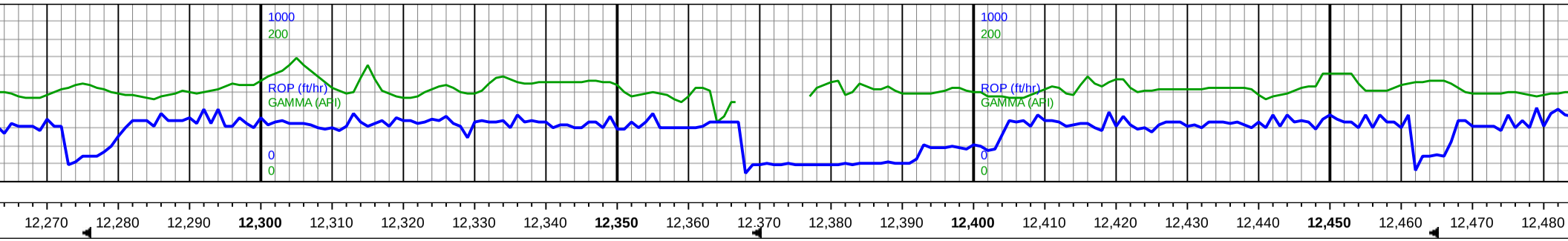
MD: 11,967'
INC: 88.83°
AZM: 90.64°
TVD: 7,260.31'
VS: 4,672.18'

WOB: 19.2klbs
RPM: 119
SPM: 201
SPP: 4,430psi



100% SS: predy gy, s&p ip, sme med gr gy ss clus, tt ip, gyshbn-lt brn ip, slty ip, mot med brn, vf-f gr, sb ang-sb rd, sb frm-frm, w srtd, grn sup silc cmt mtx, mod calc


1000
200
ROP (ft/hr)
GAMMA (API)
0
0
1000
200
ROP (ft/hr)
GAMMA (API)
0
0
12,050
12,060
12,070
12,080
12,090
12,100
12,110
12,120
12,130
12,140
12,150
12,160
12,170
12,180
12,190
12,200
12,210
12,220
12,230
12,240
12,250
12,260
MD: 12,061'
INC: 88.98°
AZM: 90.36°
TVD: 7,262.11'
VS: 4,753.74'
MD: 12,156'
INC: 89.11°
AZM: 89.28°
TVD: 7,263.69'
VS: 4,836.73'
WOB: 21.4klbs
RPM: 119
SPM: 202
SPP: 4,379psi
MD: 12,250'
INC: 89.88°
AZM: 89.23°
TVD: 7,264.52'
VS: 4,919.3'
1537u
1806u
1E4
2E6
1,000
2E5
GAS (units)
C1-C5 (PPM)
100
2E4
10
2E3
6250
8250
TVD (ft)
100% SS: predy med gy - lt gyshbn, s&p ip, mot med brn ip, com fri med gr gy ss clus, tt ip, vf-f gr, slty ip, sb ang-sb rd, sb frm-frm, w srtd, grn sup silc cmt mtx, mod calc

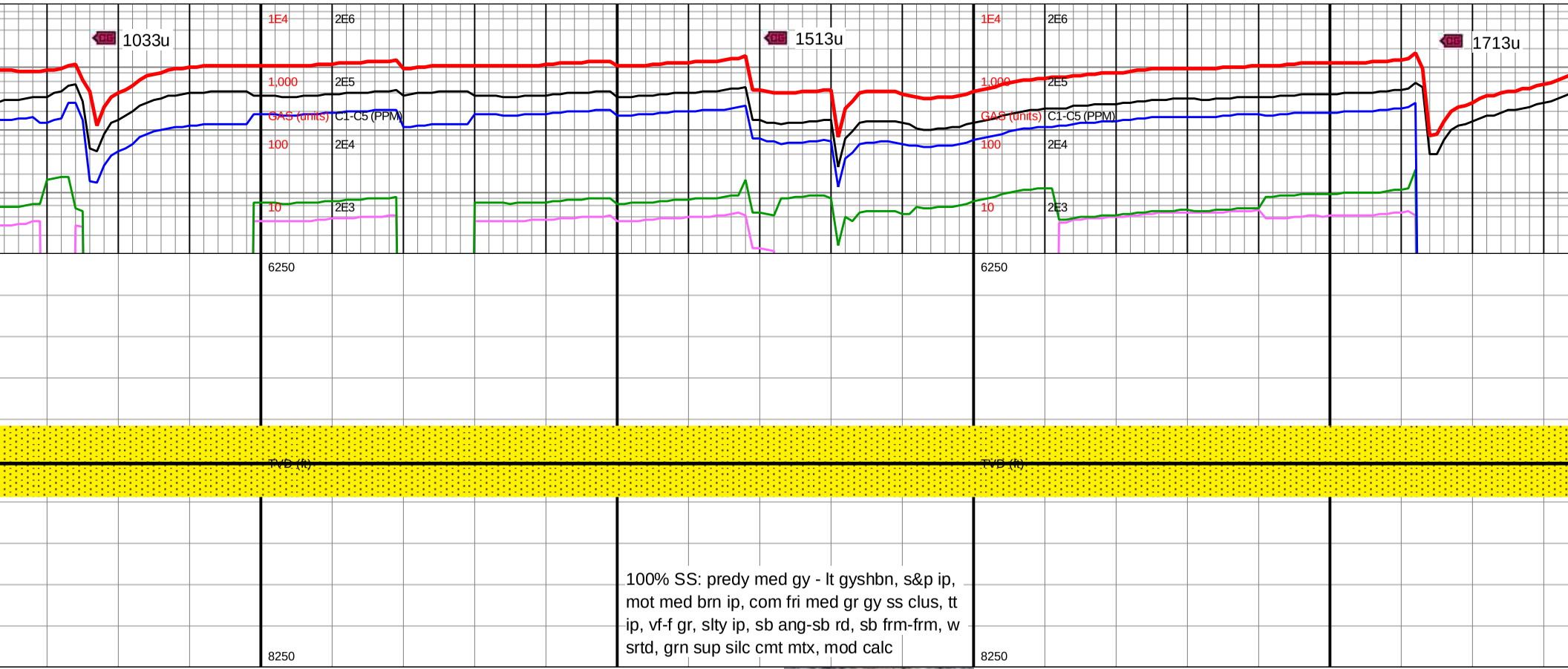


MW IN: 9.5
VIS IN: 57
MW OUT: 9.6
VIS OUT: 57

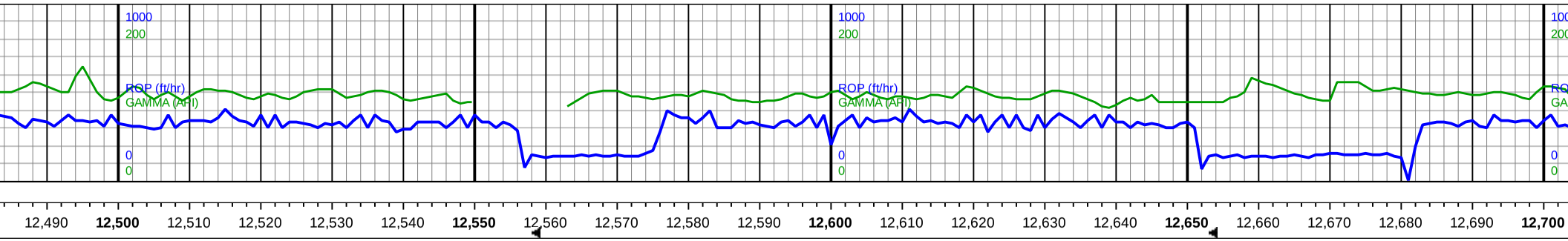
MD: 12,345'
INC: 89.94°
AZM: 89.49°
TVD: 7,264.67'
VS: 5,002.67'

WOB: 20.5klbs
RPM: 121
SPM: 202
SPP: 4,543psi

MD: 12,439'
INC: 90.52°
AZM: 88.85°
TVD: 7,264.29'
VS: 5,085.3'



100% SS: predy med gy - lt gyshbn, s&p ip, mot med brn ip, com fri med gr gy ss clus, tt ip, vf-f gr, slty ip, sb ang-sb rd, sb frm-frm, w srtd, grn sup silc cmt mtx, mod calc

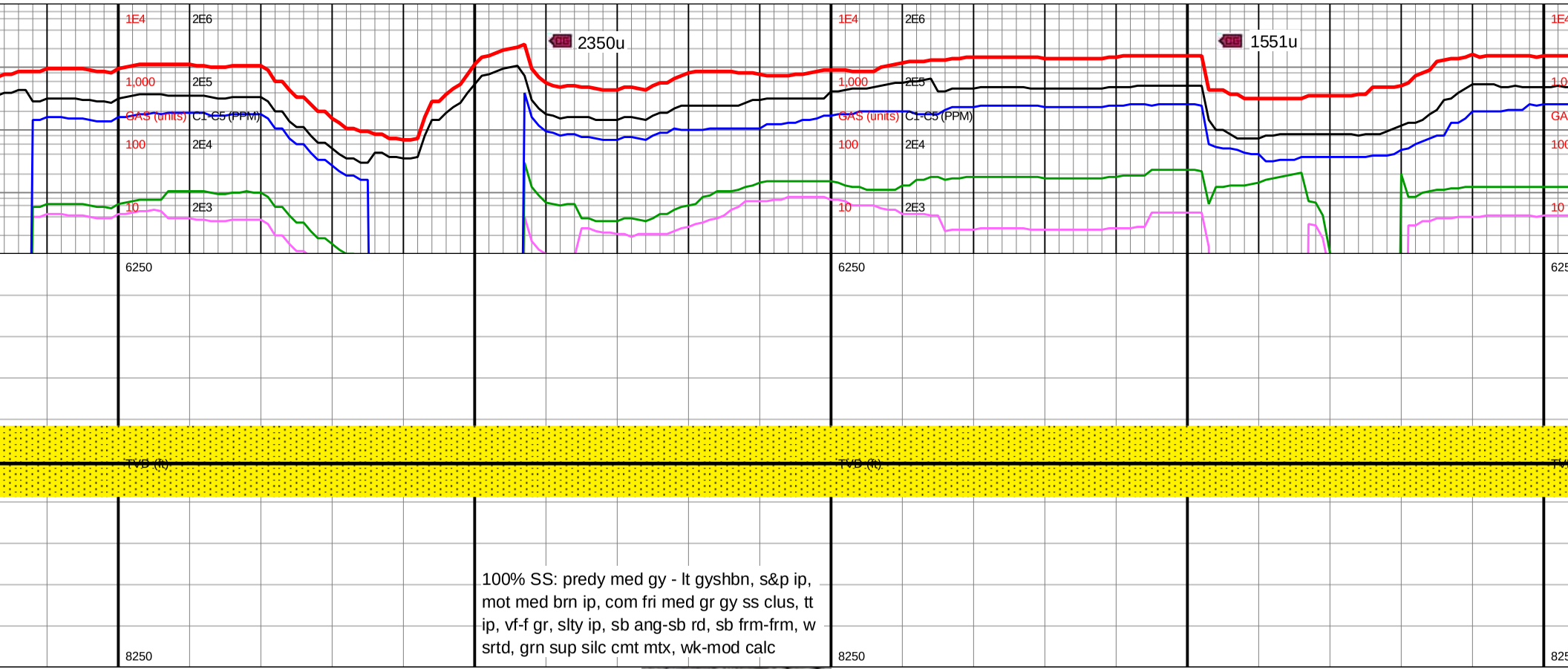


MW IN: 9.5+
VIS IN: 57
MW OUT: 9.6
VIS OUT: 60

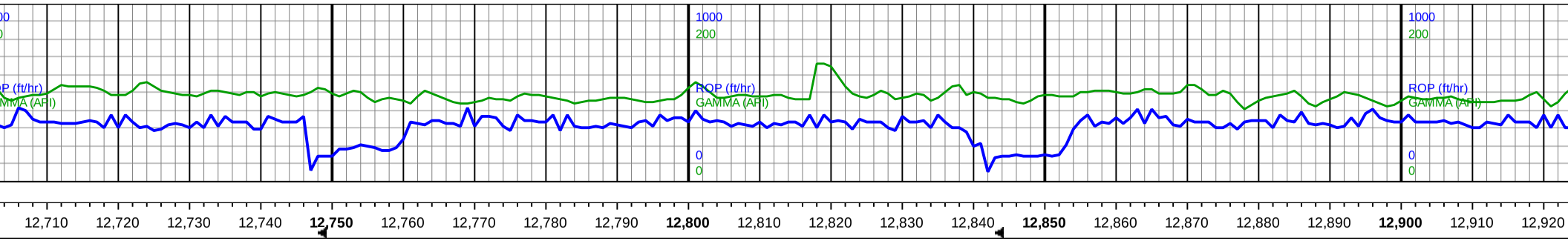
MD: 12,533'
INC: 90.58°
AZM: 87.16°
TVD: 7,263.39'
VS: 5,168.83'

WOB: 29.6klbs
RPM: 120
SPM: 202
SPP: 4,528psi

MD: 12,628'
INC: 90.43°
AZM: 86.78°
TVD: 7,262.55'
VS: 5,254.02'



100% SS: predy med gy - lt gyshbn, s&p ip, mot med brn ip, com fri med gr gy ss clus, tt ip, vf-f gr, slty ip, sb ang-sb rd, sb frm-frm, w srtd, grn sup silc cmt mtx, wk-mod calc



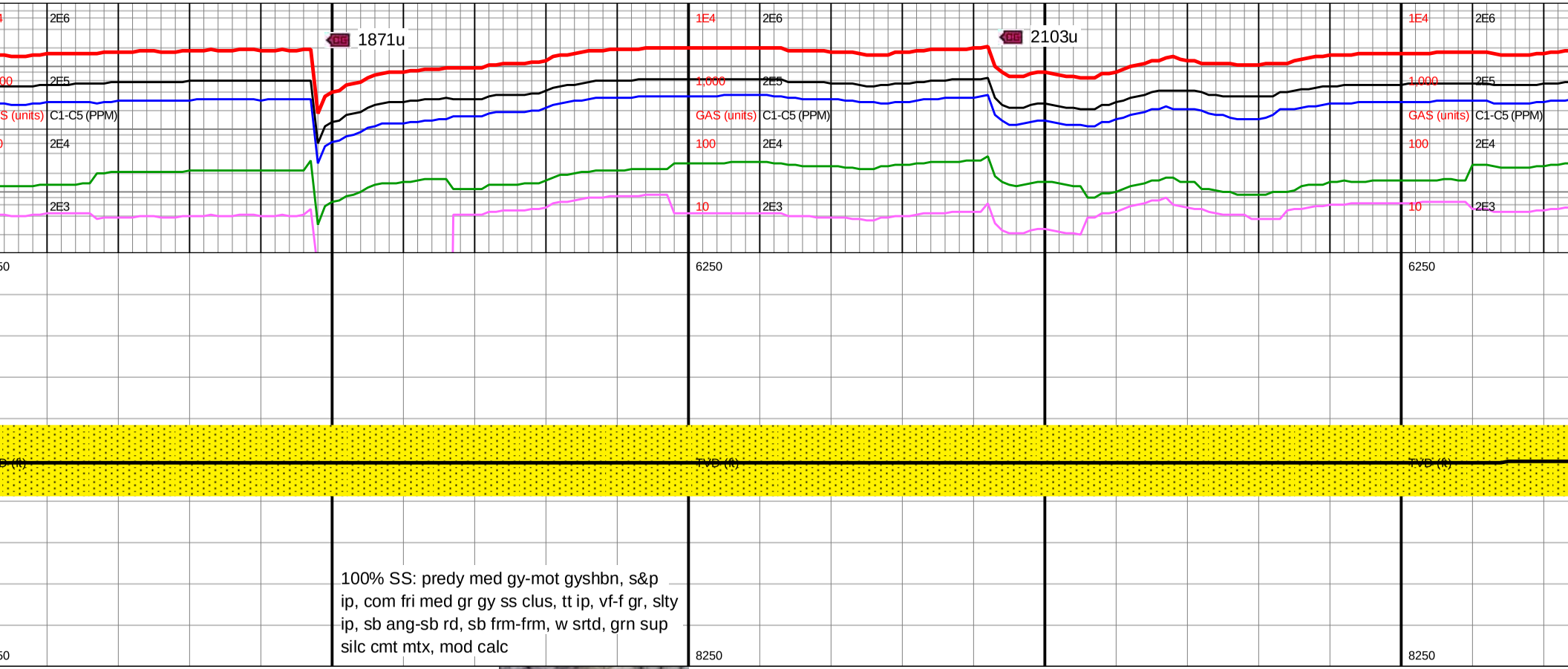
MD: 12,723'
INC: 90.37°
AZM: 88.08°
TVD: 7,261.89'
VS: 5,338.87'

WOB: 17.6klbs
RPM: 120
SPM: 200
SPP: 4,408psi

MD: 12,818'
INC: 90.49°
AZM: 88.77°
TVD: 7,261.18'
VS: 5,422.97'

MW IN: 9.5+
VIS IN: 58
MW OUT: 9.6
VIS OUT: 55

MD: 12,912'
INC: 90.49°
AZM: 91.25°
TVD: 7,260.37'
VS: 5,504.94'



100% SS: predy med gy-mot gyshbn, s&p ip, com fri med gr gy ss clus, tt ip, vf-f gr, slty ip, sb ang-sb rd, sb frm-frm, w srtd, grn sup silc cmt mtx, mod calc

MNDEPTH 04/27/2019

1000
200
ROP (ft/hr)
GAMMA (API)
0
0

12,930 12,940 **12,950** 12,960 12,970 12,980 12,990 **13,000** 13,010 13,020 13,030 13,040 **13,050** 13,060 13,070 13,080 13,090 **13,100** 13,110 13,120 13,130 13,140

WOB: 18.7klbs
RPM: 120
SPM: 204
SPP: 4,464psi

MD: 13,007'
INC: 90.74°
AZM: 92.34°
TVD: 7,259.35'
VS: 5,586.29'

MD: 13,102'
INC: 90.71°
AZM: 91.88°
TVD: 7,258.15'
VS: 5,667.37'

1932u

1838u

2093u

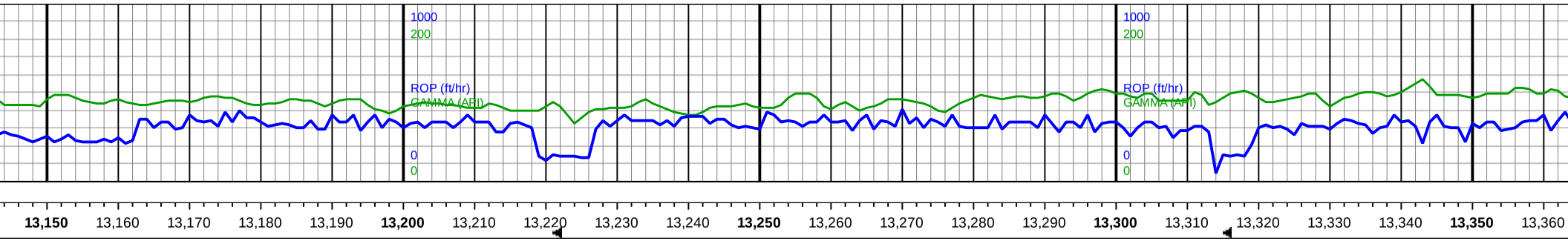
1E4 2E6
1,000 2E5
GAS (units) C1-C5 (PPM)
100 2E4
10 2E3

6250

TVD (ft)

8250

100% SS: predy med gy-mot gyshbn, s&p ip, com fri med gr gy ss clus, vf-f gr, sb ang-sb rd, sb frm-frm, w srtd, grn sup silc cmt mtx, carb ip, mod calc, tt



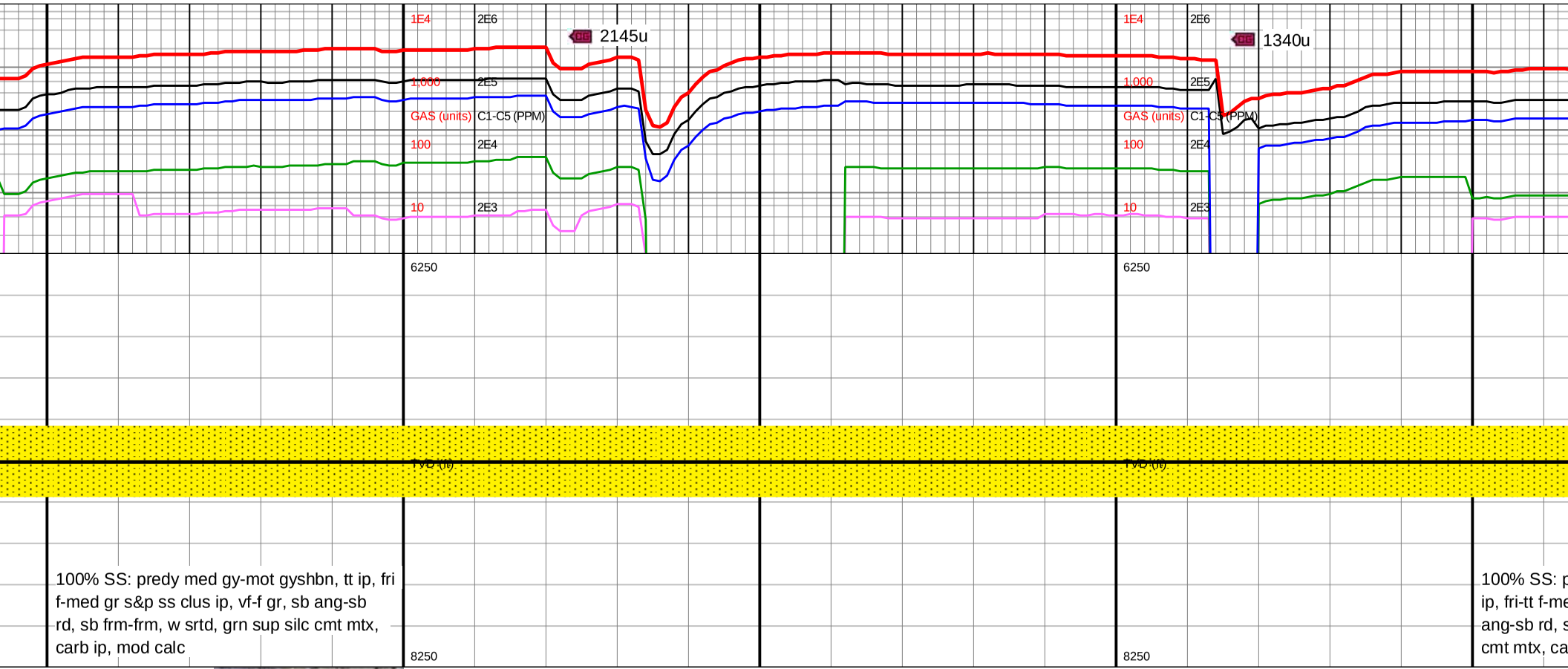
13,150 13,160 13,170 13,180 13,190 **13,200** 13,210 13,220 13,230 13,240 **13,250** 13,260 13,270 13,280 13,290 **13,300** 13,310 13,320 13,330 13,340 **13,350** 13,360

W IN: 9.6
S IN: 59
W OUT: 9.6+
S OUT: 59

MD: 13,196'
INC: 90.58°
AZM: 90.24°
TVD: 7,257.09'
VS: 5,748.48'

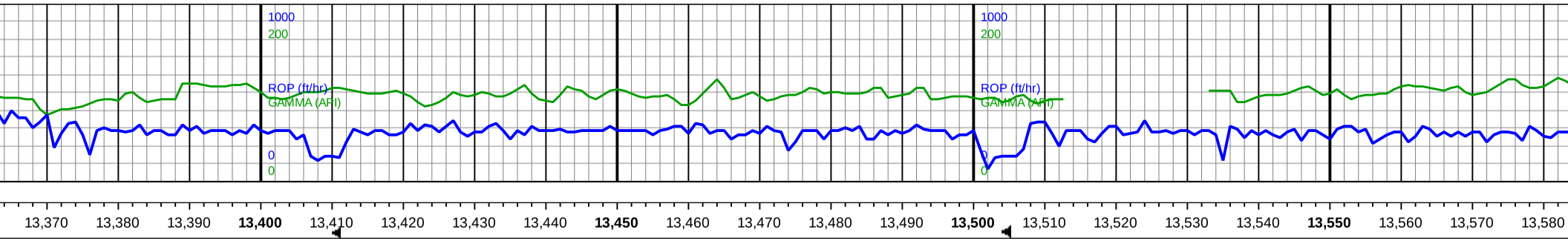
WOB: 14.4klbs
RPM: 120
SPM: 200
SPP: 4,187psi

MD: 13,291'
INC: 90.62°
AZM: 88.69°
TVD: 7,256.1'
VS: 5,831.76'



100% SS: predy med gy-mot gyshbn, tt ip, fri f-med gr s&p ss clus ip, vf-f gr, sb ang-sb rd, sb frm-frm, w srtd, grn sup silc cmt mtx, carb ip, mod calc

100% SS: p
ip, fri-tt f-me
ang-sb rd, s
cmt mtx, ca



13,370 13,380 13,390 **13,400** 13,410 13,420 13,430 13,440 **13,450** 13,460 13,470 13,480 13,490 **13,500** 13,510 13,520 13,530 13,540 **13,550** 13,560 13,570 13,580

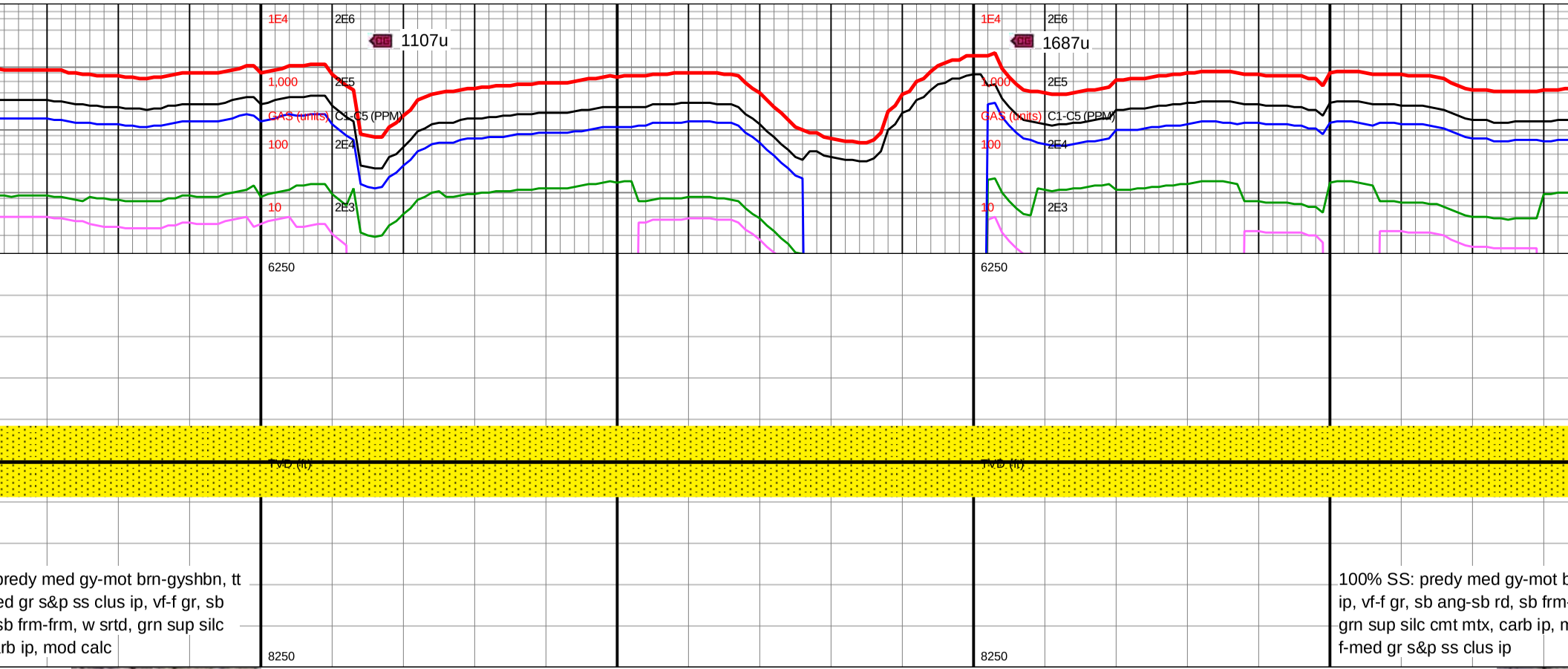
MD: 13,385'
INC: 90.06°
AZM: 89.37°
TVD: 7,255.54'
VS: 5,914.51'

WOB: 21.2klbs
RPM: 119
SPM: 200
SPP: 4,721psi

MW IN: 9.6
VIS IN: 60
MW OUT: 9.6+
VIS OUT: 55

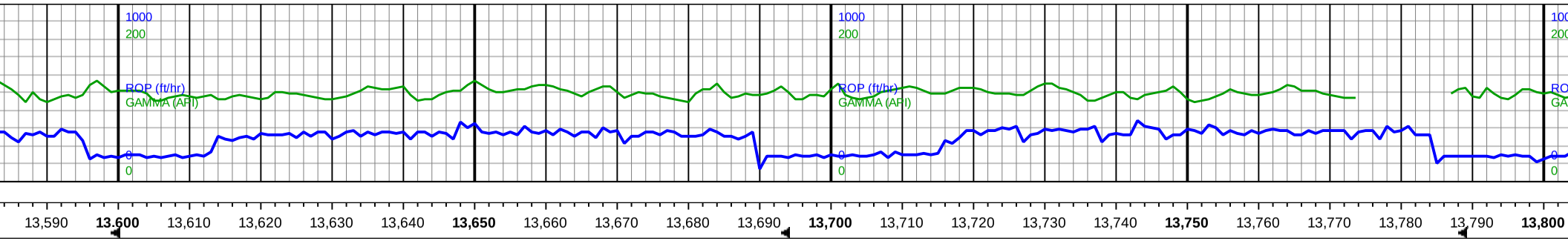
MD: 13,479'
INC: 90.09°
AZM: 90.03°
TVD: 7,255.42'
VS: 5,996.73'

MD: 13,574'
INC: 90.09°
AZM: 90.83°
TVD: 7,255.27'
VS: 6,079.23'



predy med gy-mot brn-gyshbn, tt
ed gr s&p ss clus ip, vf-f gr, sb
sb frm-frm, w srtd, grn sup silc
rb ip, mod calc

100% SS: predy med gy-mot b
ip, vf-f gr, sb ang-sb rd, sb frm
grn sup silc cmt mtx, carb ip, n
f-med gr s&p ss clus ip



WOB: 16.1klbs
RPM: 120
SPM: 200
SPP: 4,591psi

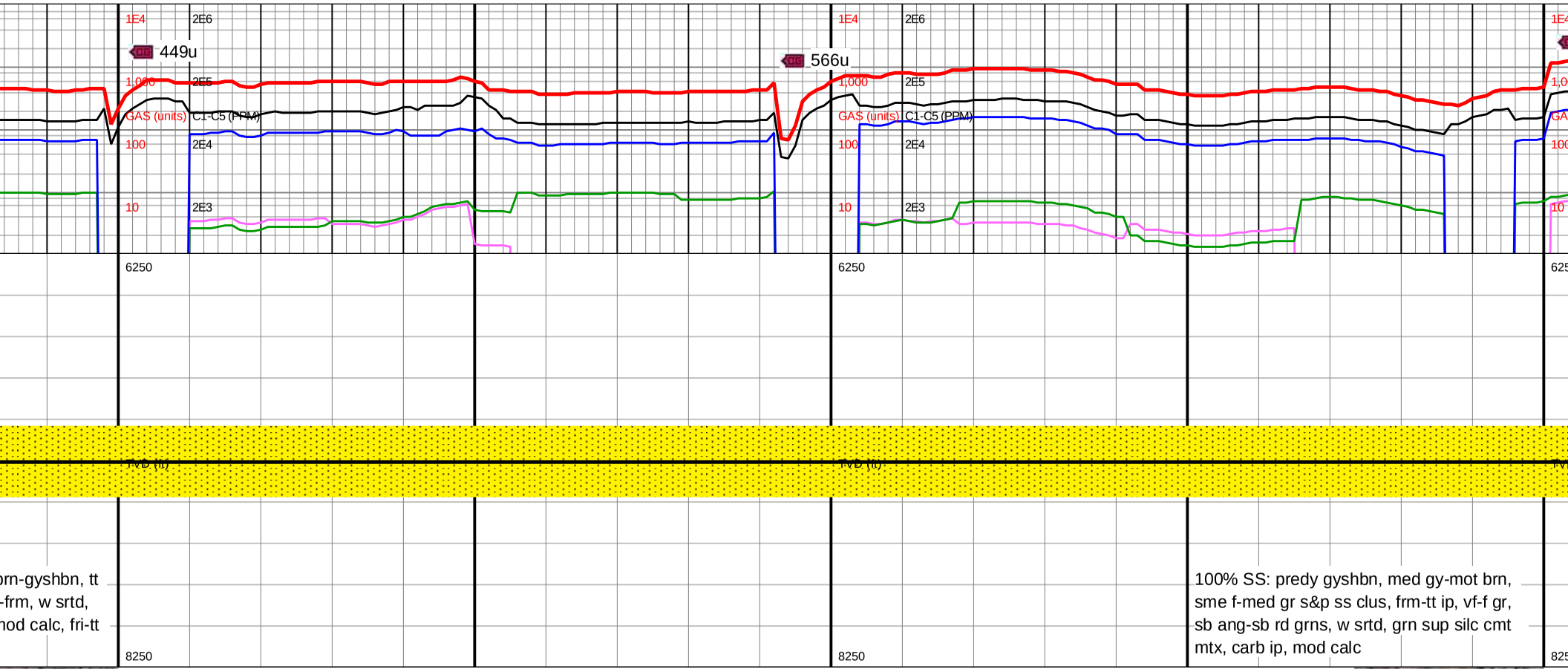
MD: 13,669'
INC: 90.15°
AZM: 91.07°
TVD: 7,255.07'
VS: 6,161.3'

MW IN: 9.6
VIS IN: 60
MW OUT: 9.6+
VIS OUT: 55

MD: 13,763'
INC: 90.06°
AZM: 91.86°
TVD: 7,254.9'
VS: 6,242.08'

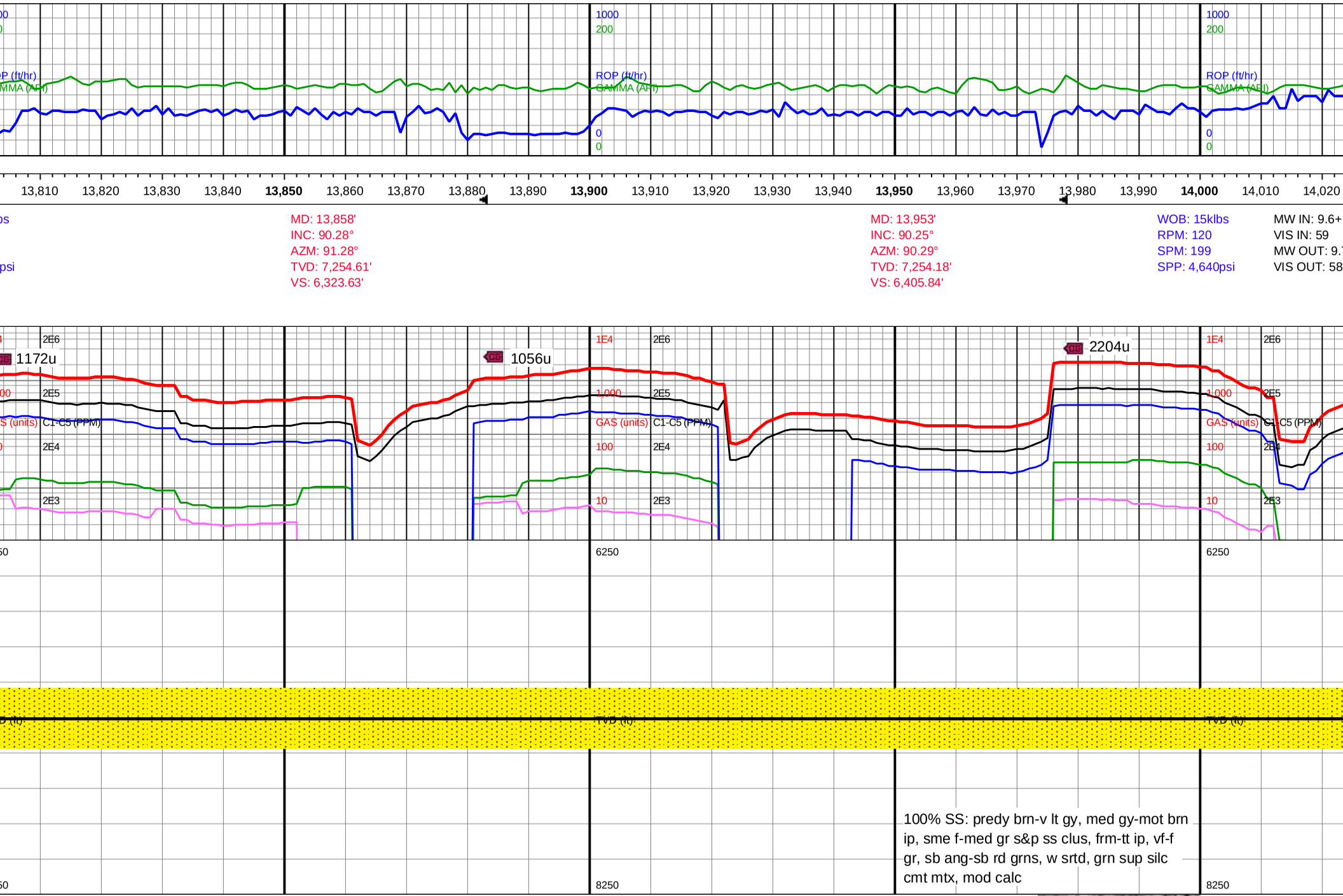
BP

WOB: 15klb
RPM: 120
SPM: 200
SPP: 4,316



brn-gyshbn, tt
-frm, w srtd,
nod calc, fri-tt

100% SS: predy gyshbn, med gy-mot brn, sme f-med gr s&p ss clus, frm-tt ip, vf-f gr, sb ang-sb rd grns, w srtd, grn sup silc cmt mtx, carb ip, mod calc



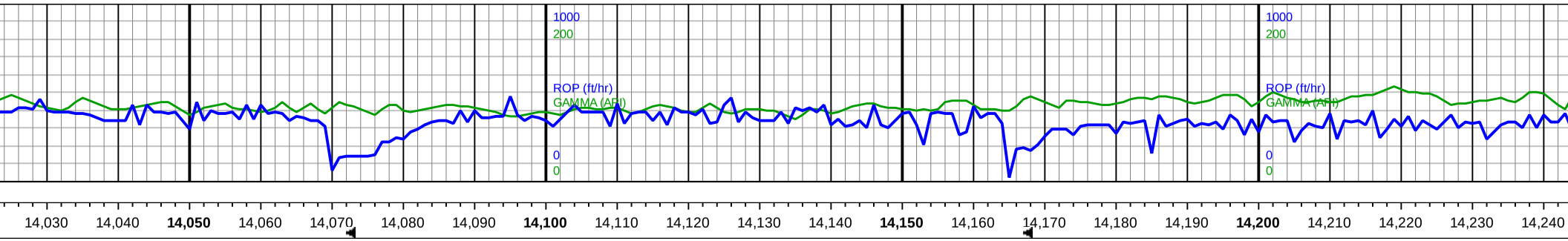
MD: 13,858'
INC: 90.28°
AZM: 91.28°
TVD: 7,254.61'
VS: 6,323.63'

MD: 13,953'
INC: 90.25°
AZM: 90.29°
TVD: 7,254.18'
VS: 6,405.84'

WOB: 15klbs
RPM: 120
SPM: 199
SPP: 4,640psi

MW IN: 9.6+
VIS IN: 59
MW OUT: 9.
VIS OUT: 58

100% SS: predy brn-v lt gy, med gy-mot brn ip, sme f-med gr s&p ss clus, frm-tt ip, vf-f gr, sb ang-sb rd grns, w srtd, grn sup silc cmt mtx, mod calc



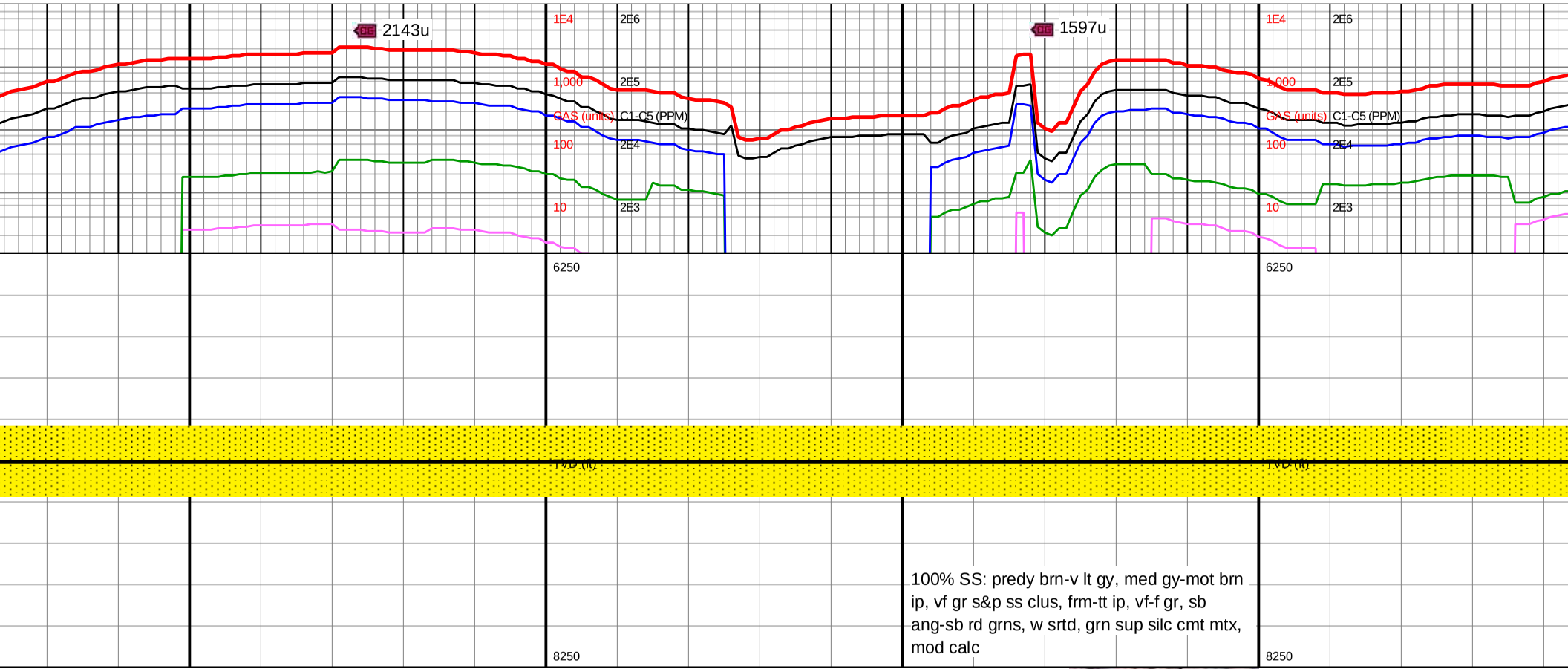
MD: 14,047'
INC: 89.97°
AZM: 89.65°
TVD: 7,253.99'
VS: 6,487.85'

MD: 14,142'
INC: 89.97°
AZM: 88.71°
TVD: 7,254.04'
VS: 6,571.36'

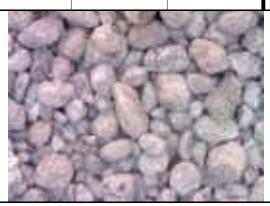
MW IN: 9.6+
VIS IN: 57
MW OUT: 9.7
VIS OUT: 53

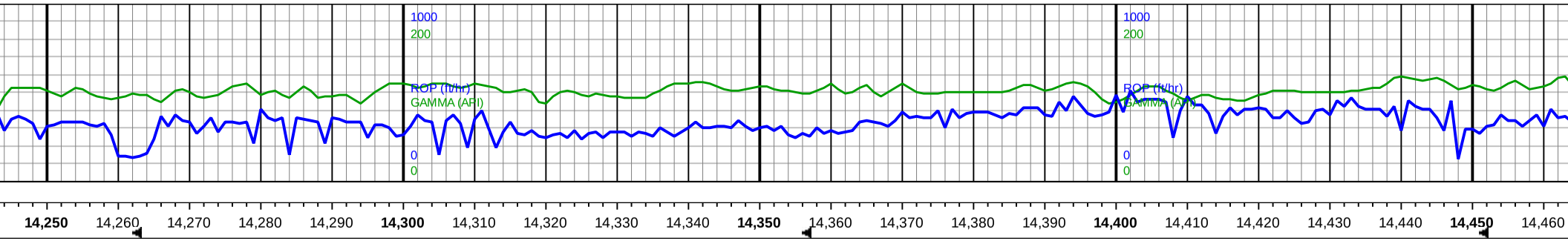
WOB: 22klbs
RPM: 120
SPM: 202
SPP: 4,809psi

MD: 14,237'
INC: 89.48°
AZM: 88.88°
TVD: 7,254.5'
VS: 6,655.17'



100% SS: predy brn-v lt gy, med gy-mot brn ip, vf gr s&p ss clus, frm-tt ip, vf-f gr, sb ang-sb rd grns, w srtd, grn sup silc cmt mtx, mod calc



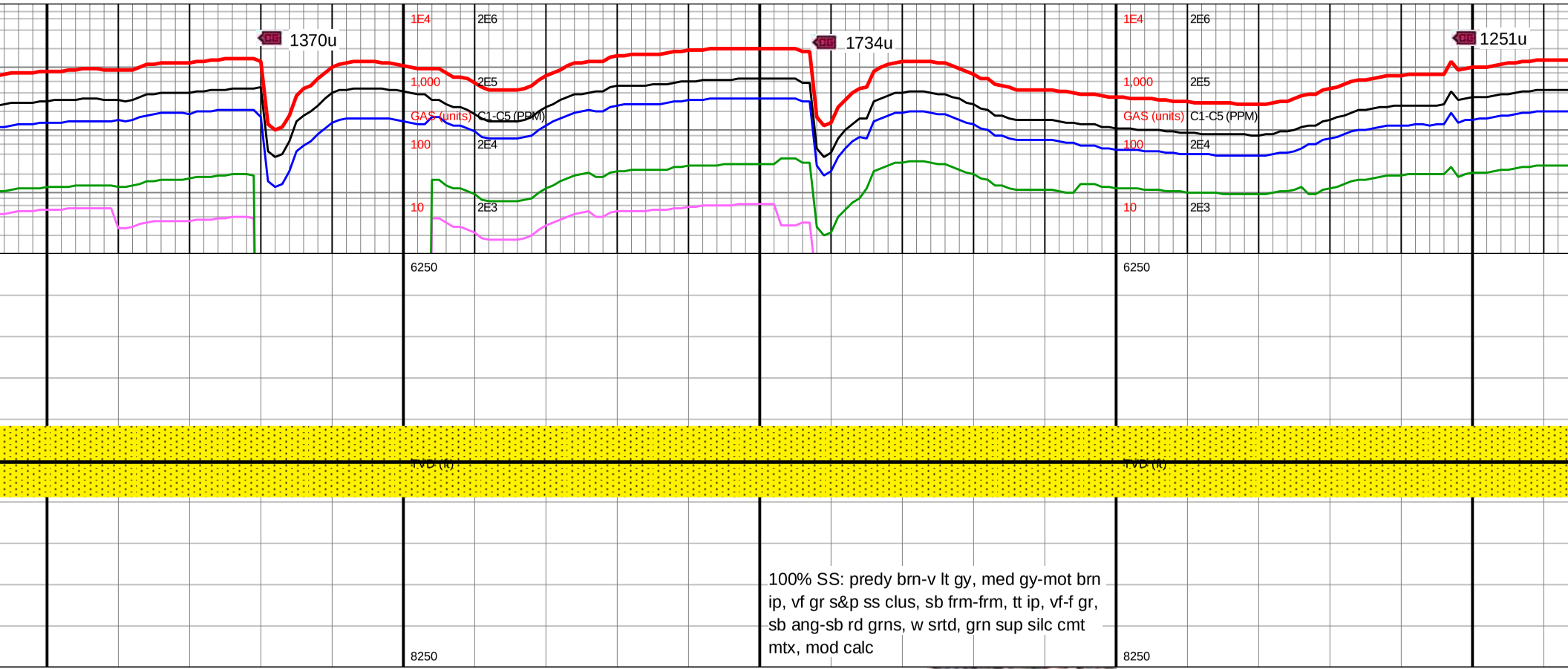


MD: 14,332'
INC: 89.48°
AZM: 90.51°
TVD: 7,255.36'
VS: 6,738.26'

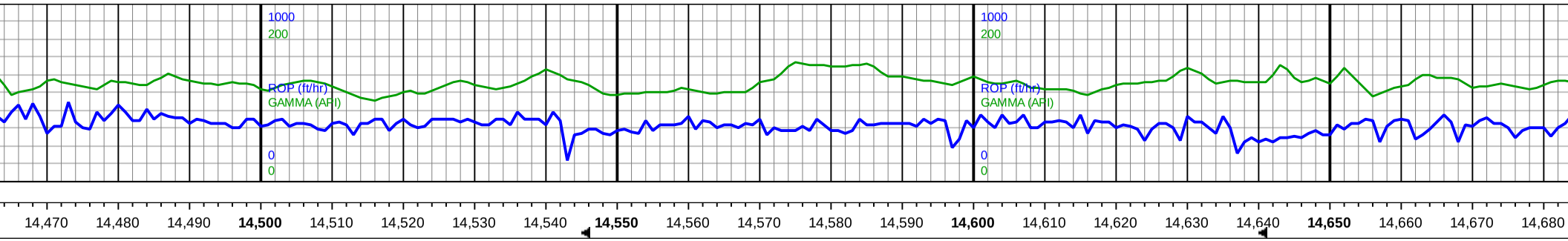
MW IN: 9.7
VIS IN: 56
MW OUT: 9.7
VIS OUT: 56

WOB: 20klbs
RPM: 120
SPM: 202
SPP: 4,946psi

MD: 14,426'
INC: 89.6°
AZM: 91.91°
TVD: 7,256.12'
VS: 6,819.25'



100% SS: predy brn-v lt gy, med gy-mot brn ip, vf gr s&p ss clus, sb frm-frm, tt ip, vf-f gr, sb ang-sb rd grns, w srtd, grn sup silc cmt mtx, mod calc

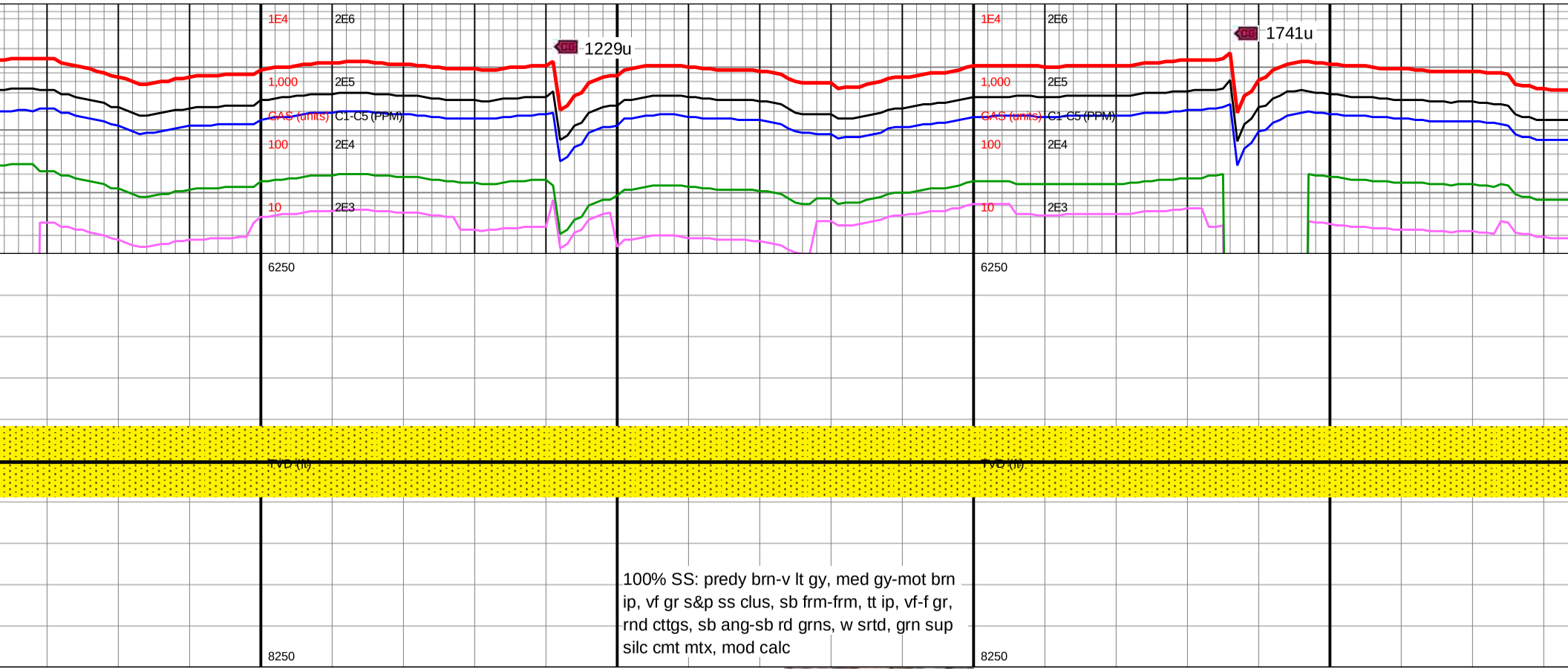


MD: 14,521'
INC: 89.57°
AZM: 91.48°
TVD: 7,256.81'
VS: 6,900.69'

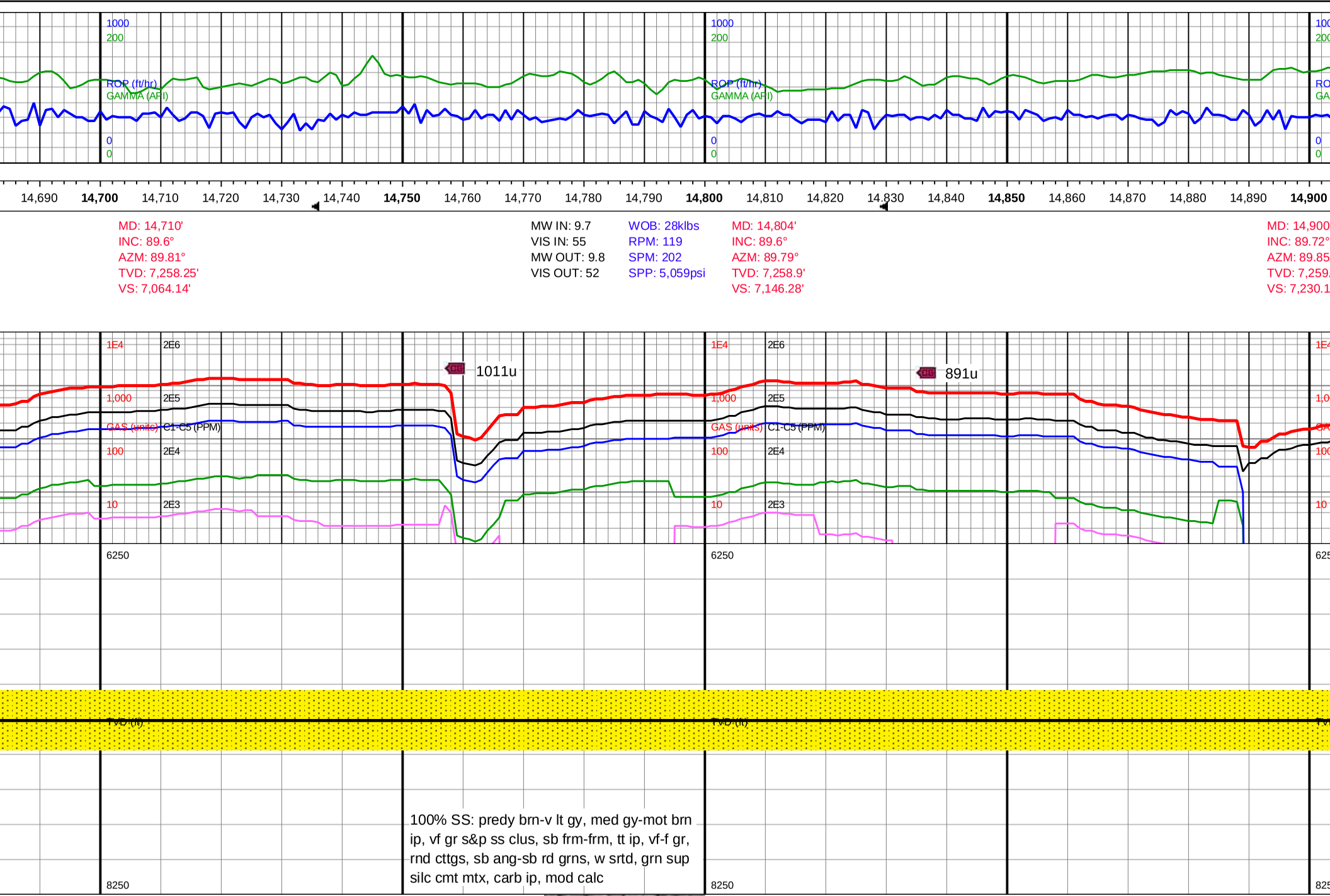
MW IN: 9.7
VIS IN: 56
MW OUT: 9.7+
VIS OUT: 51

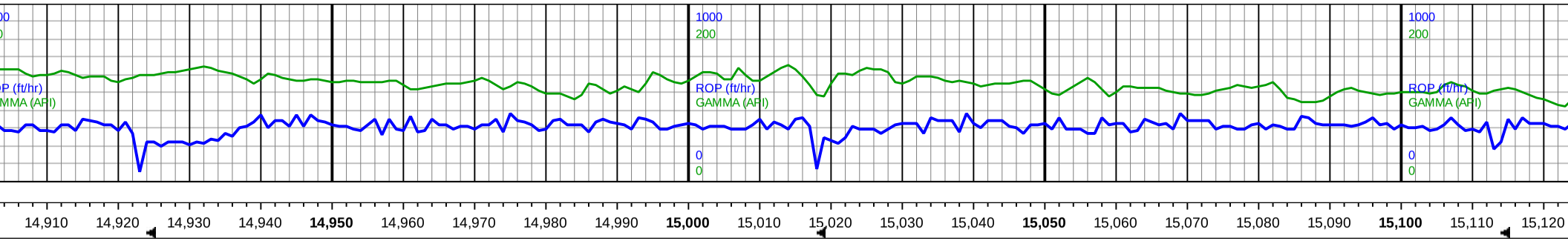
WOB: 21klbs
RPM: 120
SPM: 202
SPP: 4,966psi

MD: 14,615'
INC: 89.54°
AZM: 91.05°
TVD: 7,257.54'
VS: 6,981.64'



100% SS: predy brn-v lt gy, med gy-mot brn ip, vf gr s&p ss clus, sb frm-frm, tt ip, vf-f gr, rnd cttgs, sb ang-sb rd grns, w srtd, grn sup silc cmt mtx, mod calc


1000
200
ROP (ft/hr)
GAMMA (API)
0
0
14,690
14,700
14,710
14,720
14,730
14,740
14,750
14,760
14,770
14,780
14,790
14,800
14,810
14,820
14,830
14,840
14,850
14,860
14,870
14,880
14,890
14,900
MD: 14,710'
INC: 89.6°
AZM: 89.81°
TVD: 7,258.25'
VS: 7,064.14'
MW IN: 9.7
VIS IN: 55
MW OUT: 9.8
VIS OUT: 52
WOB: 28klbs
RPM: 119
SPM: 202
SPP: 5,059psi
MD: 14,804'
INC: 89.6°
AZM: 89.79°
TVD: 7,258.9'
VS: 7,146.28'
MD: 14,900
INC: 89.72°
AZM: 89.85
TVD: 7,259.
VS: 7,230.1
1E4
2E6
1,000
2E5
GAS (units)
C1-C5 (PPM)
100
2E4
10
2E3
1011u
891u
6250
TVD (ft)
8250
100% SS: predy brn-v lt gy, med gy-mot brn ip, vf gr s&p ss clus, sb frm-frm, tt ip, vf-f gr, rnd cttgs, sb ang-sb rd grns, w srtd, grn sup silc cmt mtx, carb ip, mod calc

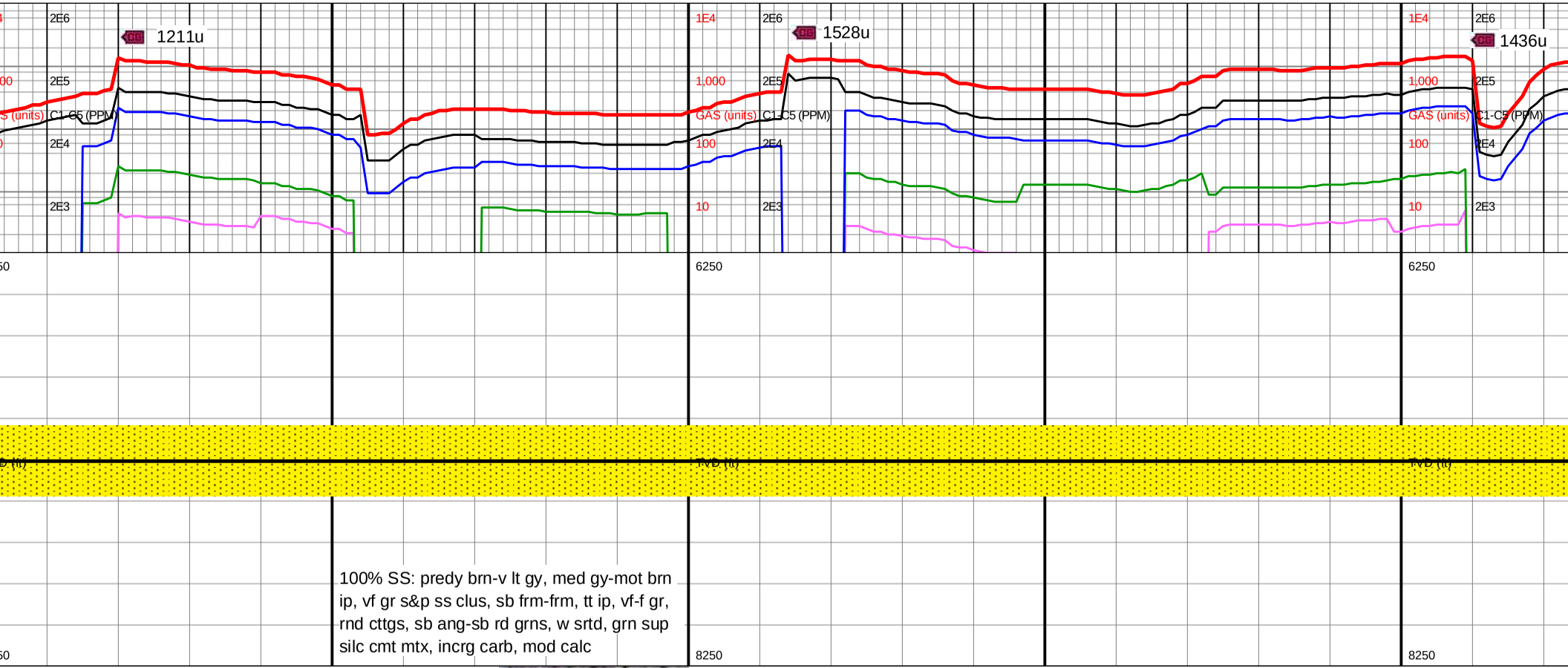


MW IN: 9.6+
VIS IN: 53
MW OUT: 9.8+
VIS OUT: 51

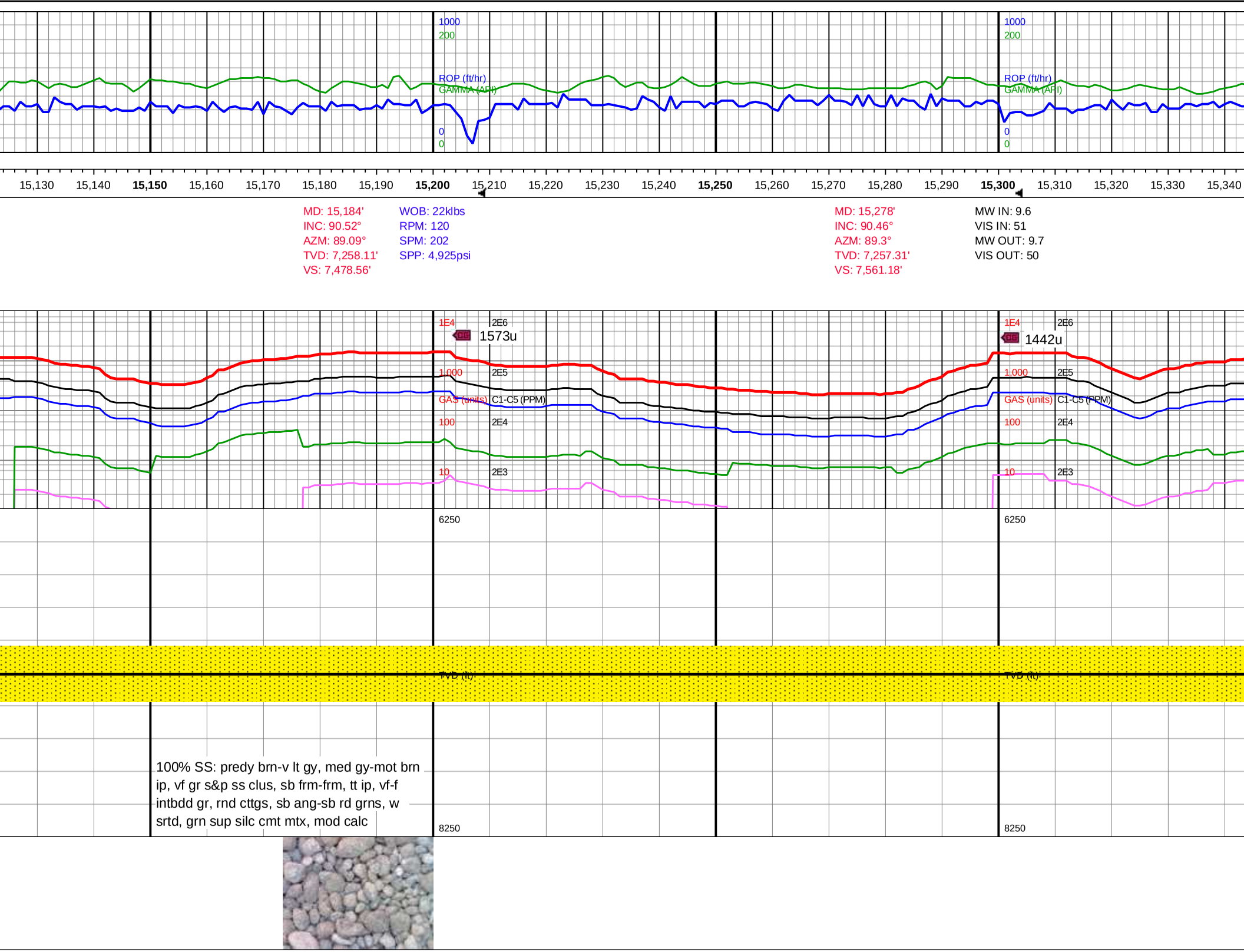
MD: 14,994'
INC: 90.18°
AZM: 89.98°
TVD: 7,259.56'
VS: 7,312.2'

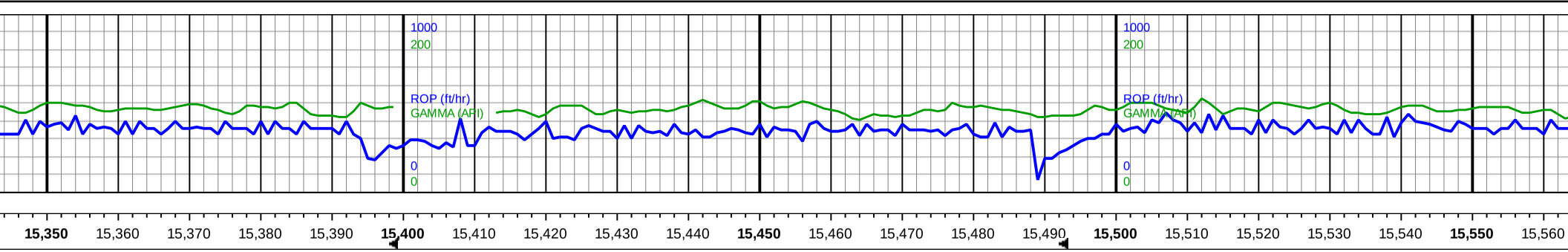
WOB: 23klbs
RPM: 119
SPM: 200
SPP: 4,990psi

MD: 15,089'
INC: 90.52°
AZM: 89.65°
TVD: 7,258.98'
VS: 7,395.2'



100% SS: predy brn-v lt gy, med gy-mot brn ip, vf gr s&p ss clus, sb frm-frm, tt ip, vf-f gr, rnd cttgs, sb ang-sb rd grns, w srtd, grn sup silc cmt mtx, incrg carb, mod calc


1000
200
ROP (ft/hr)
GAMMA (API)
0
0
15,130
15,140
15,150
15,160
15,170
15,180
15,190
15,200
15,210
15,220
15,230
15,240
15,250
15,260
15,270
15,280
15,290
15,300
15,310
15,320
15,330
15,340
MD: 15,184'
INC: 90.52°
AZM: 89.09°
TVD: 7,258.11'
VS: 7,478.56'
WOB: 22klbs
RPM: 120
SPM: 202
SPP: 4,925psi
MD: 15,278'
INC: 90.46°
AZM: 89.3°
TVD: 7,257.31'
VS: 7,561.18'
MW IN: 9.6
VIS IN: 51
MW OUT: 9.7
VIS OUT: 50
1E4
2E6
1573u
1,000
2E5
GAS (units)
C1-C5 (PPM)
100
2E4
10
2E3
6250
1442u
TVD (ft)
100% SS: predy brn-v lt gy, med gy-mot brn ip, vf gr s&p ss clus, sb frm-frm, tt ip, vf-f intbdd gr, rnd cttgs, sb ang-sb rd grns, w srtd, grn sup silc cmt mtx, mod calc
8250



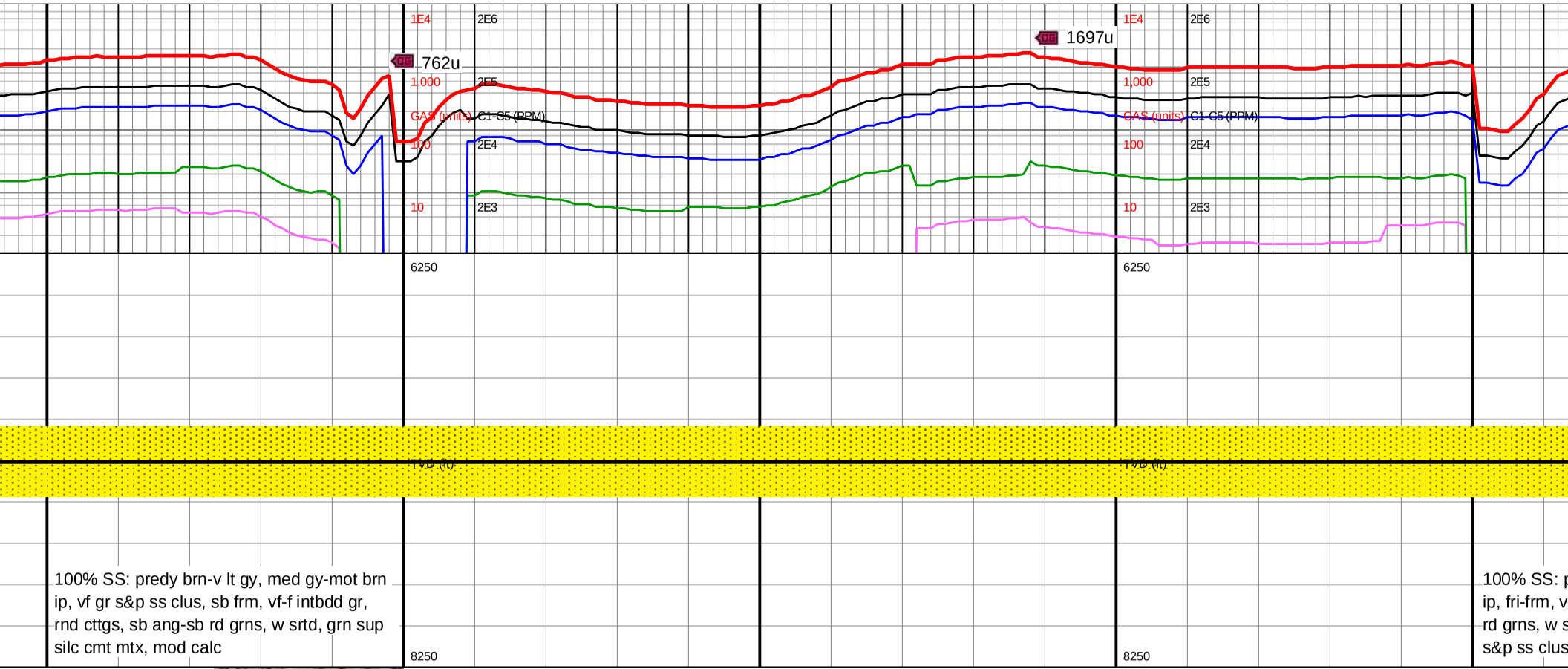
MD: 15,373'
INC: 90.55°
AZM: 87.94°
TVD: 7,256.47'
VS: 7,645.12'

WOB: 21klbs
RPM: 121
SPM: 187
SPP: 4,393psi

MW IN: 9.6
VIS IN: 53
MW OUT: 9.8
VIS OUT: 52

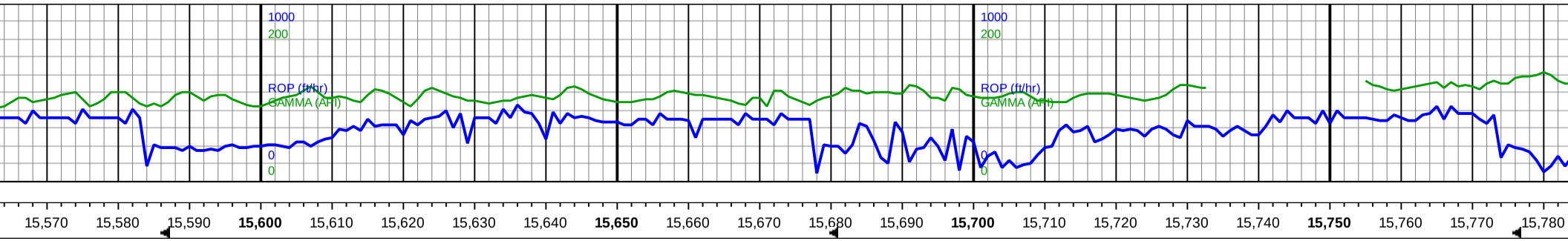
MD: 15,467'
INC: 90.58°
AZM: 87.51°
TVD: 7,255.55'
VS: 7,728.86'

MD: 15,5
INC: 89.9
AZM: 87.
TVD: 7,25
VS: 7,813



100% SS: predy brn-v lt gy, med gy-mot brn ip, vf gr s&p ss clus, sb frm, vf-f intbdd gr, rnd cttgs, sb ang-sb rd grns, w srtd, grn sup silc cmt mtx, mod calc

100% SS: p
ip, fri-frm, v
rd grns, w s
s&p ss clus



15,570 15,580 15,590 **15,600** 15,610 15,620 15,630 15,640 **15,650** 15,660 15,670 15,680 15,690 **15,700** 15,710 15,720 15,730 15,740 **15,750** 15,760 15,770 15,780

62'
4°
71°
55.11'
3.58'

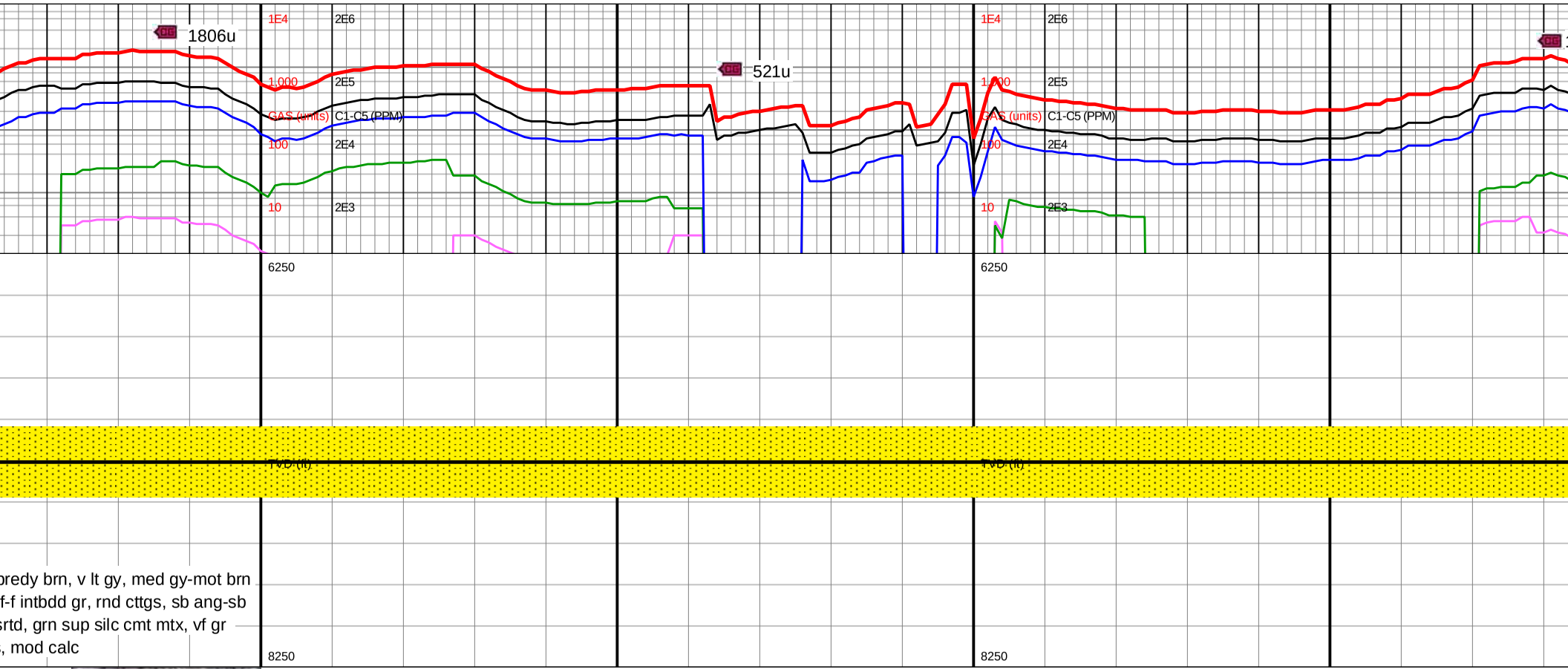
MW IN: 9.6
VIS IN: 52
MW OUT: 9.7
VIS OUT: 51

WOB: 15klbs
RPM: 120
SPM: 186
SPP: 4,325psi

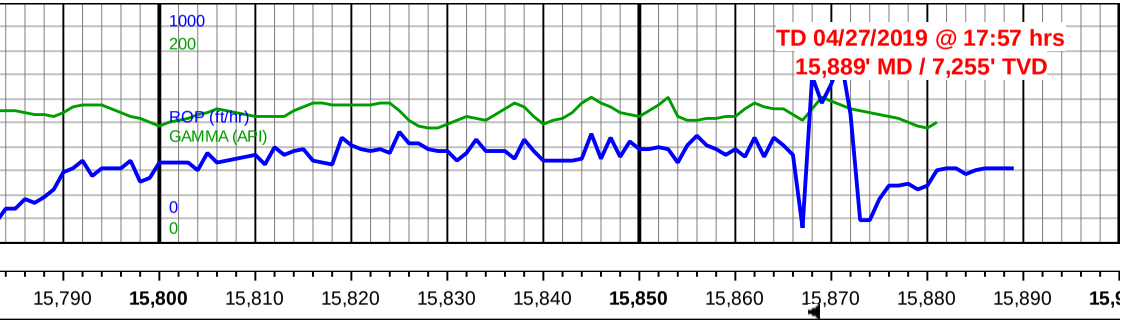
MD: 15,656'
INC: 90.03°
AZM: 88.44°
TVD: 7,255.14'
VS: 7,897.06'

MW IN: 9.5+
VIS IN: 52
MW OUT: 9.8
VIS OUT: 53

MD: 15,751'
INC: 90.18°
AZM: 91.09°
TVD: 7,254.97'
VS: 7,980.1'



predy brn, v lt gy, med gy-mot brn
f-f intbdd gr, rnd cttgs, sb ang-sb
srtd, grn sup silc cmt mtx, vf gr
, mod calc

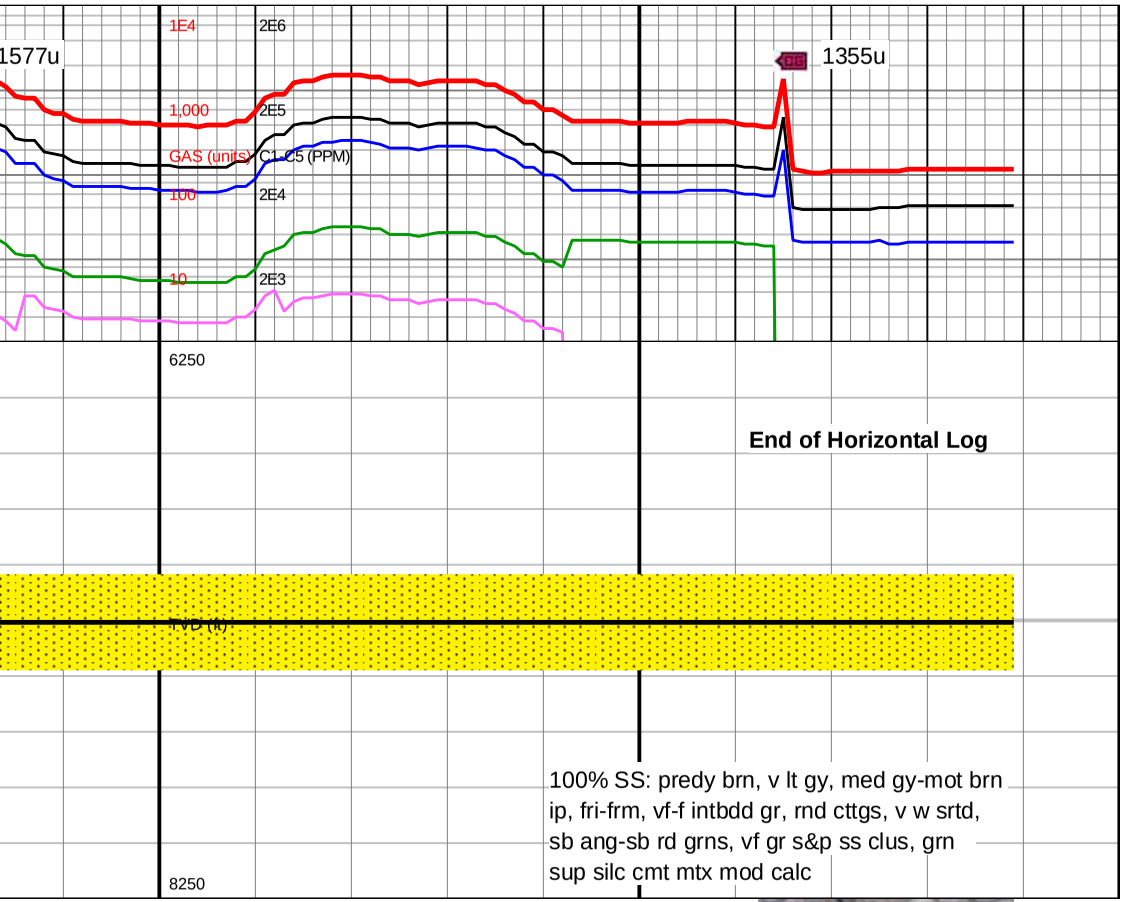


WOB: 24klbs
RPM: 120
SPM: 186
SPP: 4,633psi

MD: 15,845'
INC: 90.03°
AZM: 94.25°
TVD: 7,254.79'
VS: 8,059.84'

MW IN: 9.7+
VIS IN: 52
MW OUT: 9.7
VIS OUT: 48

Projection to bit:
MD: 15,889'
INC: 90.03°
AZM: 94.25°
TVD: 7,254.77'
VS: 8,096.51'



100% SS: predy brn, v lt gy, med gy-mot brn ip, fri-frm, vf-f intbdd gr, rnd cttgs, v w srtd, sb ang-sb rd grns, vf gr s&p ss clus, grn sup silc cmt mtx mod calc