RESERVOIR GROUP

Scale: 5" / 100'
Measured Depth Log

Well Name	Sam 3J-25H-M166		
Location	Sec. 25 T1N R66W		
State	Colorado	**County**	Weld
Country	USA	**Rig Number**	Ensign 140
API Number	05123461290000	**AFE #**	16190875
Geographic Region	Rockies	**Field**	Wattenberg
Spud Date	9/2/2018	**Drilling Completed**	9/6/2018
Surface Coordinates	Lat/Long: 40.018648/-104.733855 SHL: Sec: 25 Twp: 1N 66W Footage: 1323 FSL 310 FWL		
Bottom Hole Coordinates	Proposed BHL: Sec: 25 Twp: 1N 66W Footages: 900 FFSLL 460 FFELL		
Ground Elevation	5,086'	**K.B. Elevation**	5,109'
Logged Interval	6,000' **To** 11,890'	**Total Depth**	11,890'
Formation	B Chalk		
Type of Drilling Fluid	Synthetic Oil Based Mud		

Operator

Company Crestone Peak Resources

Address 1801 California Street, Suite 2500
Denver, CO 80202

CRESTONE PEAK

CRESTONE PEAK
RESOURCES

Geologist

Name John Ready

Company Crestone Peak Resources

Address 1801 California Street, Suite 2500
Denver, CO 80202

Zone Color Coding

Oil	Condensate	Gas
Note	Core	Pressure
Error	Water	Seal

Other

Loggers: Brian Ferwerda / Nicholas Watkins / Thomas Yull

Services Provided: 2-Man Mudlogging / Geosteering

Equipment: ML-533

Contractor: Empirica, Reservoir Group
6360 West Sam Houston Pkwy N
Houston, TX 77041

Service Start Date: 9/3/2018

Rock Types

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

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

Other Symbols

- FORMATION TOP
- GAS SHOW
- MN DEPTH
- NORMAL FAULT
- OIL SHOW
- OVERTURNED STRATA
- REVERSE FAULT
- SIDEWALL CORE (LEFT)
- SIDEWALL CORE (RIGHT)
- SLIDE
- SURVEY
- TRIP GAS
- WIRELINE TESTED - LEFT
- WIRELINE TESTED - RT

Rounding

- A ANGULAR
- R ROUNDED
- SUBANG
- SUBRND

Textures

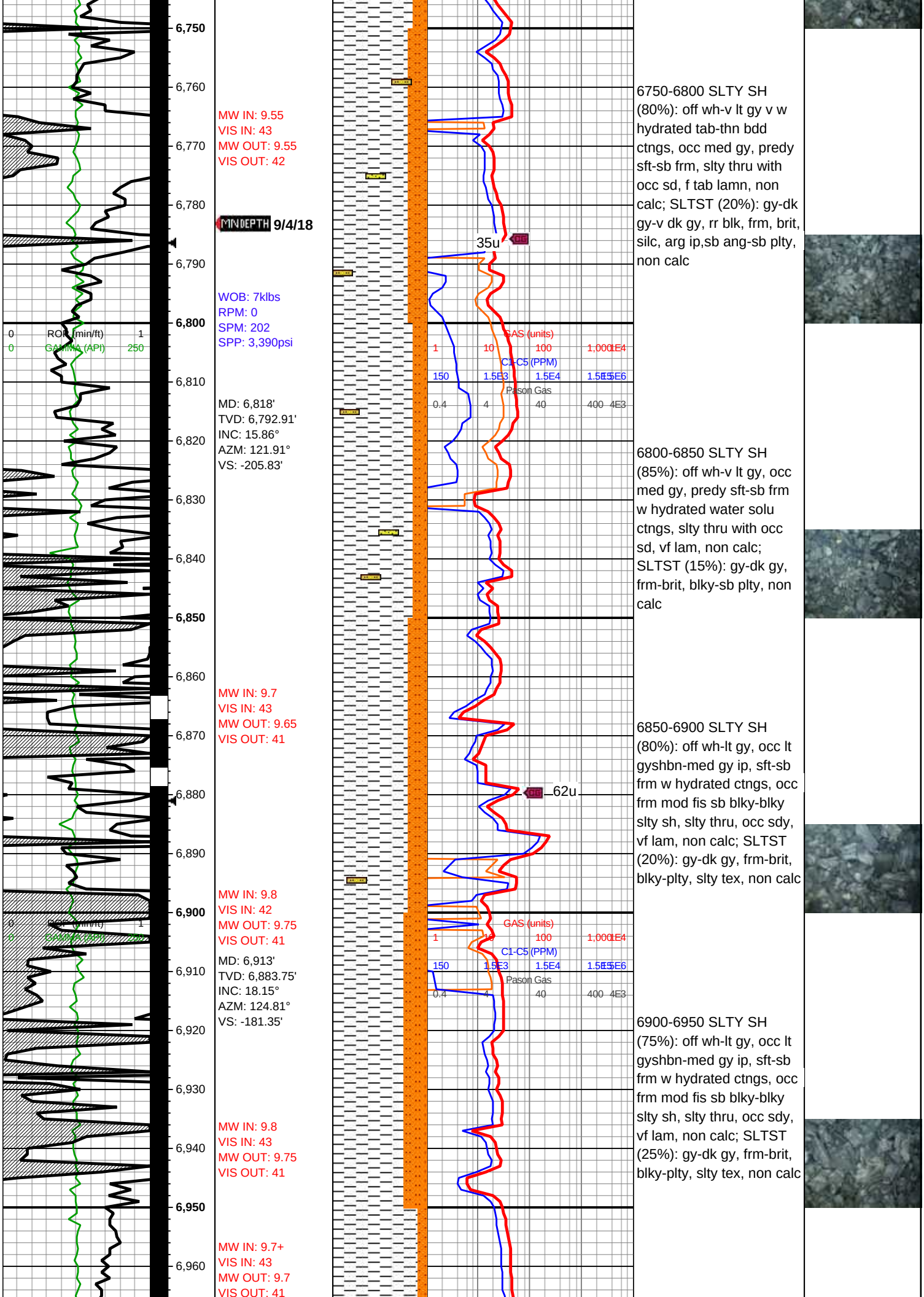
- BS BOUNDSTONE
- C CHALKY
- CX CRYPTOXLN
- E EARTHY
- FX FINELYXLN
- GS GRAINSTONE
- L LITHOGRAPHIC
- MX MICROXLN
- MS MUDSTONE
- PS PACKSTONE
- WS WACKESTONE

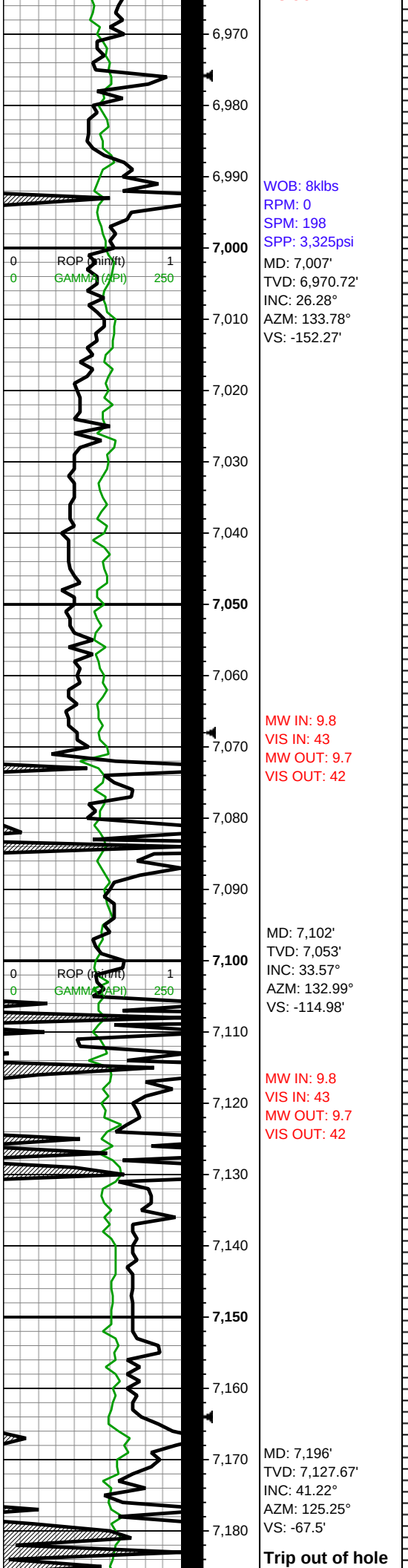
Sorting

- M MODERATE
- P POOR
- W WELL

ROP / GAMMA	Slide/Rotate	Depth Labels	Notes	% Lith	Total Gas (GAS, C1, C2, C3, C4, C5, Pason Gas)	Lithology Descriptions	Images
Crestone Peak Resources **Sam 3J-25H-M166** **9 5/8" Surface Casing @ 2419'** **Spud Date: 9/2/18** **2 man Logging Began: 9/3/18 @ 6,600'** **All Depths Correspond to Driller's Pipe Tally**		6,560 6,570 6,580 6,590 **6,600** 6,610 6,620 6,630 6,640 **6,650** 6,660 6,670 6,680 6,690 **6,700** 6,710 6,720 6,730 6,740	Bit #: 1 Type: U516M Size: 8 1/2 Depth In: 2,440' Depth Out: 7,195' Hours: 26 hrs Avg Ft/Hr: 183 '/hr Jets: 5x14 S/N: 43453 MW IN: 9.55 VIS IN: 45 MW OUT: 9.5 VIS OUT: 43 MD: 6,724' TVD: 6,701.67' INC: 11.91° AZM: 122.26° VS: -225.97'		**SYSTEM CALIBRATED** **1% Methane = 100 Units** **100% Methane = 10000 Units** GAS (units) 1 10 100 1,000 1E4 C1-C5 (PPM) 150 1.5E3 1.5E4 1.5E5 1.5E6 Pason Gas 0.4 4 40 400 4E3 87u	6600-6650 SLTY SH (80%): off wh-v lt gy, occ med gy, predy sft-sb frm w hydrated water solu ctngs, slty thru with occ sd, vf lam, non calc; SLTST (20%): gy-dk gy, frm-sl hrd, blky, tr vf pyr, non calc 6650-6700 SLTY SH (80%): med gy-med gyshbn, dk gy, med frm-sl hd, sb blky-tab ctngs, sl slty thru, vf lam, tr mic pyr, non calc; SLTST (40%): gy-dk gy, frm-sl hrd, blky, non calc, rgh tex, tr pyr; SST (20%): offwht-lt gy, frm, blky, w cons gr sup cls cons wi arg-silc cmt, v f grnd grdg to slt 6700-6750 SLTY SH (85%): off wh-v lt gy, occ med gy, predy sft-sb frm w hydrated water solu ctngs, slty thru with occ sd, vf lam, non calc; SLTST (15%): gy-dk gy, frm-sl hrd, blky, tr vf pyr, non calc	  

ROP (min/ft) 0 1
GAMMA (API) 0 250


6,750
6,760
6,770
6,780
6,790
6,800
6,810
6,820
6,830
6,840
6,850
6,860
6,870
6,880
6,890
6,900
6,910
6,920
6,930
6,940
6,950
6,960
0 ROP (min/ft) 1
0 GAMMA (API) 250
MW IN: 9.55
VIS IN: 43
MW OUT: 9.55
VIS OUT: 42
MNDEPTH 9/4/18
WOB: 7klbs
RPM: 0
SPM: 202
SPP: 3,390psi
MD: 6,818'
TVD: 6,792.91'
INC: 15.86°
AZM: 121.91°
VS: -205.83'
MW IN: 9.7
VIS IN: 43
MW OUT: 9.65
VIS OUT: 41
MW IN: 9.8
VIS IN: 42
MW OUT: 9.75
VIS OUT: 41
MD: 6,913'
TVD: 6,883.75'
INC: 18.15°
AZM: 124.81°
VS: -181.35'
MW IN: 9.8
VIS IN: 43
MW OUT: 9.75
VIS OUT: 41
MW IN: 9.7+
VIS IN: 43
MW OUT: 9.7
VIS OUT: 41
35u
62u
GAS (units)
1 10 100 1,000 1E4
C1-C5 (PPM)
150 1.5E3 1.5E4 1.5E5 1.5E6
Pason Gas
0.4 4 40 400 4E3
6750-6800 SLTY SH (80%): off wh-v lt gy v w hydrated tab-thn bdd ctngs, occ med gy, predy sft-sb frm, slty thru with occ sd, f tab lamn, non calc; SLTST (20%): gy-dk gy-v dk gy, rr blk, frm, brit, silc, arg ip,sb ang-sb plty, non calc
6800-6850 SLTY SH (85%): off wh-v lt gy, occ med gy, predy sft-sb frm w hydrated water solu ctngs, slty thru with occ sd, vf lam, non calc; SLTST (15%): gy-dk gy, frm-brit, blky-sb plty, non calc
6850-6900 SLTY SH (80%): off wh-lt gy, occ lt gyshbn-med gy ip, sft-sb frm w hydrated ctngs, occ frm mod fis sb blky-blky slty sh, slty thru, occ sdy, vf lam, non calc; SLTST (20%): gy-dk gy, frm-brit, blky-plty, slty tex, non calc
6900-6950 SLTY SH (75%): off wh-lt gy, occ lt gyshbn-med gy ip, sft-sb frm w hydrated ctngs, occ frm mod fis sb blky-blky slty sh, slty thru, occ sdy, vf lam, non calc; SLTST (25%): gy-dk gy, frm-brit, blky-plty, slty tex, non calc



WOB: 8klbs
RPM: 0
SPM: 198
SPP: 3,325psi
MD: 7,007'
TVD: 6,970.72'
INC: 26.28°
AZM: 133.78°
VS: -152.27'

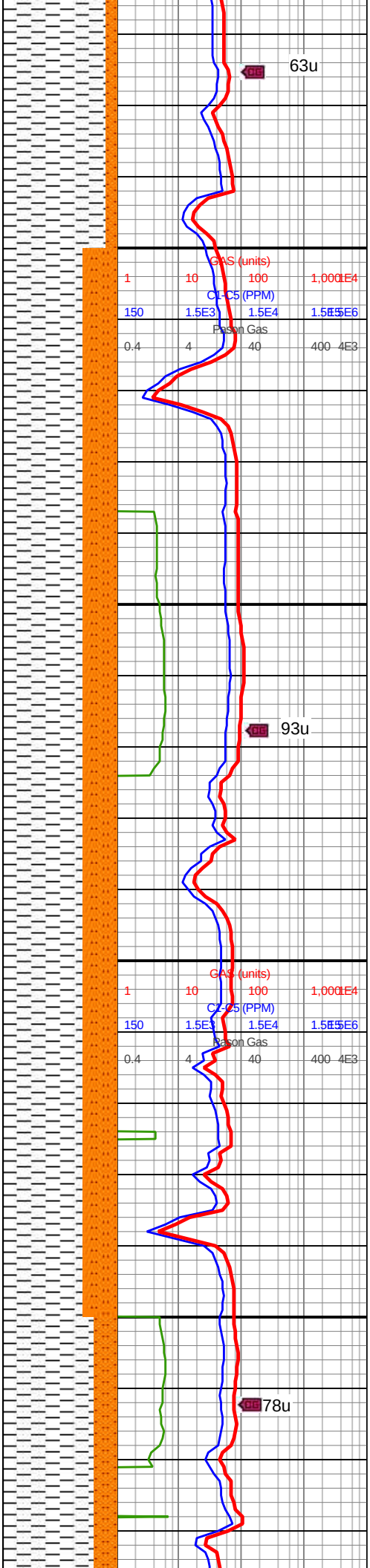
MW IN: 9.8
VIS IN: 43
MW OUT: 9.7
VIS OUT: 42

MD: 7,102'
TVD: 7,053'
INC: 33.57°
AZM: 132.99°
VS: -114.98'

MW IN: 9.8
VIS IN: 43
MW OUT: 9.7
VIS OUT: 42

MD: 7,196'
TVD: 7,127.67'
INC: 41.22°
AZM: 125.25°
VS: -67.5'

Trip out of hole



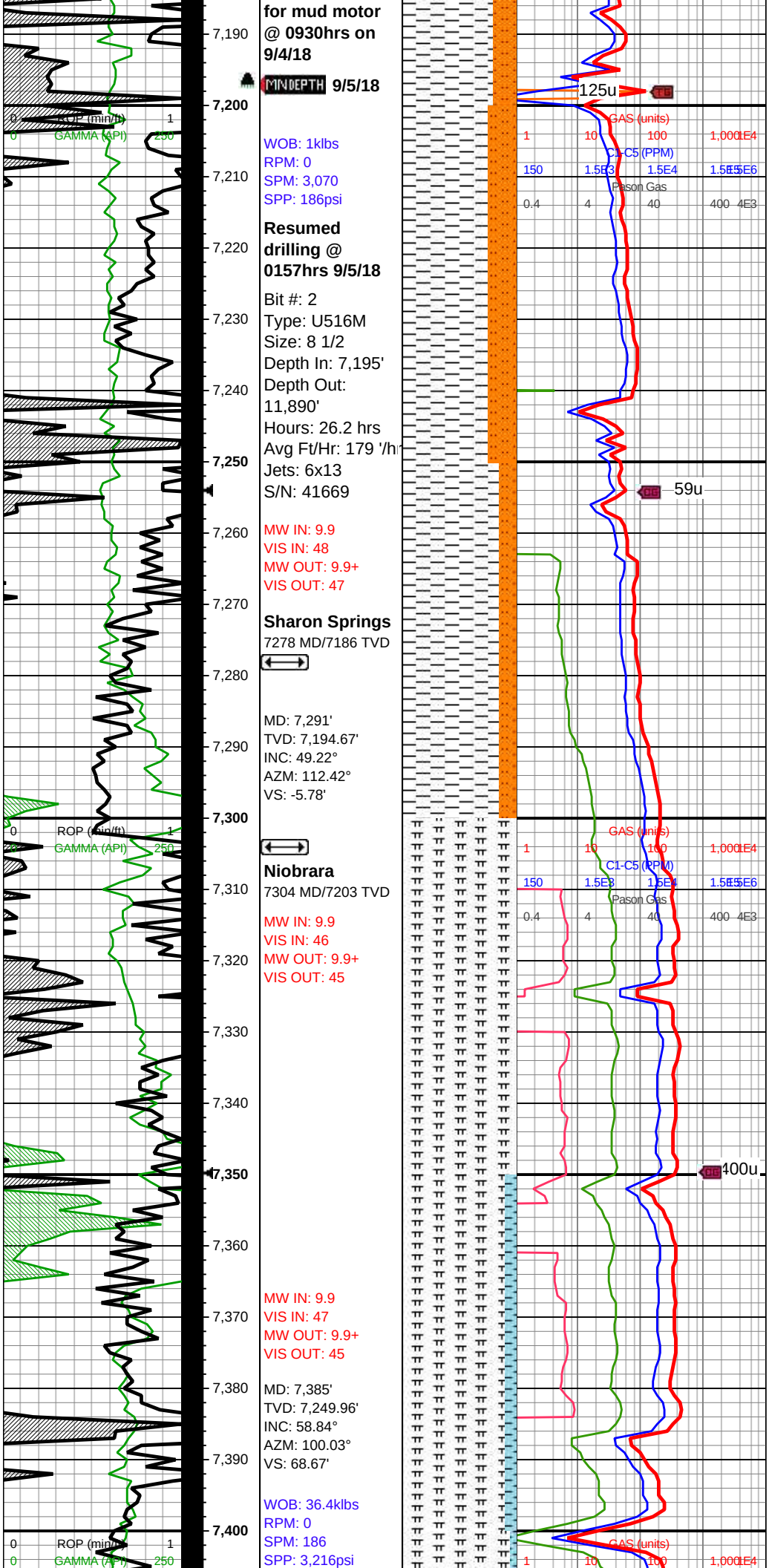
6950-7000 SLTY SH (90%): med gy-med gyshbn, dk gy, med frm-sl hd, sb blky-tab ctngs, sl slty thru, vf lam, tr mic pyr, non calc, com micmica; SLTST (10%): gy-dk gy, frm-sl hrd, blky, non calc, rgh tex, tr pyr

7000-7050 SLTY SH (90%): med gy-med gyshbn, dk gy, med frm-sl hd, sb blky-tab ctngs, sl slty thru, vf lam, tr mic pyr, non calc, com micmica; SLTST (10%): gy-dk gy, frm-sl hrd, blky, non calc, rgh tex, tr pyr

7050-7100 SLTY SH (70%): mod dk gy-v dk gy, tr gyshbn-lt gy, v rr blk, frm-v frm, sb plty, v f slty tex; SLTST (30%): gy-dk gy, frm-sl hrd, blky, non calc, rgh tex, tr pyr

7000-7050 SLTY SH (70%): mod dk gy-v dk gy, tr gyshbn-lt gy, v rr blk, frm-v frm, sb plty, v f slty tex; SLTST (30%): gy-dk gy, frm-sl hrd, blky, non calc, rgh tex, tr pyr

7150-7200 SLTY SH (80%): mod dk gy-v dk gy, tr gyshbn-lt gy, v rr blk,



for mud motor @ **0930hrs on 9/4/18**

MD DEPTH **9/5/18**

WOB: 1klbs
RPM: 0
SPM: 3,070
SPP: 186psi

Resumed drilling @ 0157hrs 9/5/18

Bit #: 2
Type: U516M
Size: 8 1/2
Depth In: 7,195'
Depth Out: 11,890'
Hours: 26.2 hrs
Avg Ft/Hr: 179 '/hr
Jets: 6x13
S/N: 41669

MW IN: 9.9
VIS IN: 48
MW OUT: 9.9+
VIS OUT: 47

Sharon Springs
7278 MD/7186 TVD

MD: 7,291'
TVD: 7,194.67'
INC: 49.22°
AZM: 112.42°
VS: -5.78'

Niobrara
7304 MD/7203 TVD

MW IN: 9.9
VIS IN: 46
MW OUT: 9.9+
VIS OUT: 45

MW IN: 9.9
VIS IN: 47
MW OUT: 9.9+
VIS OUT: 45

MD: 7,385'
TVD: 7,249.96'
INC: 58.84°
AZM: 100.03°
VS: 68.67'

WOB: 36.4klbs
RPM: 0
SPM: 186
SPP: 3,216psi

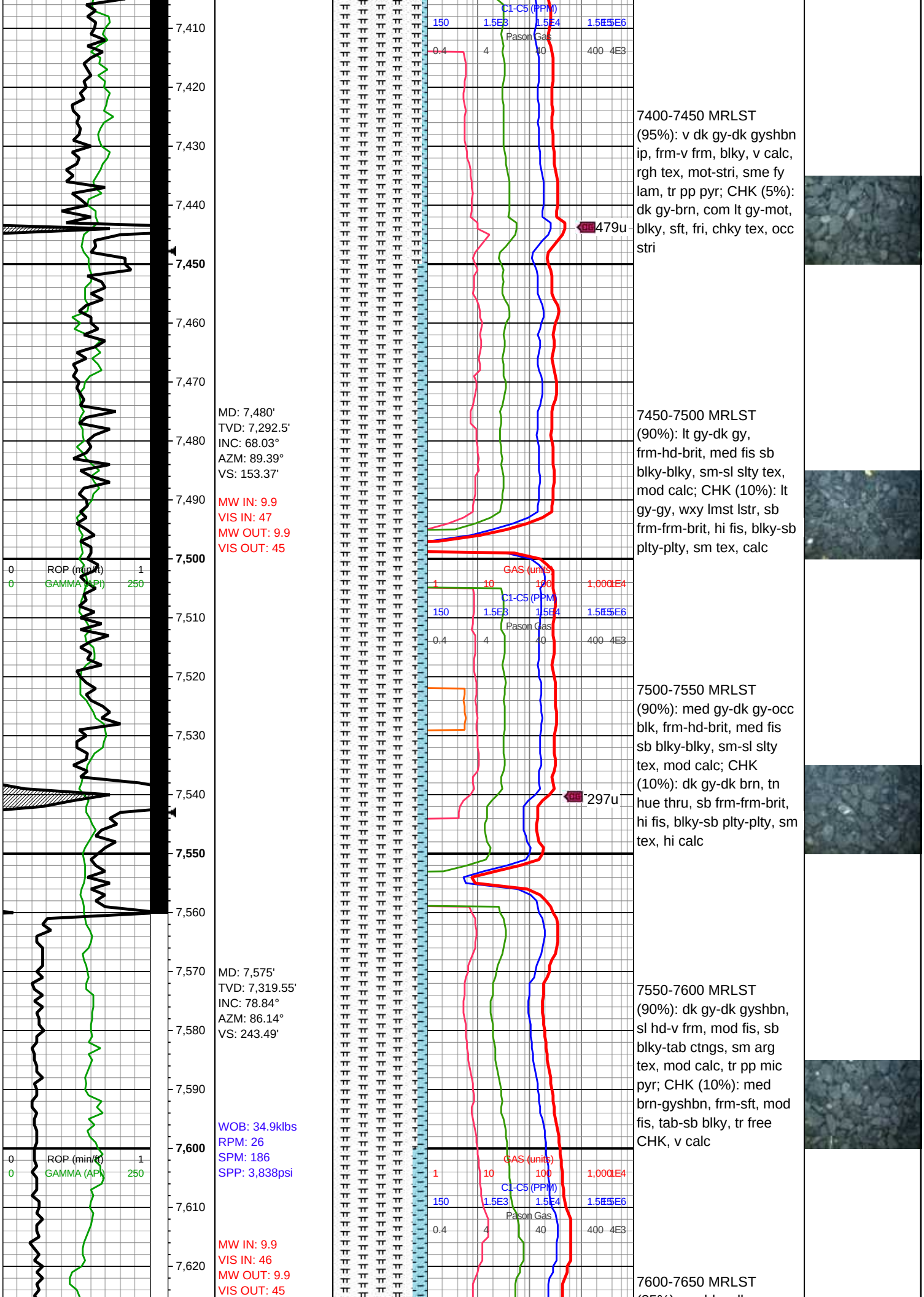
frm-v frm, sb plty, v f slty tex; SLTST (20%): gy-dk gy, frm-sl hrd, blky, non calc, rgh tex, tr pyr

7200-7250 SLTY SH (75%): off wh-lt gy sft-sb frm w hydrated water solu ctngs intbdd wi frm mod fis sb blky-blky med gy slty sh, tr bent, non calc; SLTST (25%): gy-dk gy, frm-brit, blky-plty, slty tex, slightly calc

7250-7300 SLTY SH (85%): off wh-lt gy sft-sb frm w hydrated water solu ctngs intbdd wi frm mod fis sb blky-blky med gy slty sh, non calc; SLTST (15%): gy-dk gy, frm-brit, blky-plty, slty tex, slightly calc

7300-7350 MRLST (100%): dk gy-v dk gy, frm-brit, med-hi fis blky ctngs, rr vf pyr, pyrc bent, mod calc

7350-7400 MRLST (90%): med gy-dk gy, frm, brit, med-hi fis sb blky-sb plty ctngs, mod calc; CHK (10%): lt-med gy, sl brn hue ip, sb frm-frm, sb rd-sb blky, tr vf pyr, hi calc



MD: 7,480'
TVD: 7,292.5'
INC: 68.03°
AZM: 89.39°
VS: 153.37'

MW IN: 9.9
VIS IN: 47
MW OUT: 9.9
VIS OUT: 45

MD: 7,575'
TVD: 7,319.55'
INC: 78.84°
AZM: 86.14°
VS: 243.49'

WOB: 34.9klbs
RPM: 26
SPM: 186
SPP: 3,838psi

MW IN: 9.9
VIS IN: 46
MW OUT: 9.9
VIS OUT: 45

7400-7450 MRLST (95%): v dk gy-dk gyshbn ip, frm-v frm, blky, v calc, rgh tex, mot-stri, sme fy lam, tr pp pyr; CHK (5%): dk gy-brn, com lt gy-mot, blky, sft, fri, chky tex, occ stri

7450-7500 MRLST (90%): lt gy-dk gy, frm-hd-brit, med fis sb blky-blky, sm-sl slty tex, mod calc; CHK (10%): lt gy-gy, wxy lmst lstr, sb frm-frm-brit, hi fis, blky-sb plty-plty, sm tex, calc

7500-7550 MRLST (90%): med gy-dk gy-occ blk, frm-hd-brit, med fis sb blky-blky, sm-sl slty tex, mod calc; CHK (10%): dk gy-dk brn, tn hue thru, sb frm-frm-brit, hi fis, blky-sb plty-plty, sm tex, hi calc

7550-7600 MRLST (90%): dk gy-dk gyshbn, sl hd-v frm, mod fis, sb blky-tab ctngs, sm arg tex, mod calc, tr pp mic pyr; CHK (10%): med brn-gyshbn, frm-sft, mod fis, tab-sb blky, tr free CHK, v calc

7600-7650 MRLST

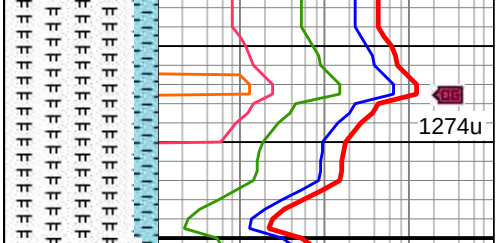
7,630
7,640
7,650
7,660
7,670
7,680
7,690
7,700
7,710
7,720
7,730
7,740
7,750
7,760
7,770
7,780
7,790
7,800
7,810
7,820
7,830
7,840

0 ROP (min/ft) 1
0 GAMMA (API) 250

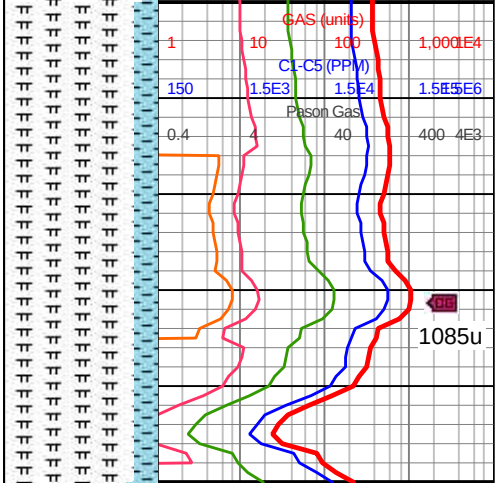
MD: 7,669'
TVD: 7,335.79'
INC: 81.26°
AZM: 86.49°
VS: 334.94'

MD: 7,764'
TVD: 7,347.56'
INC: 84.51°
AZM: 85.7°
VS: 427.99'

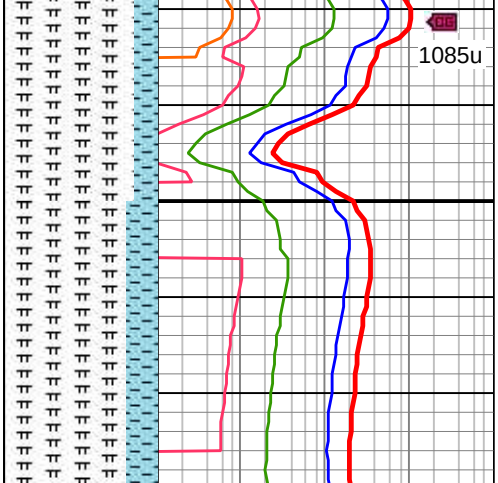
WOB: 38.7klbs
RPM: 26
SPM: 185
SPP: 3,670psi



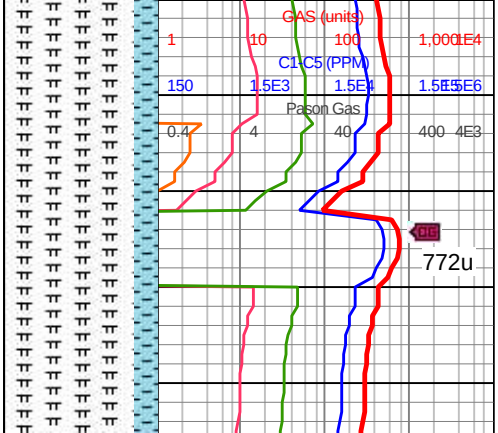
(85%): gyshbn-dk gy, frm-hd, occ sft, predy brit, sm-sl slty tex, mod-hi calc; CHK (15%): lt gy-lt gyshbn, sft-sb frm-frm, sb blky, chky tex, tr-rr ptch pyr strg, med-hi calc, scat lse cal & cal vns



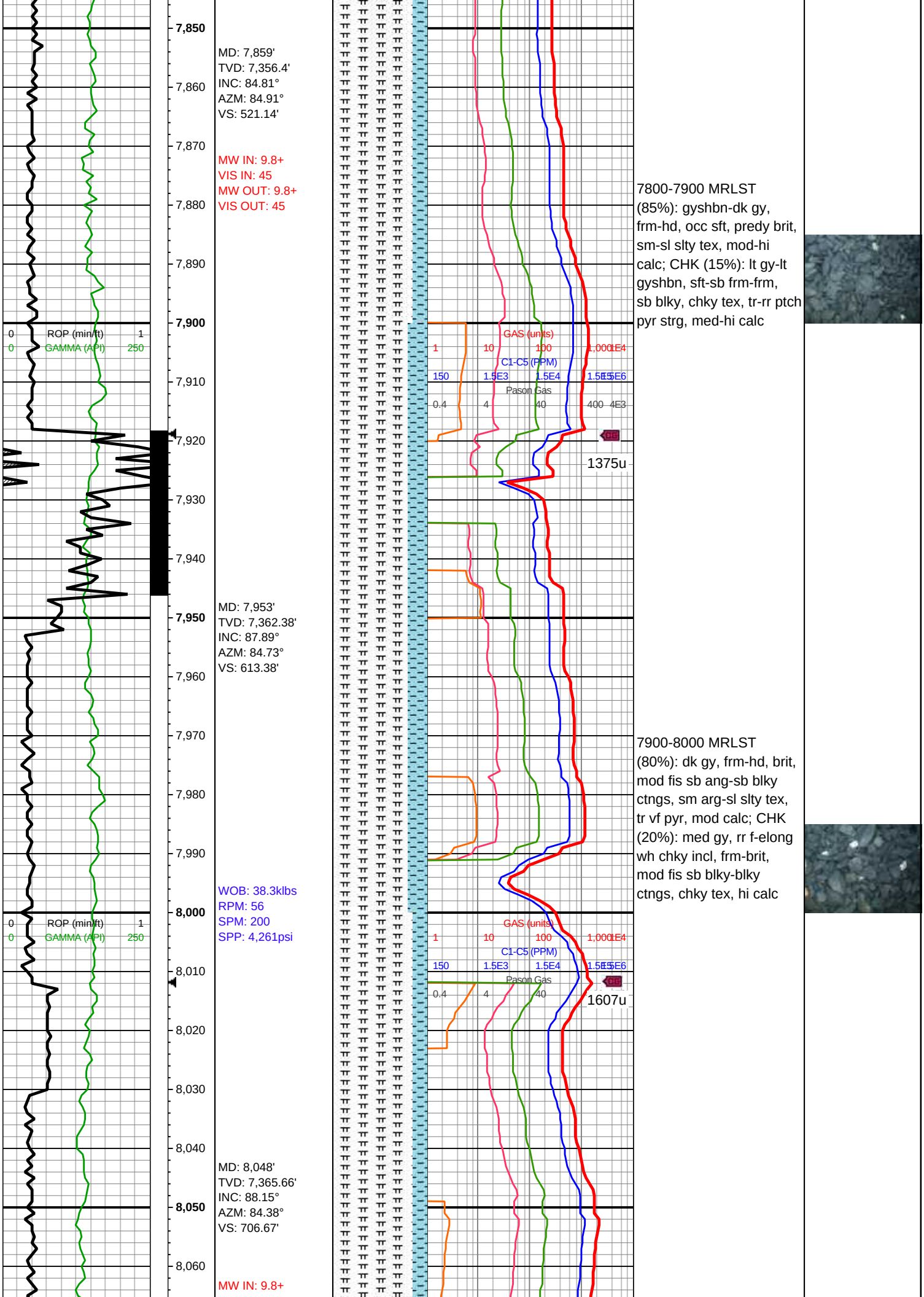
7650-7700 MRLST (90%): dk gy-dk gyshbn, sl hd-v frm, mod fis, sb blky-tab ctngs, sm arg tex, mod calc, tr pp mic pyr; CHK (10%): med brn-gyshbn, frm-sft, mod fis, tab-sb blky, tr free CHK, v calc



7700-7750 MRLST (85%): predy dk gyshbn, com dk gy wi brn marly incl, frm-brit ip mod fis sb blky-blky-tab ctngs, sl slty tex, mod calc; CHK (15%): dk gy wi vf lt gy chky lamn & f chky incl, l-mod fis sb rd-sb blky frm-sl brit ctngs, hi calc



7750-7800 MRLST (80%): med gy-gyshbn-dk gy, sb frm-frm-brit, sb rd-sb blky l-mod fis ctngs, sm arg-sl slty tex, rr vf pyr, mod calc; CHK (20%): med gy, lt gy ip, frm, brit, mod fis sb blky-blky ctngs, hi calc



MD: 7,859'
TVD: 7,356.4'
INC: 84.81°
AZM: 84.91°
VS: 521.14'

MW IN: 9.8+
VIS IN: 45
MW OUT: 9.8+
VIS OUT: 45

7800-7900 MRLST (85%): gyshbn-dk gy, frm-hd, occ sft, predy brit, sm-sl slty tex, mod-hi calc; CHK (15%): lt gy-lt gyshbn, sft-sb frm-frm, sb blky, chky tex, tr-rr ptch pyr strg, med-hi calc

MD: 7,953'
TVD: 7,362.38'
INC: 87.89°
AZM: 84.73°
VS: 613.38'

7900-8000 MRLST (80%): dk gy, frm-hd, brit, mod fis sb ang-sb blky ctngs, sm arg-sl slty tex, tr vf pyr, mod calc; CHK (20%): med gy, rr f-elong wh chky incl, frm-brit, mod fis sb blky-blky ctngs, chky tex, hi calc

WOB: 38.3klbs
RPM: 56
SPM: 200
SPP: 4,261psi

MD: 8,048'
TVD: 7,365.66'
INC: 88.15°
AZM: 84.38°
VS: 706.67'

MW IN: 9.8+

VIS IN: 44
MW OUT: 9.8+
VIS OUT: 44

8,070
8,080
8,090
8,100
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

0 ROP (min/ft) 1
0 GAMMA (API) 250

GAS (units)
1 10 100 1,000 1E4
C1-C5 (PPM)
150 1.5E3 1.5E4 1.5E5
Pason Gas
0.4 4 40 400 4E3
2729u

MD: 8,142'
TVD: 7,368.16'
INC: 88.81°
AZM: 83.24°
VS: 798.76'

B Chalk
8173 MD/7369 TVD

8000-8100 MRLST (85%): med gy-dk gy-occ blk, frm-hd-brit, med fis sb blky-blky, sm-sl slty tex, mod calc; CHK (15%): lt gy-dk gy, tn hue thru, wxy lmst lstr, sb frm-frm-brit, hi fis, blky-sb plty-plty, sm tex, hi calc

8100-8200 CHK (80%): predy gyshbn-med gy, sme lt gy, sb blky-sb ang ctngs, fri-frm, tr intbd MRLST, sm chky tex, scat mic fos frags, calc; MRLST (20%): dk gyshbn-dk gy, frm-sl hd, sb blky-ang ctngs, sl sm-rgh tex, com intbd CHK, hi calc

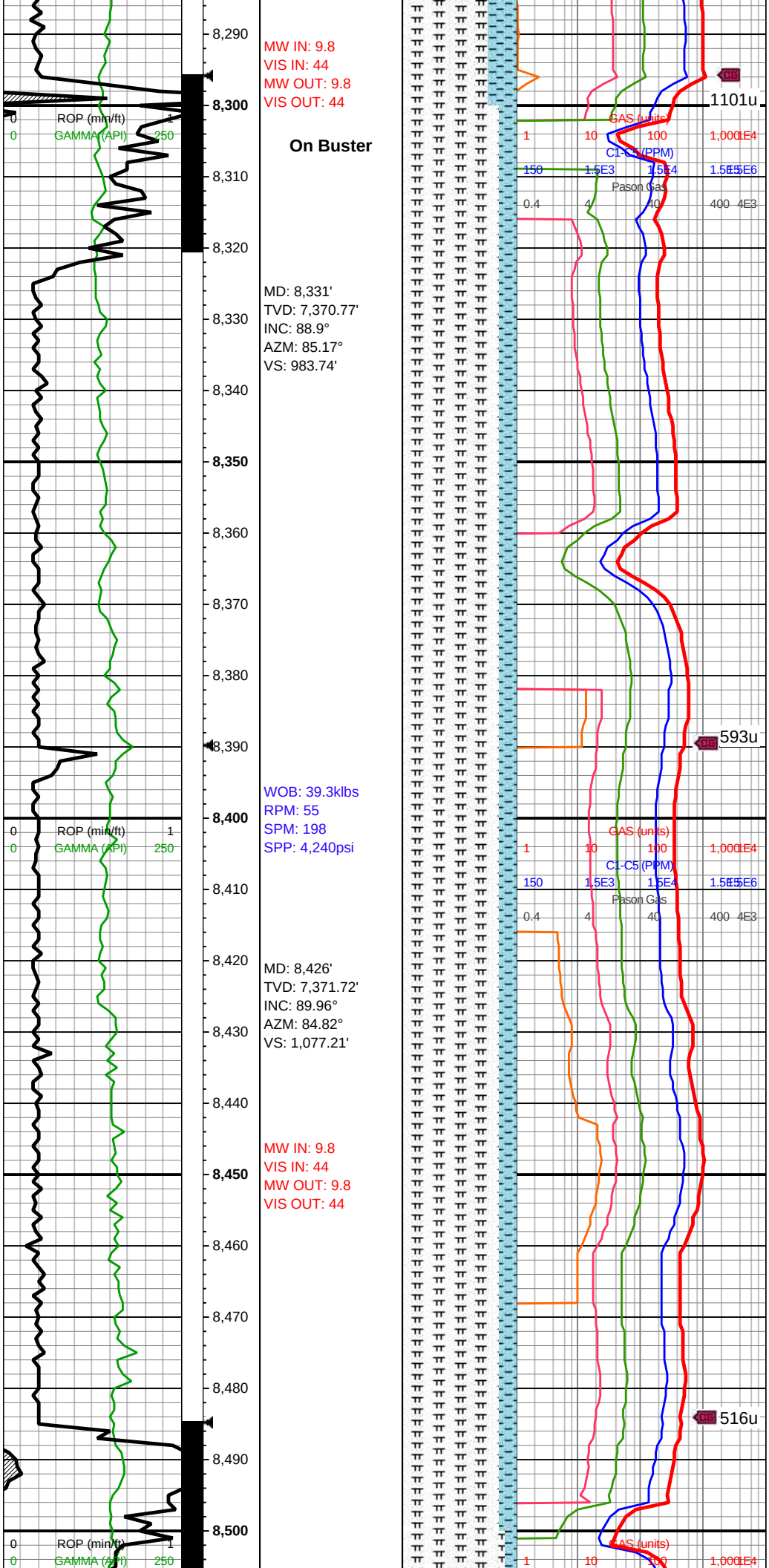
WOB: 39.8klbs
RPM: 56
SPM: 202
SPP: 4,272psi

0 ROP (min/ft) 1
0 GAMMA (API) 250

GAS (units)
1 10 100 1,000 1E4
C1-C5 (PPM)
150 1.5E3 1.5E4 1.5E5 1.5E6
Pason Gas
0.4 4 40 400 4E3
5031u

MD: 8,237'
TVD: 7,369.51'
INC: 89.56°
AZM: 82.8°
VS: 891.58'

8200-8300 MRLST (75%): v dk gy-dk gy, frm-hd-brit, med fis sb



MW IN: 9.8
VIS IN: 44
MW OUT: 9.8
VIS OUT: 44

On Buster

MD: 8,331'
TVD: 7,370.77'
INC: 88.9°
AZM: 85.17°
VS: 983.74'

WOB: 39.3klbs
RPM: 55
SPM: 198
SPP: 4,240psi

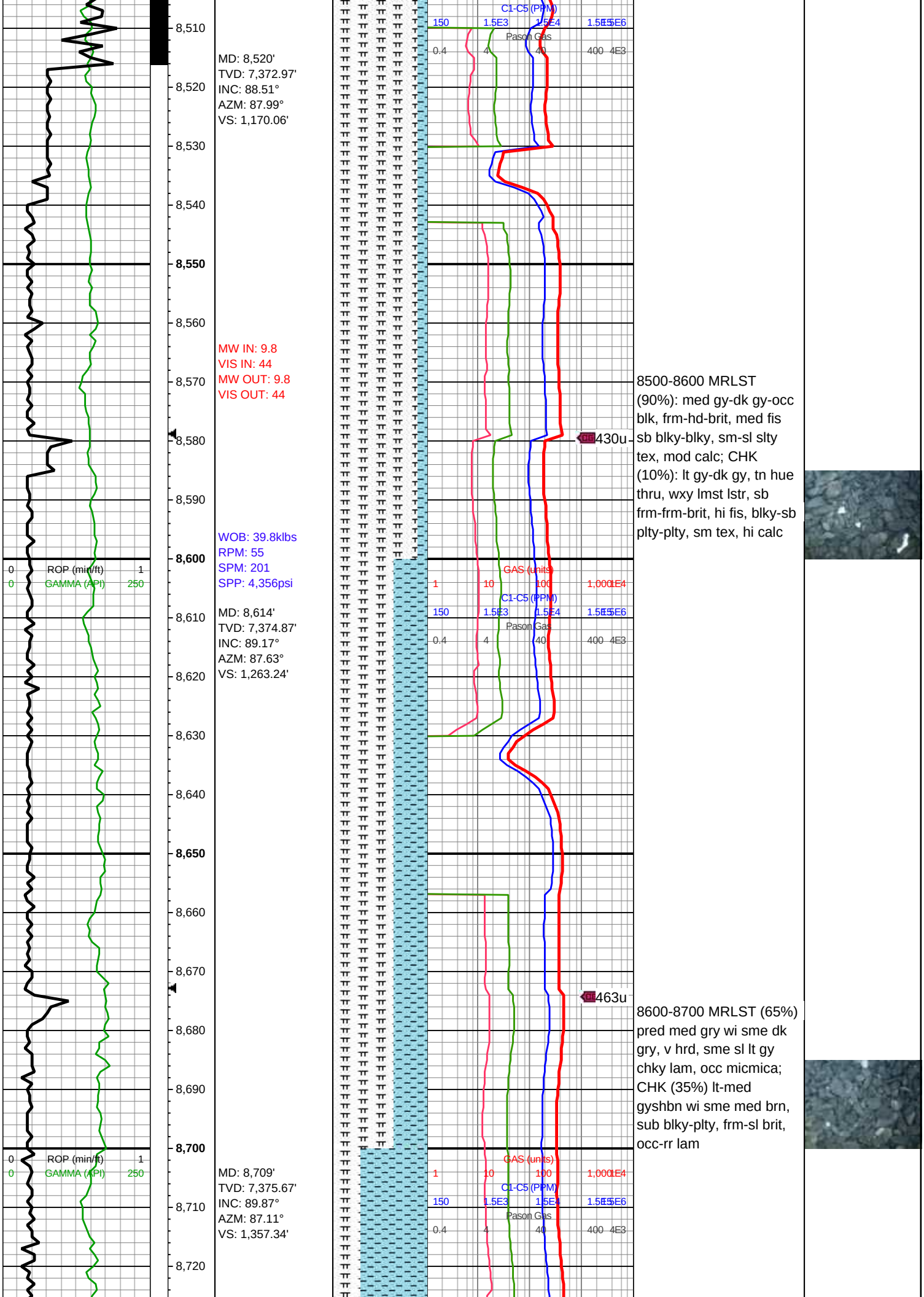
MD: 8,426'
TVD: 7,371.72'
INC: 89.96°
AZM: 84.82°
VS: 1,077.21'

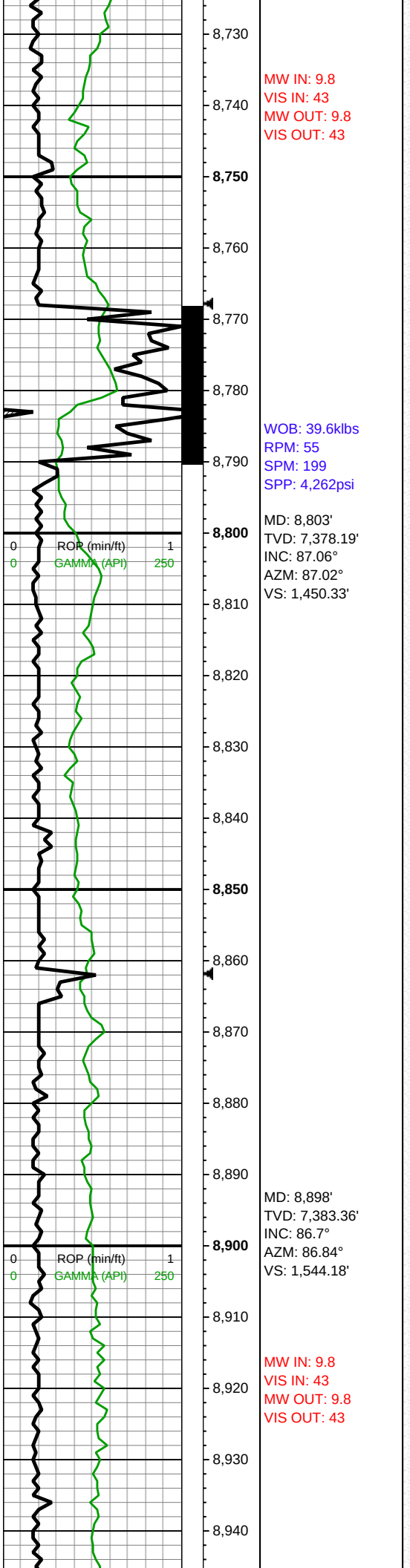
MW IN: 9.8
VIS IN: 44
MW OUT: 9.8
VIS OUT: 44

blky-blky, sm-sl slty tex, mod calc; CHK (25%): lt gy-gy, wxy lmst lstr, sb frm-frm-brit, hi fis, blky-sb plty-plty, sm tex, calc

8300-8400 MRLST (85%): med gy-gyshbn-dk gy, sb frm-frm-brit, sb rd-sb blky l-mod fis ctngs, sm arg-sl slty tex, rr vf pyr, mod calc; CHK (15%): med gy, lt gy ip, frm, brit, mod fis sb blky-blky ctngs, hi calc

8400-8500 MRLST (85%): predy dk gyshbn, com dk gy wi brn marly incl, frm-brit ip mod fis sb blky-blky-tab ctngs, sl slty tex, mod calc; CHK (15%): dk gy wi vf lt gy chky lamn & f chky incl, l-mod fis sb rd-sb blky frm-sl brit ctngs, hi calc


8,510
8,520
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
0 ROP (min/ft) 1
0 GAMMA (API) 250
C1-C5 (PPM)
150 1.5E3 1.5E4 1.5E5 1.5E6
Pason Gas
0.4 4 40 400 4E3
GAS (units)
1 10 100 1,000 1E4
430u
463u
MD: 8,520'
TVD: 7,372.97'
INC: 88.51°
AZM: 87.99°
VS: 1,170.06'
MW IN: 9.8
VIS IN: 44
MW OUT: 9.8
VIS OUT: 44
WOB: 39.8klbs
RPM: 55
SPM: 201
SPP: 4,356psi
MD: 8,614'
TVD: 7,374.87'
INC: 89.17°
AZM: 87.63°
VS: 1,263.24'
MD: 8,709'
TVD: 7,375.67'
INC: 89.87°
AZM: 87.11°
VS: 1,357.34'
8500-8600 MRLST (90%): med gy-dk gy-occ blk, frm-hd-brit, med fis sb blky-blky, sm-sl slty tex, mod calc; CHK (10%): lt gy-dk gy, tn hue thru, wxy lmst lstr, sb frm-frm-brit, hi fis, blky-sb plty-plty, sm tex, hi calc
8600-8700 MRLST (65%) pred med gry wi sme dk gry, v hrd, sme sl lt gy chky lam, occ micmica; CHK (35%) lt-med gyshbn wi sme med brn, sub blky-plty, frm-sl brit, occ-rr lam



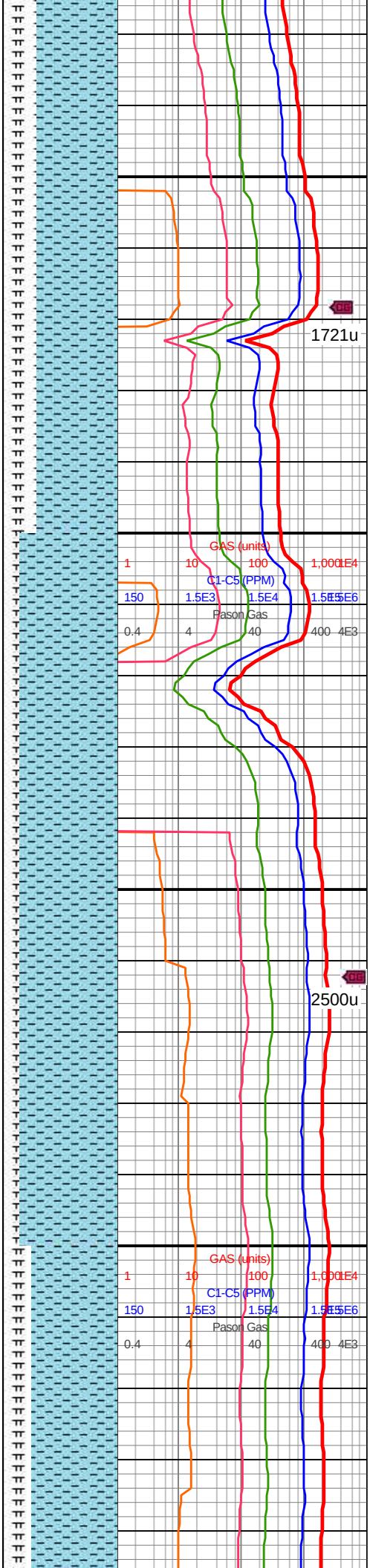
MW IN: 9.8
VIS IN: 43
MW OUT: 9.8
VIS OUT: 43

WOB: 39.6klbs
RPM: 55
SPM: 199
SPP: 4,262psi

MD: 8,803'
TVD: 7,378.19'
INC: 87.06°
AZM: 87.02°
VS: 1,450.33'

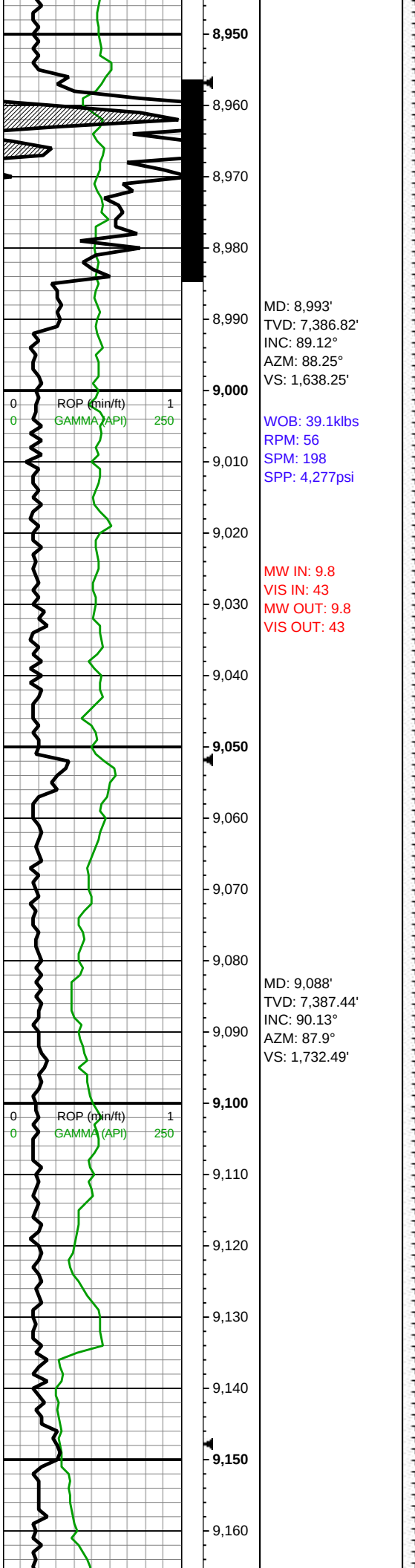
MD: 8,898'
TVD: 7,383.36'
INC: 86.7°
AZM: 86.84°
VS: 1,544.18'

MW IN: 9.8
VIS IN: 43
MW OUT: 9.8
VIS OUT: 43



8700-8800 CHK(87%): med gy-sl gyshbn, sub blky-sub plty med fis ctngs, frm, occ-com fos frags, rr forams,tr vf-uf pyr, hi calc; MRLST (30%): dk gyshbn-dk gy, frm-sl hd-brit, mod calc, tr CHK incl

8800-8900 CHK (85%): lt gy-med gy wi sme wh chky incl thru, sb frm-frm, l-mod fis sb rd-sb blky ctngs, scat-tr mic fos frags, tr vf pyr, hi calc; MRLST (15%): dk gy-dk gyshbn, frm-hd-brit, mod fis sb ang-sb blky-blky ctngs, sl slty-slty tex, tr vf pyr, mod calc

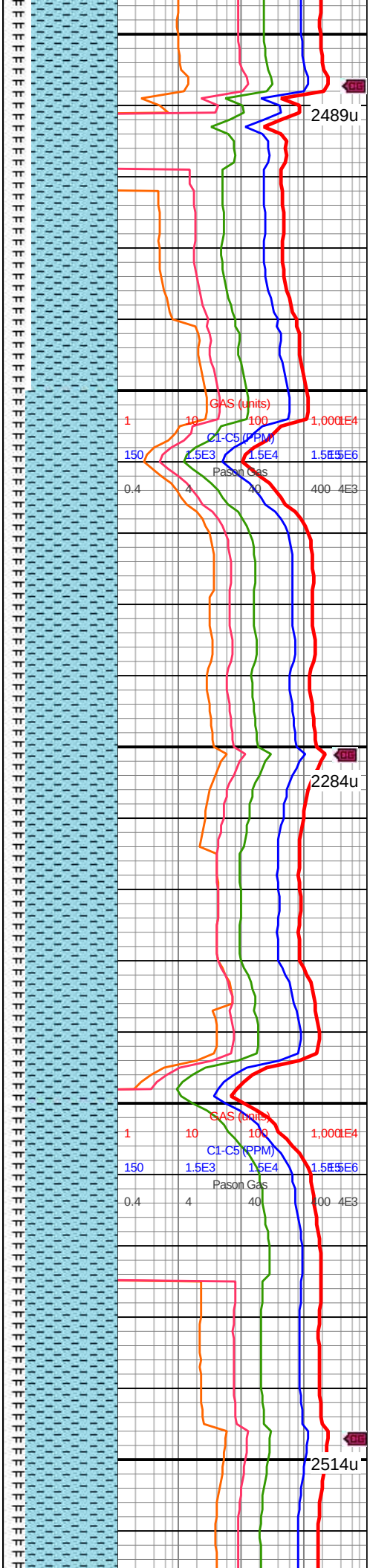


MD: 8,993'
TVD: 7,386.82'
INC: 89.12°
AZM: 88.25°
VS: 1,638.25'

WOB: 39.1klbs
RPM: 56
SPM: 198
SPP: 4,277psi

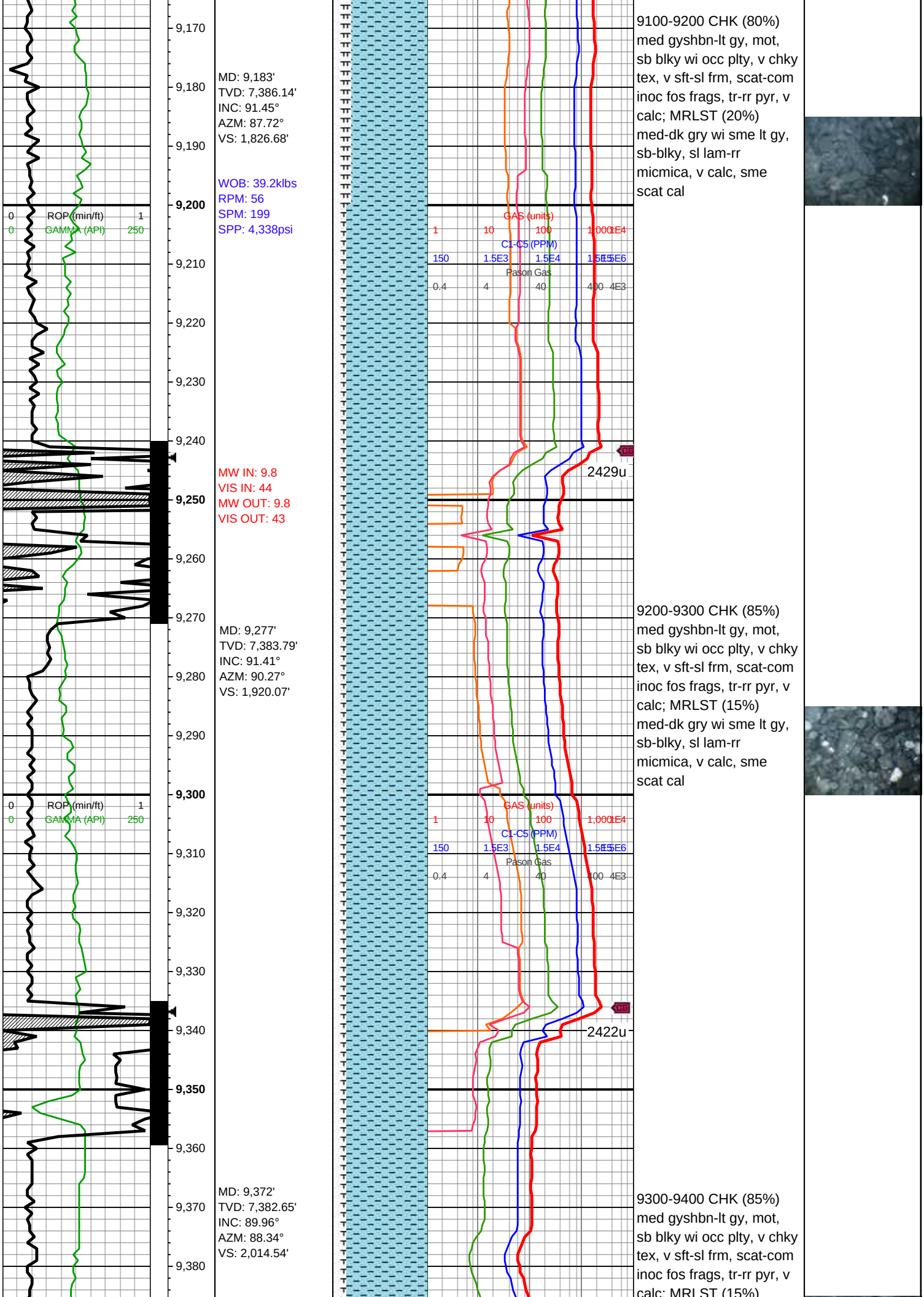
MW IN: 9.8
VIS IN: 43
MW OUT: 9.8
VIS OUT: 43

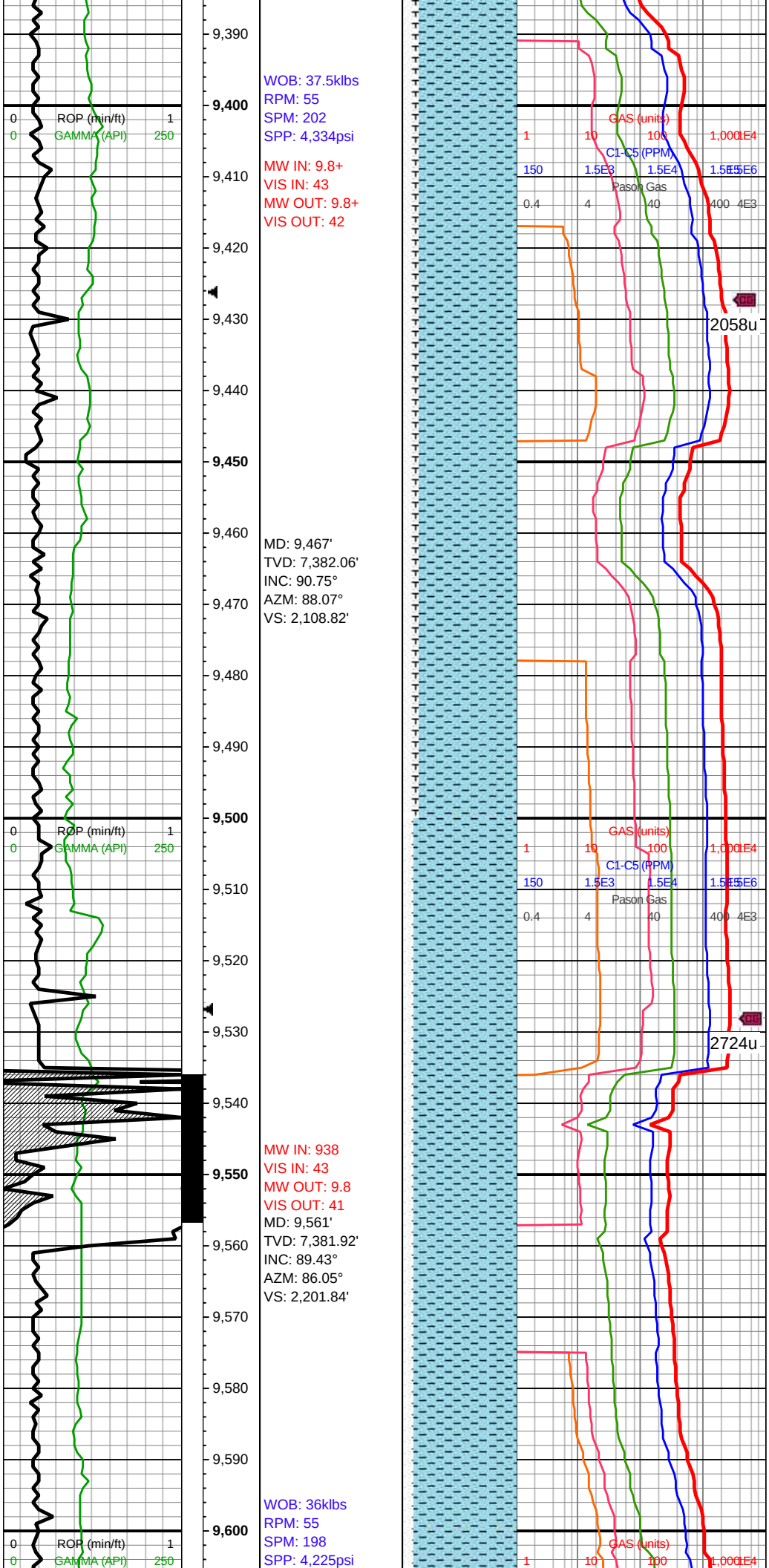
MD: 9,088'
TVD: 7,387.44'
INC: 90.13°
AZM: 87.9°
VS: 1,732.49'



8900-9000 CHK (75%)
med gyshbn-lt gy, mot, sb blky wi occ plty, v chky tex, v sft-sl frm, scat-com inoc fos frags, tr-rr pyr, v calc; MRLST (25%) med-dk gry wi sme lt gy, sb-blky, sl lam-rr micmica, v calc, sme scat cal

9000-9100 CHK (80%)
med gyshbn-lt gy, mot, sb blky wi occ plty, v chky tex, v sft-sl frm, scat-com inoc fos frags, tr-rr pyr, v calc; MRLST (20%) med-dk gry wi sme lt gy, sb-blky, sl lam-rr micmica, v calc, sme scat cal

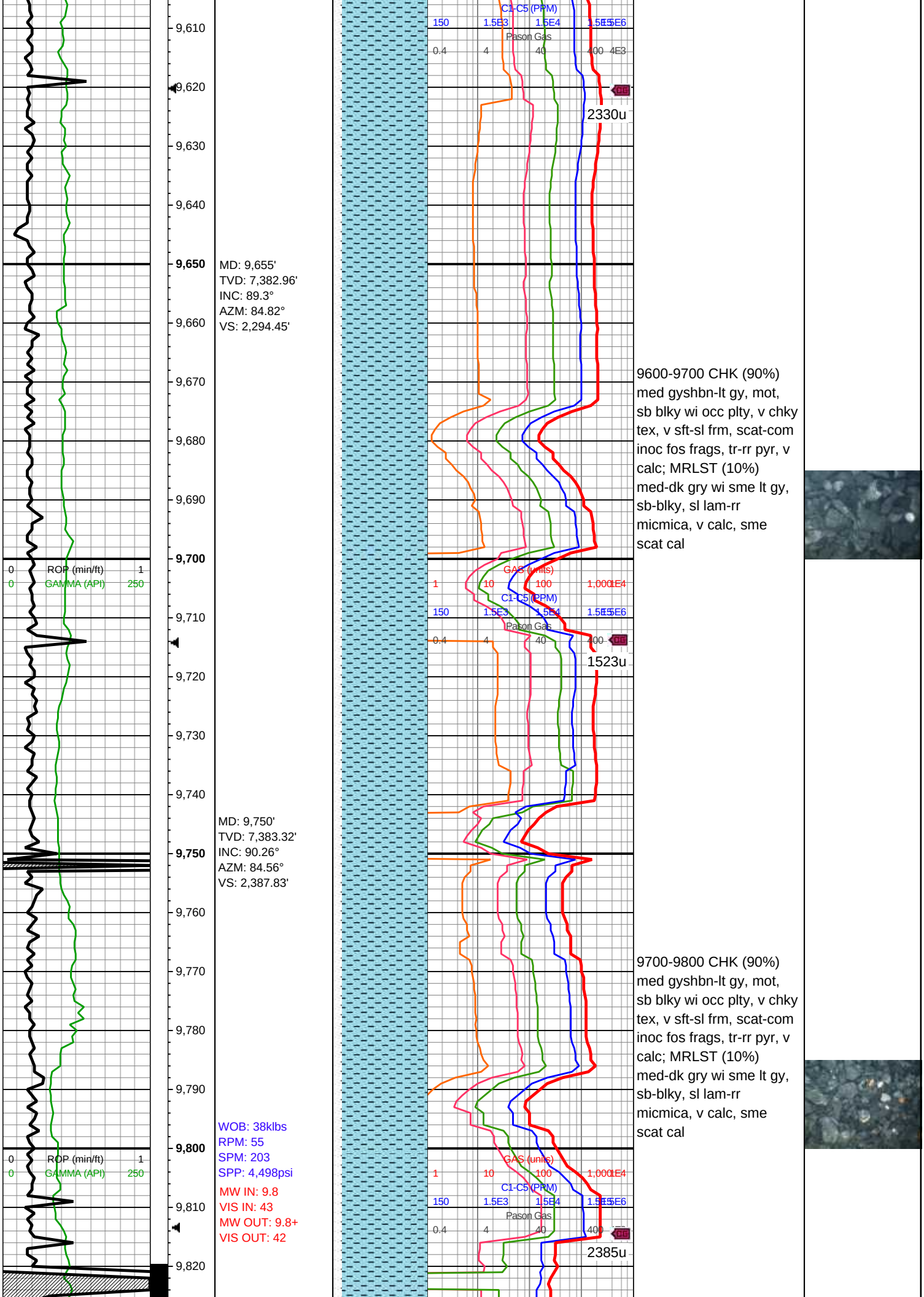

9,170
9,180
9,190
9,200
9,210
9,220
9,230
9,240
9,250
9,260
9,270
9,280
9,290
9,300
9,310
9,320
9,330
9,340
9,350
9,360
9,370
9,380
0 ROP (min/ft) 1
0 GAMMA (API) 250
MD: 9,183'
TVD: 7,386.14'
INC: 91.45°
AZM: 87.72°
VS: 1,826.68'
WOB: 39.2klbs
RPM: 56
SPM: 199
SPP: 4,338psi
MW IN: 9.8
VIS IN: 44
MW OUT: 9.8
VIS OUT: 43
MD: 9,277'
TVD: 7,383.79'
INC: 91.41°
AZM: 90.27°
VS: 1,920.07'
MD: 9,372'
TVD: 7,382.65'
INC: 89.96°
AZM: 88.34°
VS: 2,014.54'
GAS (units)
1 10 100 1,000 1E4
C1-C5 (PPM)
150 1.5E3 1.5E4 1.5E5 1.5E6
Pason Gas
0.4 4 40 400 4E3
2429u
2422u
9100-9200 CHK (80%) med gyshbn-lt gy, mot, sb blky wi occ plty, v chky tex, v sft-sl frm, scat-com inoc fos frags, tr-rr pyr, v calc; MRLST (20%) med-dk gry wi sme lt gy, sb-blky, sl lam-rr micmica, v calc, sme scat cal
9200-9300 CHK (85%) med gyshbn-lt gy, mot, sb blky wi occ plty, v chky tex, v sft-sl frm, scat-com inoc fos frags, tr-rr pyr, v calc; MRLST (15%) med-dk gry wi sme lt gy, sb-blky, sl lam-rr micmica, v calc, sme scat cal
9300-9400 CHK (85%) med gyshbn-lt gy, mot, sb blky wi occ plty, v chky tex, v sft-sl frm, scat-com inoc fos frags, tr-rr pyr, v calc; MRLST (15%)



med-dk gry wi sme lt gy, sb-blky, sl lam-rr micmica, v calc, sme scat cal

9400-9500 CHK (85%) med gyshbn-lt gy, mot, sb blky wi occ plty, v chky tex, v sft-sl frm, scat-com inoc fos frags, tr-rr pyr, v calc; MRLST (15%) med-dk gry wi sme lt gy, sb-blky, sl lam-rr micmica, v calc, sme scat cal

9500-9600 CHK (90%) med gyshbn-lt gy, mot, sb blky wi occ plty, v chky tex, v sft-sl frm, scat-com inoc fos frags, tr-rr pyr, v calc; MRLST (10%) med-dk gry wi sme lt gy, sb-blky, sl lam-rr micmica, v calc, sme scat cal



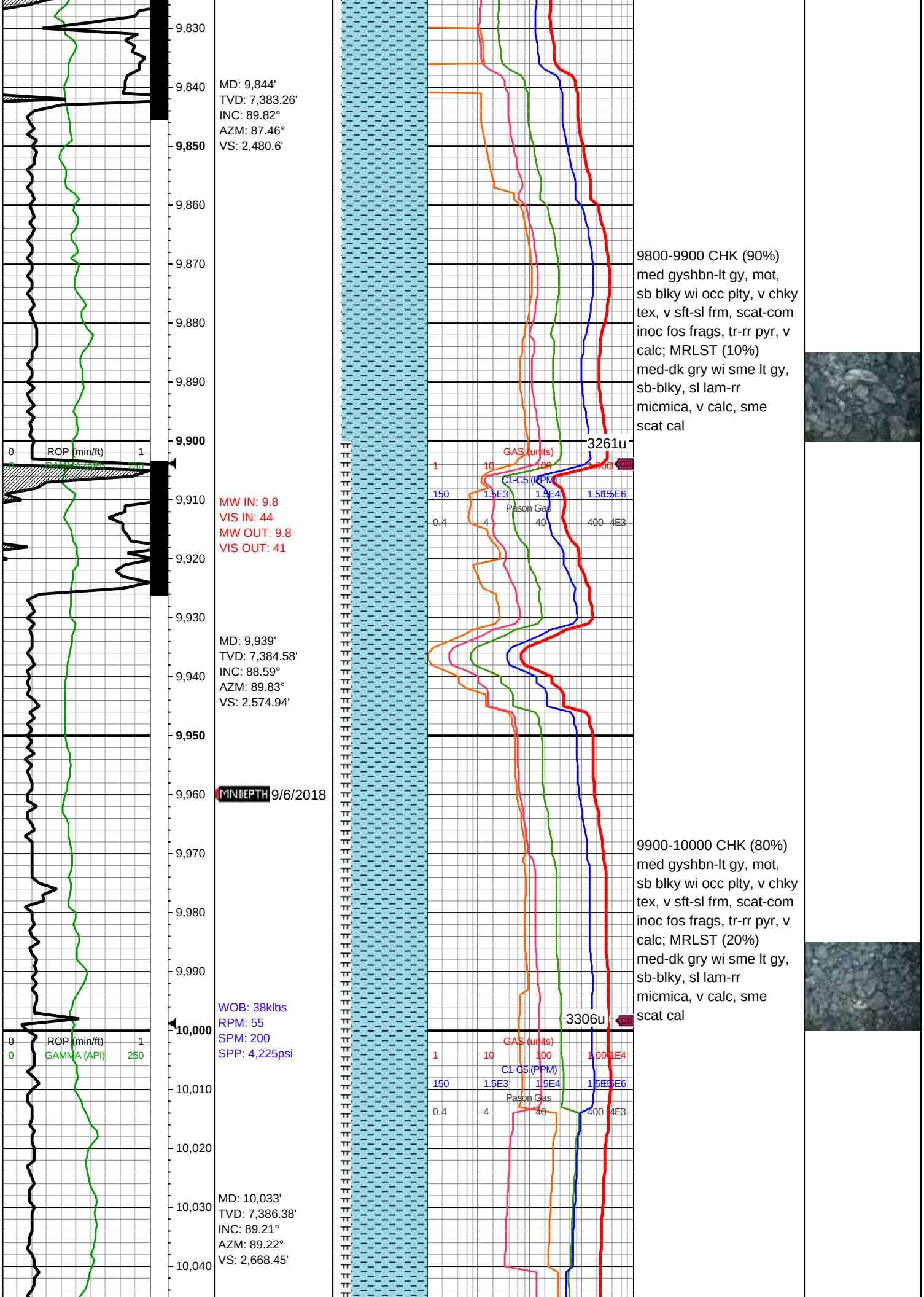
MD: 9,655'
TVD: 7,382.96'
INC: 89.3°
AZM: 84.82°
VS: 2,294.45'

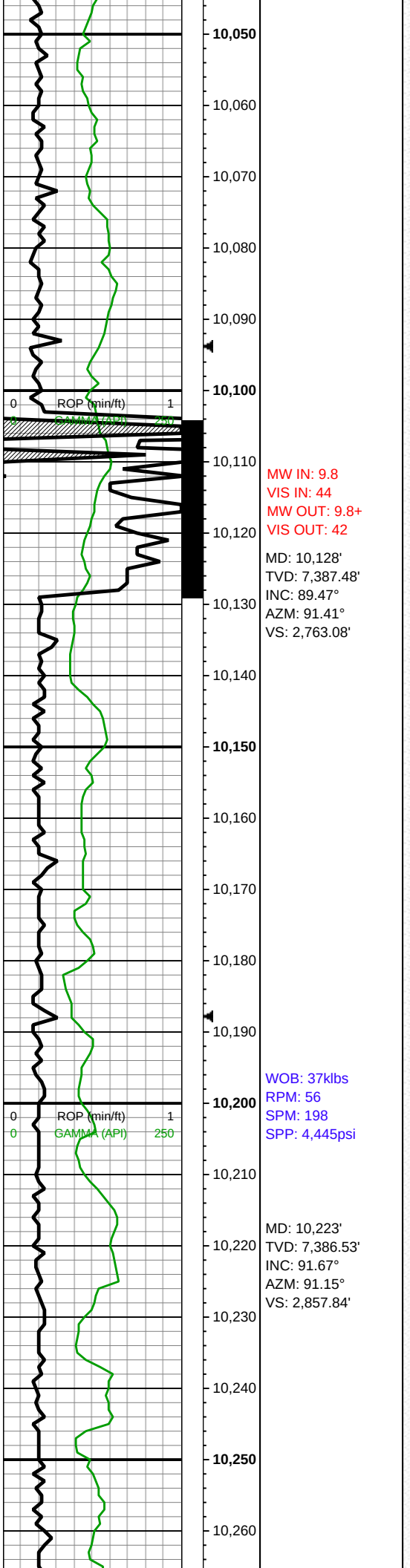
9600-9700 CHK (90%)
med gyshbn-lt gy, mot, sb blky wi occ plty, v chky tex, v sft-sl frm, scat-com inoc fos frags, tr-rr pyr, v calc; MRLST (10%)
med-dk gry wi sme lt gy, sb-blky, sl lam-rr micmica, v calc, sme scat cal

MD: 9,750'
TVD: 7,383.32'
INC: 90.26°
AZM: 84.56°
VS: 2,387.83'

9700-9800 CHK (90%)
med gyshbn-lt gy, mot, sb blky wi occ plty, v chky tex, v sft-sl frm, scat-com inoc fos frags, tr-rr pyr, v calc; MRLST (10%)
med-dk gry wi sme lt gy, sb-blky, sl lam-rr micmica, v calc, sme scat cal

WOB: 38klbs
RPM: 55
SPM: 203
SPP: 4,498psi
MW IN: 9.8
VIS IN: 43
MW OUT: 9.8+
VIS OUT: 42


9,830
9,840
9,850
9,860
9,870
9,880
9,890
9,900
9,910
9,920
9,930
9,940
9,950
9,960
9,970
9,980
9,990
10,000
10,010
10,020
10,030
10,040
0 ROP (min/ft) 1
0 GAMMA (API) 250
MD: 9,844'
TVD: 7,383.26'
INC: 89.82°
AZM: 87.46°
VS: 2,480.6'
MW IN: 9.8
VIS IN: 44
MW OUT: 9.8
VIS OUT: 41
MD: 9,939'
TVD: 7,384.58'
INC: 88.59°
AZM: 89.83°
VS: 2,574.94'
MNDEPTH 9/6/2018
WOB: 38klbs
RPM: 55
SPM: 200
SPP: 4,225psi
MD: 10,033'
TVD: 7,386.38'
INC: 89.21°
AZM: 89.22°
VS: 2,668.45'
GAS (units)
1 10 100 1,000
C1-C5 (PPM)
150 1.5E3 1.5E4 1.5E5 1.5E6
Pason Gas
0.4 4 40 400 4E3
3261u
3306u
9800-9900 CHK (90%) med gyshbn-lt gy, mot, sb blky wi occ plty, v chky tex, v sft-sl frm, scat-com inoc fos frags, tr-rr pyr, v calc; MRLST (10%) med-dk gry wi sme lt gy, sb-blky, sl lam-rr micmica, v calc, sme scat cal
9900-10000 CHK (80%) med gyshbn-lt gy, mot, sb blky wi occ plty, v chky tex, v sft-sl frm, scat-com inoc fos frags, tr-rr pyr, v calc; MRLST (20%) med-dk gry wi sme lt gy, sb-blky, sl lam-rr micmica, v calc, sme scat cal



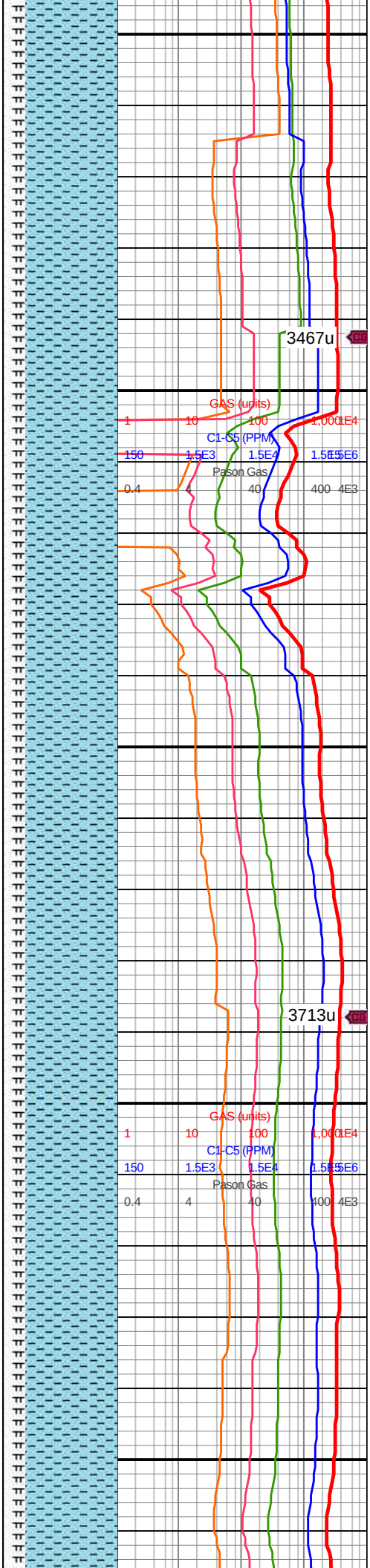
10,050
10,060
10,070
10,080
10,090
10,100
10,110
10,120
10,130
10,140
10,150
10,160
10,170
10,180
10,190
10,200
10,210
10,220
10,230
10,240
10,250
10,260

MW IN: 9.8
VIS IN: 44
MW OUT: 9.8+
VIS OUT: 42

MD: 10,128'
TVD: 7,387.48'
INC: 89.47°
AZM: 91.41°
VS: 2,763.08'

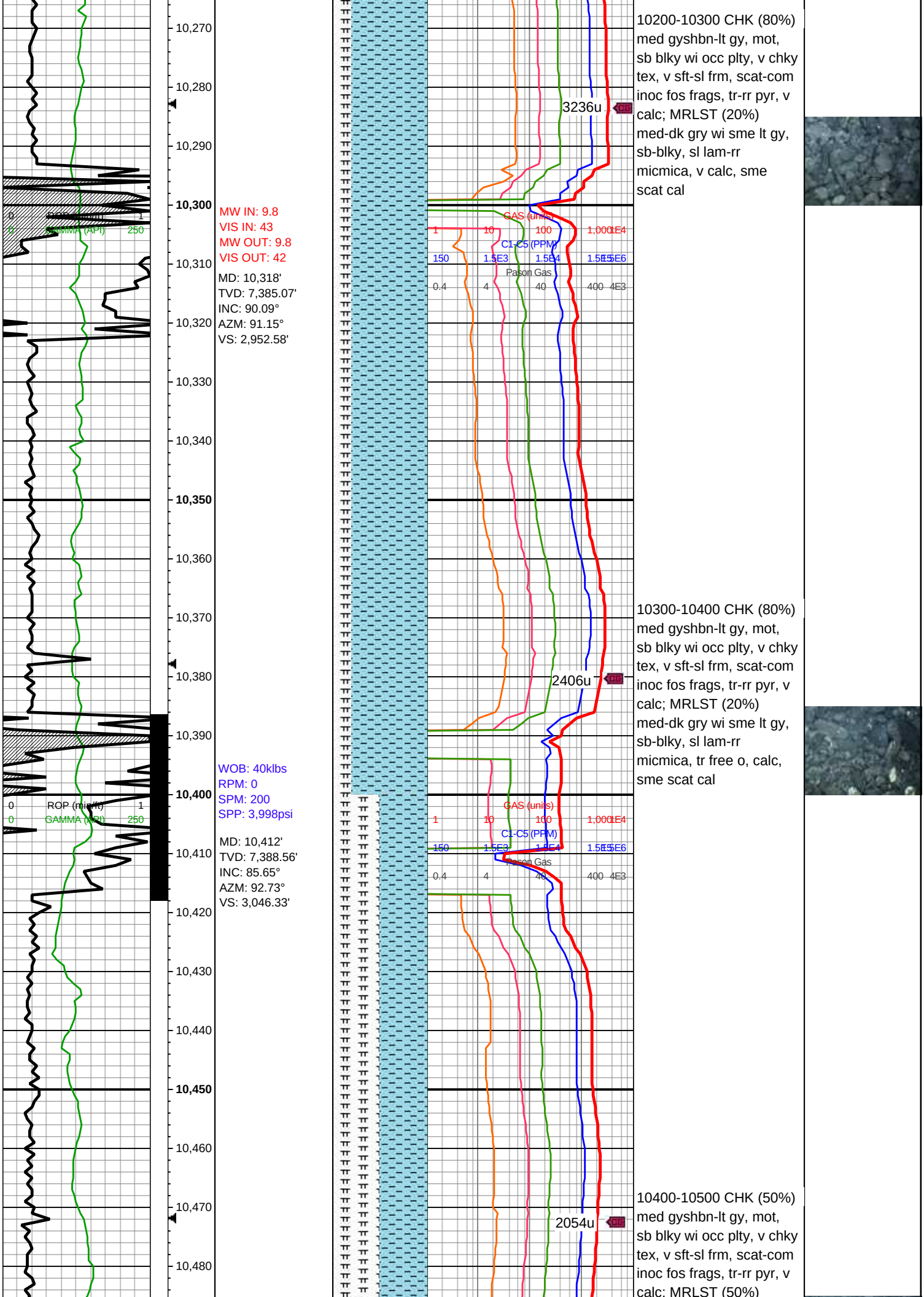
WOB: 37klbs
RPM: 56
SPM: 198
SPP: 4,445psi

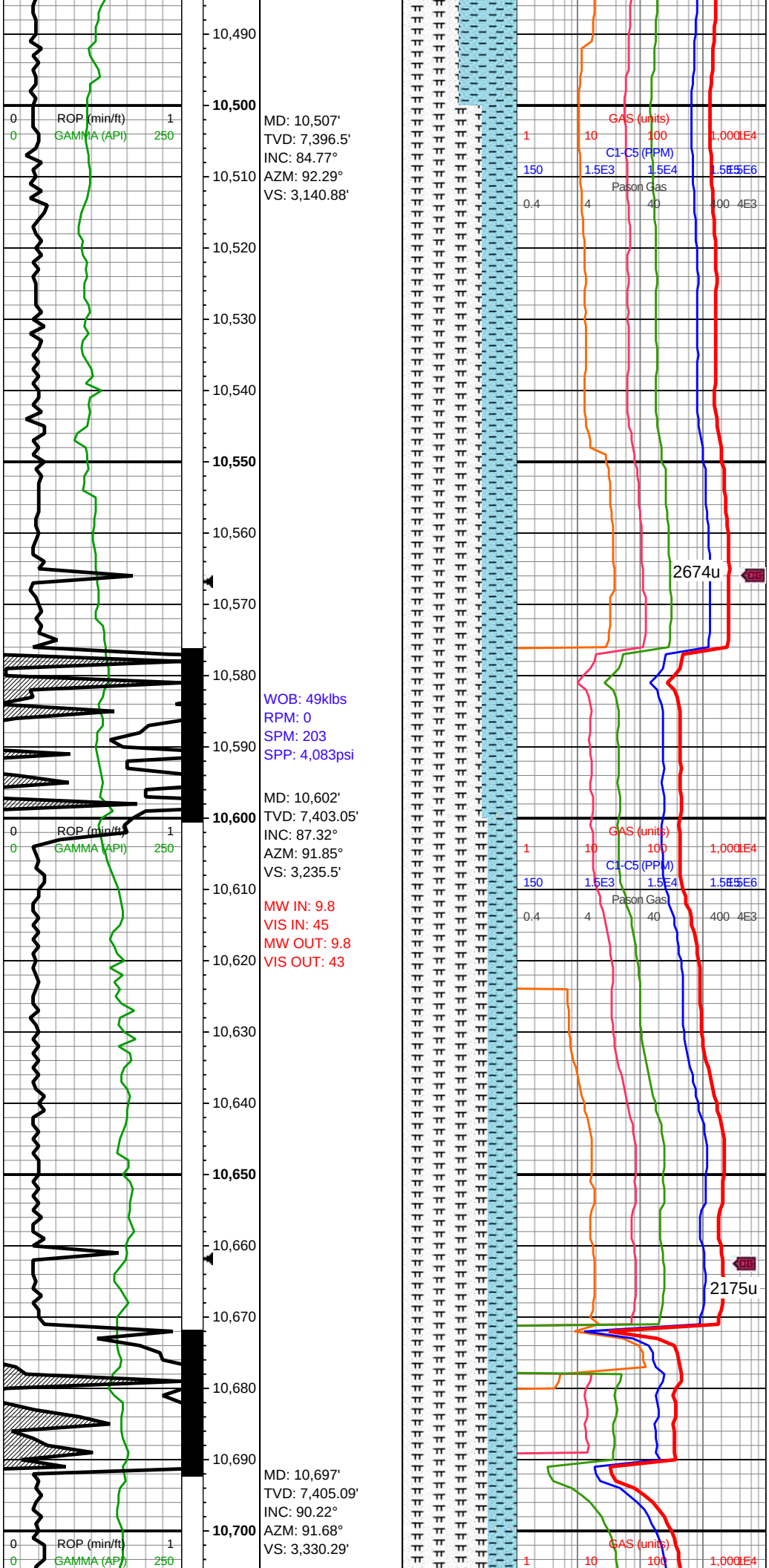
MD: 10,223'
TVD: 7,386.53'
INC: 91.67°
AZM: 91.15°
VS: 2,857.84'



10000-10100 CHK (80%) med gyshbn-lt gy, mot, sb blky wi occ plty, v chky tex, v sft-sl frm, scat-com inoc fos frags, tr-rr pyr, v calc; MRLST (20%) med-dk gry wi sme lt gy, sb-blky, sl lam-rr micmica, v calc, sme scat cal

10100-10200 CHK (80%) med gyshbn-lt gy, mot, sb blky wi occ plty, v chky tex, v sft-sl frm, scat-com inoc fos frags, tr-rr pyr, v calc; MRLST (20%) med-dk gry wi sme lt gy, sb-blky, sl lam-rr micmica, v calc, sme scat cal


10,270
10,280
10,290
10,300
10,310
10,320
10,330
10,340
10,350
10,360
10,370
10,380
10,390
10,400
10,410
10,420
10,430
10,440
10,450
10,460
10,470
10,480
0
ROP (min/ft)
1
0
GAMMA (API)
250
MW IN: 9.8
VIS IN: 43
MW OUT: 9.8
VIS OUT: 42
MD: 10,318'
TVD: 7,385.07'
INC: 90.09°
AZM: 91.15°
VS: 2,952.58'
WOB: 40klbs
RPM: 0
SPM: 200
SPP: 3,998psi
MD: 10,412'
TVD: 7,388.56'
INC: 85.65°
AZM: 92.73°
VS: 3,046.33'
3236u
GAS (units)
1
10
100
1,000
1E4
C1-C5 (PPM)
150
1.5E3
1.5E4
1.5E5
1.5E6
Pason Gas
0.4
4
40
400
4E3
2406u
2054u
10200-10300 CHK (80%) med gyshbn-lt gy, mot, sb blky wi occ plty, v chky tex, v sft-sl frm, scat-com inoc fos frags, tr-rr pyr, v calc; MRLST (20%) med-dk gry wi sme lt gy, sb-blky, sl lam-rr micmica, v calc, sme scat cal
10300-10400 CHK (80%) med gyshbn-lt gy, mot, sb blky wi occ plty, v chky tex, v sft-sl frm, scat-com inoc fos frags, tr-rr pyr, v calc; MRLST (20%) med-dk gry wi sme lt gy, sb-blky, sl lam-rr micmica, tr free o, calc, sme scat cal
10400-10500 CHK (50%) med gyshbn-lt gy, mot, sb blky wi occ plty, v chky tex, v sft-sl frm, scat-com inoc fos frags, tr-rr pyr, v calc; MRLST (50%)



MD: 10,507'
TVD: 7,396.5'
INC: 84.77°
AZM: 92.29°
VS: 3,140.88'

WOB: 49klbs
RPM: 0
SPM: 203
SPP: 4,083psi

MD: 10,602'
TVD: 7,403.05'
INC: 87.32°
AZM: 91.85°
VS: 3,235.5'

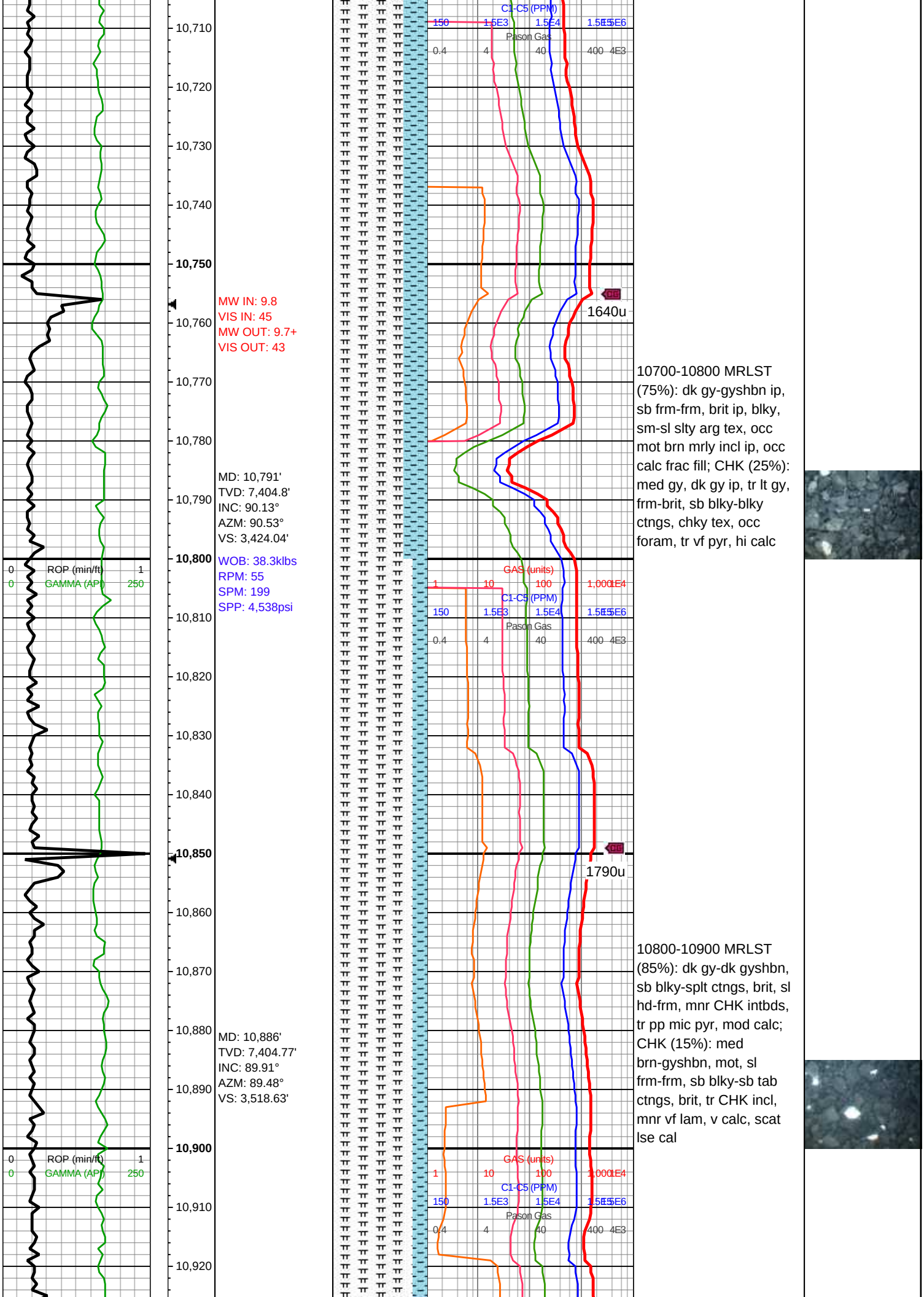
MW IN: 9.8
VIS IN: 45
MW OUT: 9.8
VIS OUT: 43

MD: 10,697'
TVD: 7,405.09'
INC: 90.22°
AZM: 91.68°
VS: 3,330.29'

med-dk gry wi sme lt gy, sb-blky, sl lam-rr micmica, tr free o, calc, sme scat cal

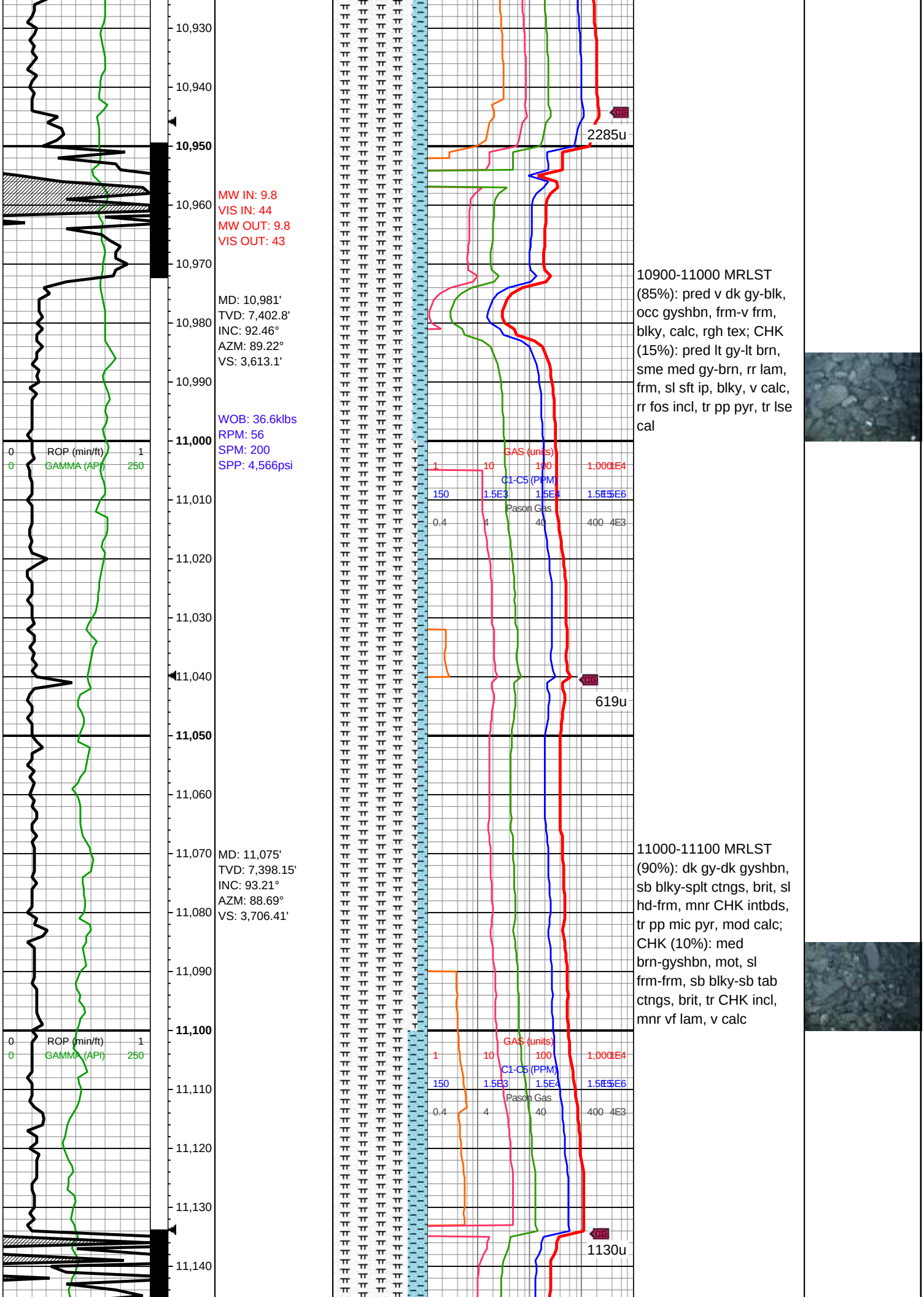
10500-10600 MRLST (70%): dk gy-dk gyshbn, frm-brit, mod fis sb blky-blky ctngs, mot wi brn marl incl, tr vf pyr, mod calc; CHK (30%): gy-dk gy wi f wh chky incl & lamn, frm-brit, mod fis sb blky-blky ctngs, tr-scat mic fos frags, tr vf pyr, hi calc

10600-10700 MRLST (75%): dk gy-dk gyshbn, mod fis wi wxy lstr ip, sb blky-blky ctngs, rr plty hi fis ctngs, sb frm-frm, occ hd-brit, sl slty tex, thn lamn ip, v tr vf pyr, mod calc; CHK (25%): lt gy, occ dk gy, sft-sb frm-frm, sb blky, chky tex, rr foram, tr vf pyr, hi calc



10700-10800 MRLST (75%): dk gy-gyshbn ip, sb frm-frm, brit ip, blky, sm-sl slty arg tex, occ mot brn mrly incl ip, occ calc frac fill; CHK (25%): med gy, dk gy ip, tr lt gy, frm-brit, sb blky-blky ctngs, chky tex, occ foram, tr vf pyr, hi calc

10800-10900 MRLST (85%): dk gy-dk gyshbn, sb blky-splt ctngs, brit, sl hd-frm, mnr CHK intbds, tr pp mic pyr, mod calc; CHK (15%): med brn-gyshbn, mot, sl frm-frm, sb blky-sb tab ctngs, brit, tr CHK incl, mnr vf lam, v calc, scat lse cal



10900-11000 MRLST (85%): pred v dk gy-blk, occ gyshbn, frm-v frm, blky, calc, rgh tex; CHK (15%): pred lt gy-lt brn, sme med gy-brn, rr lam, frm, sl sft ip, blky, v calc, rr fos incl, tr pp pyr, tr lse cal

11000-11100 MRLST (90%): dk gy-dk gyshbn, sb blky-splt ctngs, brit, sl hd-frm, mnr CHK intbds, tr pp mic pyr, mod calc; CHK (10%): med brn-gyshbn, mot, sl frm-frm, sb blky-sb tab ctngs, brit, tr CHK incl, mnr vf lam, v calc

11,150
MW IN: 9.8
VIS IN: 45
MW OUT: 9.7+
VIS OUT: 45
11,160
MD: 11,170'
TVD: 7,393.23'
INC: 92.73°
AZM: 89.39°
VS: 3,800.72'
11,170
11,180
11,190
WOB: 37.1klbs
RPM: 55
SPM: 202
SPP: 4,672psi
11,200
0 ROP (min/ft) 1
0 GAMMA (API) 250
GAS (units)
1 10 100 1,000 1E4
C1-C5 (PPM)
150 1.5E3 1.5E4 1.5E5 1.5E6
Pason Gas
0.4 4 40 400 4E3
11,210
11,220
11,230
579u
11,240
11,250
11,260
MD: 11,264'
TVD: 7,388.72'
INC: 92.77°
AZM: 89.04°
VS: 3,894.09'
11,270
11,280
11,290
11,300
0 ROP (min/ft) 1
0 GAMMA (API) 250
GAS (units)
1 10 100 1,000 1E4
C1-C5 (PPM)
150 1.5E3 1.5E4 1.5E5 1.5E6
Pason Gas
0.4 4 40 400 4E3
11,310
11,320
688u
11,330
11,340
MW IN: 9.7
VIS IN: 45
MW OUT: 9.7+
VIS OUT: 45
11,350
MD: 11,359'
TVD: 7,386.21'
INC: 90.26°
AZM: 90.45°
VS: 3,988.6'
11,360

11100-11200 MRLST (80%): med gy-gyshbn-dk gy, sb frm-frm-brit, sb rd-sb blky l-mod fis ctngs, sm arg-sl slty tex, rr vf pyr, mod calc; CHK (20%): med gy, lt gy ip, frm, brit, mod fis sb blky-blky ctngs, sl slty tex, tr fos frags, hi calc

11200-11300 MRLST (50%): dk gy-dk gyshbn, sb blky-splt ctngs, brit, sl hd-frm, mnr CHK intbds, tr pp mic pyr, mod calc; CHK (50%): med brn-gyshbn, mot, sl frm-frm, sb blky-sb tab ctngs, brit, tr CHK incl, mnr vf lam, v calc

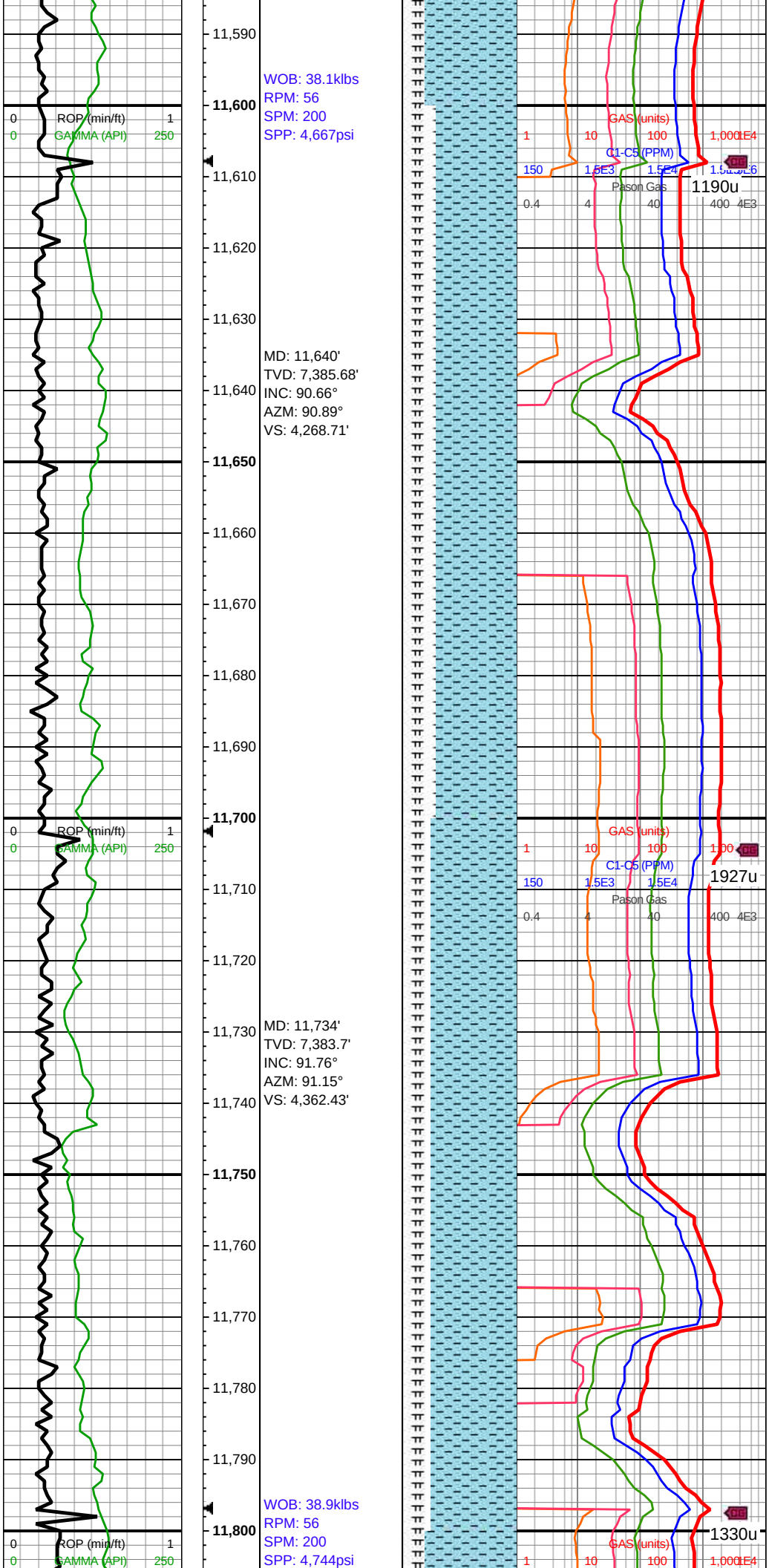
11300-11400 CHK

11,370
11,380
11,390
WOB: 35.5klbs
RPM: 55
SPM: 200
SPP: 4,593psi
11,400
0 ROP (min/ft) 1
0 GAMMA (API) 250
11,410
11,420
11,430
11,440
MD: 11,453'
TVD: 7,385.96'
INC: 90.04°
AZM: 90.62°
VS: 4,082.28'
11,450
11,460
11,470
11,480
11,490
11,500
0 ROP (min/ft) 1
0 GAMMA (API) 250
11,510
11,520
11,530
11,540
MD: 11,546'
TVD: 7,386.08'
INC: 89.82°
AZM: 90.89°
VS: 4,174.99'
11,550
MW IN: 9.7
VIS IN: 45
MW OUT: 9.7+
VIS OUT: 45
11,560
11,570
11,580
GAS (units)
1 10 100 1,000 1E4
C1-C5 (PPM)
150 1.5E3 1.5E4 1.5E5 1.5E6
Pason Gas
0.4 4 40 400 4E3
1288u
GAS (units)
1 10 100 1,000 1E4
C1-C5 (PPM)
150 1.5E3 1.5E4 1.5E5 1.5E6
Pason Gas
0.4 4 40 400 4E3
575u

11300-11400 CHK (60%): gyshbn-lt gy, mot med gy, chky rthy tex, frm-brit, sb blky-blky, mod fis, mot wh chky incl, scat inoc fos frags, v calc; MRLST (40%): dk gy-med gy, sb blky-blky, frm-brit, sm-sl slty tex, com intbd chk, mod calc, tr intbd mic pyr

11400-11500 CHK (75%): lt-med gry wi lt brn, sme sl med gy-brn, frm-sl brit, sb blky-sb tab, v calc, scat mic fos frags, tr imbd mic pyr; MRLST (25%): dk gy-med gy, blky, frm-v frm, sl rgh tex, mod calc, tr micmica

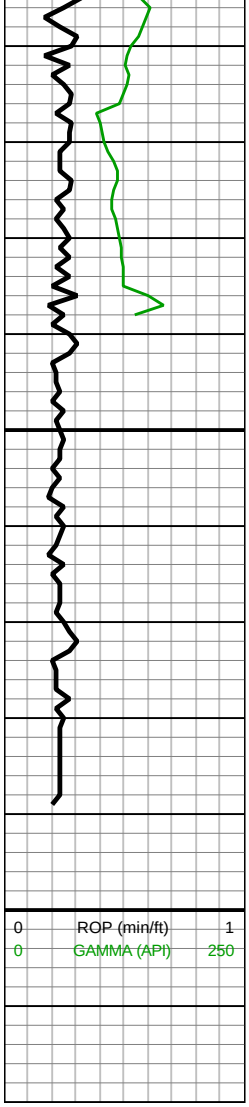
11500-11600 CHK (80%) med gyshbn-lt gy, mot, sb blky wi occ plty, v chky tex, v sft-sl frm, scat-com inoc fos frags, tr-rr pyr, v calc; MRLST (20%)



med-dk gry wi sme lt gy, sb-blky, sl lam-rr micmica, v calc, sme scat cal

11600-11700 CHK (70%) med gyshbn-lt gy, mot, sb blky wi occ plty, v chky tex, v sft-sl frm, scat-com inoc fos frags, tr-rr pyr, v calc; MRLST (30%) med-dk gry wi sme lt gy, sb-blky, sl lam-rr micmica, v calc

11700-11800 CHK (70%): lt gy-gyshbn, med gy-dk gy, wh chky incl thru, sb rd-sb blky, sl frm-frm, brit, mod fis, tr vf pyr, com-scat mic fos frags, v calc; MRLST (30%): dk gy-med gy, frm-hd, brit, sm sl slty tex, sme intbdd wi chky incl, occ mrly incl, mod calc, com lse cal



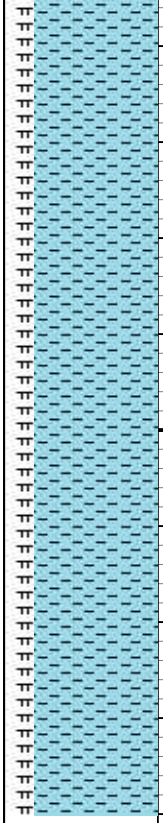
11,810
11,820
11,830
11,840
11,850
11,860
11,870
11,880
11,890
11,900
11,910
11,920

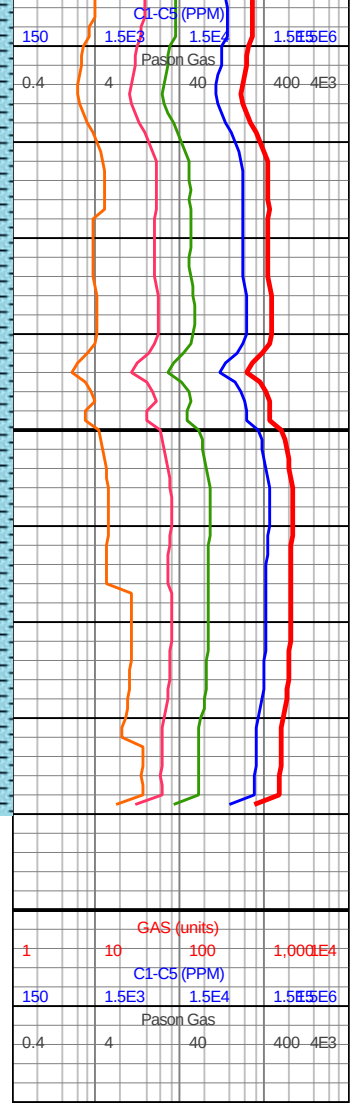
MD: 11,828'
TVD: 7,379.95'
INC: 92.81°
AZM: 90.45°
VS: 4,456.06'

MW IN: 9.8
VIS IN: 44
MW OUT: 9.8
VIS OUT: 44

Bit Projection
MD: 11,890'
TVD: 7,376.91'
INC: 92.81°
AZM: 90.45°
VS: 4,517.77'

TD Well 13:00 hrs 9/6/18 @ 11,890' MD





11800-11890 CHK (80%): med gy-lt gy, sme offwht, tr lt gyshbn, sm chky tex, frm-brit, sb blky-blky, hi calc, scat inoc fos, tr dissm pyrc cls; MRLST (20%): dk gy-med gy, mot, tab-blky, sm-sl slty arg tex, sb frm-frm, brit ip, v calc