RESERVOIR GROUP

Scale: 5" / 100'
Measured Depth Log

Well Name	Sam 3A-25H-M166		
Location	Sec. 25 T1N R66W		
State	Colorado	**County**	Weld
Country	USA	**Rig Number**	Ensign 140
API Number	05123461250000	**AFE #**	16190869
Geographic Region	Rockies	**Field**	Wattenberg
Spud Date	8/5/2018	**Drilling Completed**	8/11/2018
Surface Coordinates	Lat/Long: 40.018895/-104.733852 SHL: Sec: 25 Twp: 1N 66W Footage: 1413 FSL 311 FWL		
Bottom Hole Coordinates	Proposed BHL: Sec: 25 Twp: 1N 66W Footages: 2560 FFSL 460 FFWLL		
Ground Elevation	5,086'	**K.B. Elevation**	5,109'
Logged Interval	6,700' **To** 11,930'	**Total Depth**	11,930'
Formation	C Chalk		
Type of Drilling Fluid	Synthetic Oil Based Mud		

Operator

Company Crestone Peak Resources

Address 370 17th Street #2170
Denver, CO 80202

CRESTONE PEAK
RESOURCES

Geologist

Zone Color Coding

Name John Ready

Company Crestone Peak Resources

Address 370 17th Street #2170
Denver, CO 80202

CRESTONE PEAK
RESOURCES

Oil
Condensate
Gas
Note
Core
Pressure
Error
Water
Seal

Other

Loggers: Brian Ferwerda / Nicholas Watkins

Services Provided: 2-Man Mudlogging / Geosteering

Equipment: ML-522

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

Service Start Date: 8/6/2018

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
- 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

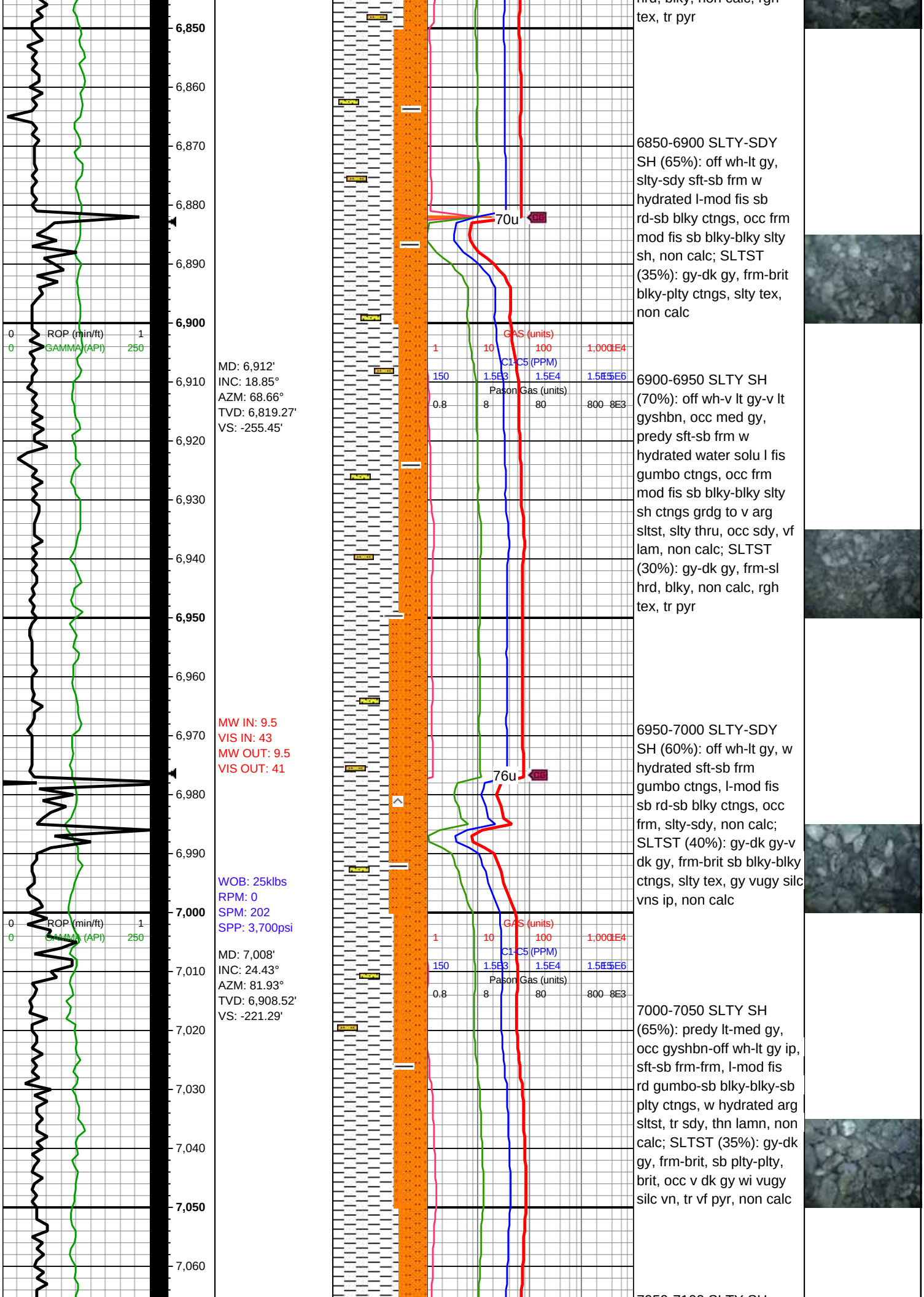
Textures

- 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 3A-35H-M166** **9 5/8" Surface Casing @ 2,419'** **Spud Date: 8/5/18** **2 man Logging Began: 8/6/18 @ 6,700'** **All Depths Correspond to Driller's Pipe Tally**		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	Bit #: 1 Type: U516M Size: 8 1/2 Depth In: 2,434' Depth Out: 7,955' Hours: 15.8 hrs Avg Ft/Hr: 349 '/hr Jets: 6x13 S/N: 41522 MD: 6,724' INC: 6.24° AZM: 344.02° TVD: 6,635.29' VS: -279.39' MW IN: 9.5 VIS IN: 44 MW OUT: 9.5 VIS OUT: 41 WOB: 21klbs RPM: 0 SPM: 206 SPP: 3,930psi MD: 6,818' INC: 10.85° AZM: 38.86° TVD: 6,728.36' VS: -275.22'		**SYSTEM CALIBRATED** **1% Methane = 100 Units** **100% Methane = 10000 Units** 144u 61u 73u	6700-6750 SLTY SH (70%): off wh-v lt gy-v lt gyshbn, occ med gy, predy sft-sb frm w hydrated water solu l fis gumbo ctngs, occ frm mod fis sb blky-blky slty sh ctngs grdg to v arg sltst, slty thru, occ sdy, vf lam, non calc; SLTST (30%): gy-dk gy, frm-sl hrd, blky, tr vf pyr, non calc 6750-6800 SLTY SH (65%): 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 (35%): gy-dk gy, frm-brit, blky-plty, slty tex, non calc 6800-6850 SLTY SH (75%): off wh-v lt gy-v lt gyshbn, occ med gy, predy sft-sb frm w hydrated water solu l fis gumbo ctngs, occ frm mod fis sb blky-blky slty sh ctngs grdg to v arg sltst, slty thru, occ sdy, vf lam, non calc; SLTST (25%): gy-dk gy, frm-sl hrd, blky, non calc, rgh	  



tex, tr pyr

6850-6900 SLTY-SDY SH (65%): off wh-lt gy, slty-sdy sft-sb frm w hydrated l-mod fis sb rd-sb blky ctngs, occ frm mod fis sb blky-blky slty sh, non calc; SLTST (35%): gy-dk gy, frm-brit blky-plty ctngs, slty tex, non calc

6900-6950 SLTY SH (70%): off wh-v lt gy-v lt gyshbn, occ med gy, predy sft-sb frm w hydrated water solu l fis gumbo ctngs, occ frm mod fis sb blky-blky slty sh ctngs grdg to v arg sltst, slty thru, occ sdy, vf lam, non calc; SLTST (30%): gy-dk gy, frm-sl hrd, blky, non calc, rgh tex, tr pyr

6950-7000 SLTY-SDY SH (60%): off wh-lt gy, w hydrated sft-sb frm gumbo ctngs, l-mod fis sb rd-sb blky ctngs, occ frm, slty-sdy, non calc; SLTST (40%): gy-dk gy-v dk gy, frm-brit sb blky-blky ctngs, slty tex, gy vugy silc vns ip, non calc

7000-7050 SLTY SH (65%): predy lt-med gy, occ gyshbn-off wh-lt gy ip, sft-sb frm-frm, l-mod fis rd gumbo-sb blky-blky-sb plty ctngs, w hydrated arg sltst, tr sdy, thn lamn, non calc; SLTST (35%): gy-dk gy, frm-brit, sb plty-plty, brit, occ v dk gy wi vugy silc vn, tr vf pyr, non calc

7050-7100 SLTY SH (70%): predy gy-gyshbn sb frm-frm mod fis sb blky-sb plty ctngs, occ off wh-v lt gy sft w hydrated gumbo slty sh, thn lamn, slty arg tex, non calc; SLTST (30%): gy-dk gy, frm-brit, sb plty-plty, brit, occ v dk gy wi vugy silc vn, tr vf pyr, non calc

7,070
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

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

MD: 7,102'
INC: 32.92°
AZM: 84.66°
TVD: 6,990.92'
VS: -176.52'

73u

GAS (units)
1 10 100 1,000 1E4
C1-C5 (PPM)
150 1.5E3 1.5E4 1.5E5 1.5E6
Pason Gas (units)
0.8 8 80 800 8E3

7100-7150 SLTY SH (70%): predy lt-med gy, occ gyshbn-off wh-lt gy ip, sft-sb frm-frm, l-mod fis rd gumbo-sb blky-blky-sb plty ctngs, w hydrated arg sltst, tr sdy, thn lamn, non calc; SLTST (30%): gy-dk gy, frm-brit, sb plty-plty, brit, occ v dk gy wi vugy silc vn, tr vf pyr, non calc

100u

7150-7200 SLTY SH (70%): predy gy-gyshbn sb frm-frm mod fis sb blky-sb plty ctngs, occ off wh-v lt gy sft w hydrated gumbo slty sh, thn lamn, slty arg tex, non calc; SLTST (30%): gy-dk gy, frm-brit, sb plty-plty, brit, occ v dk gy wi vugy silc vn, tr vf pyr, non calc

MD: 7,197'
INC: 42.41°
AZM: 79.47°
TVD: 7,066.05'
VS: -119.17'

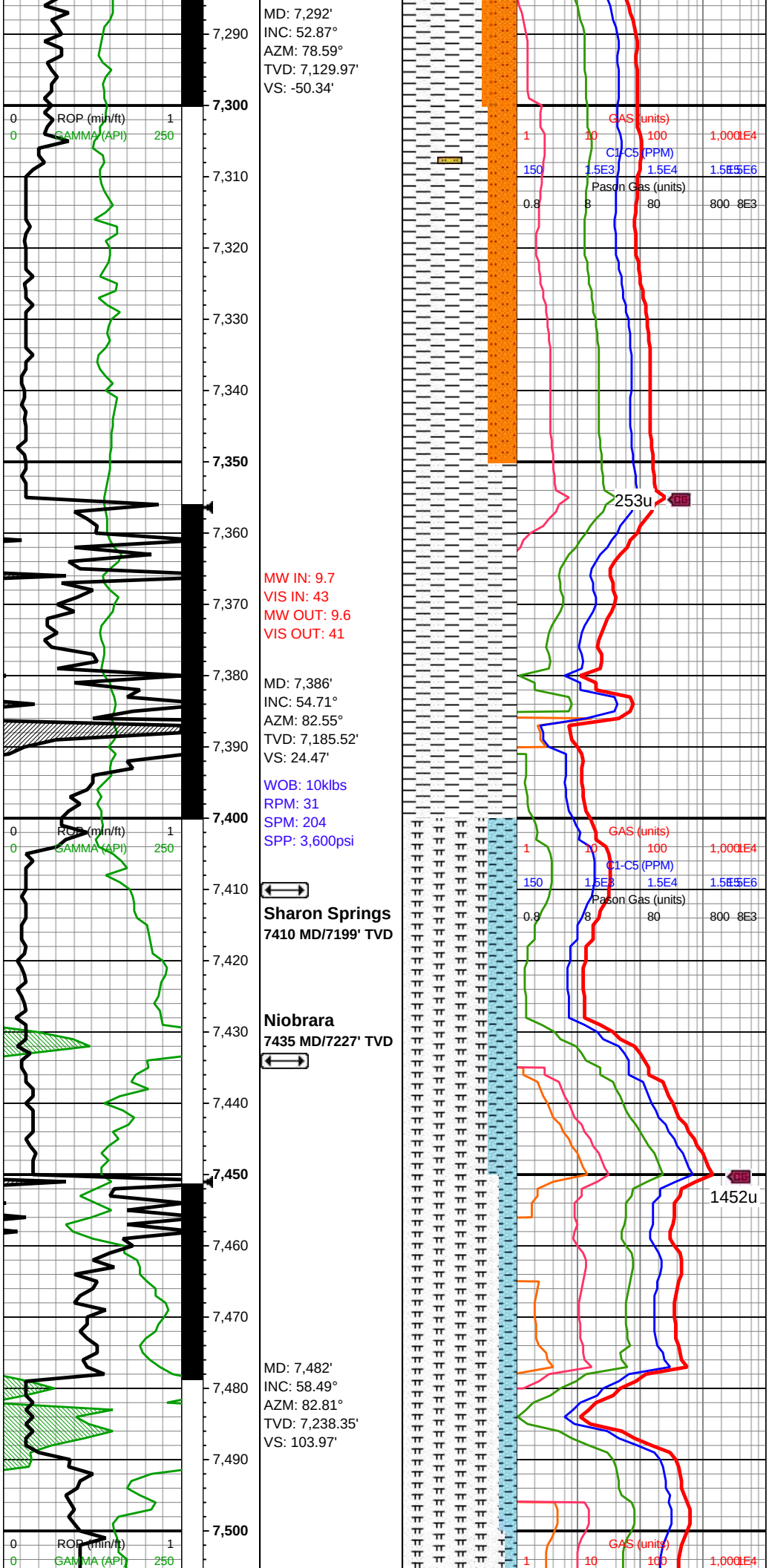
WOB: 27klbs
RPM: 0
SPM: 204
SPP: 3,760psi

MW IN: 9.7
VIS IN: 43
MW OUT: 9.5
VIS OUT: 41

7200-7250 SLTY SH (60%): predy 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 (40%): gy-dk gy, frm-brit, blky-plty, slty tex, non calc

119u

7250-7300 SLTY SH (70%): off wh-lt gy sft-sb frm w hydrated water solu ctngs, occ frm mod



MD: 7,292'
INC: 52.87°
AZM: 78.59°
TVD: 7,129.97'
VS: -50.34'

MW IN: 9.7
VIS IN: 43
MW OUT: 9.6
VIS OUT: 41

MD: 7,386'
INC: 54.71°
AZM: 82.55°
TVD: 7,185.52'
VS: 24.47'

WOB: 10klbs
RPM: 31
SPM: 204
SPP: 3,600psi

Sharon Springs
7410 MD/7199' TVD

Niobrara
7435 MD/7227' TVD

MD: 7,482'
INC: 58.49°
AZM: 82.81°
TVD: 7,238.35'
VS: 103.97'

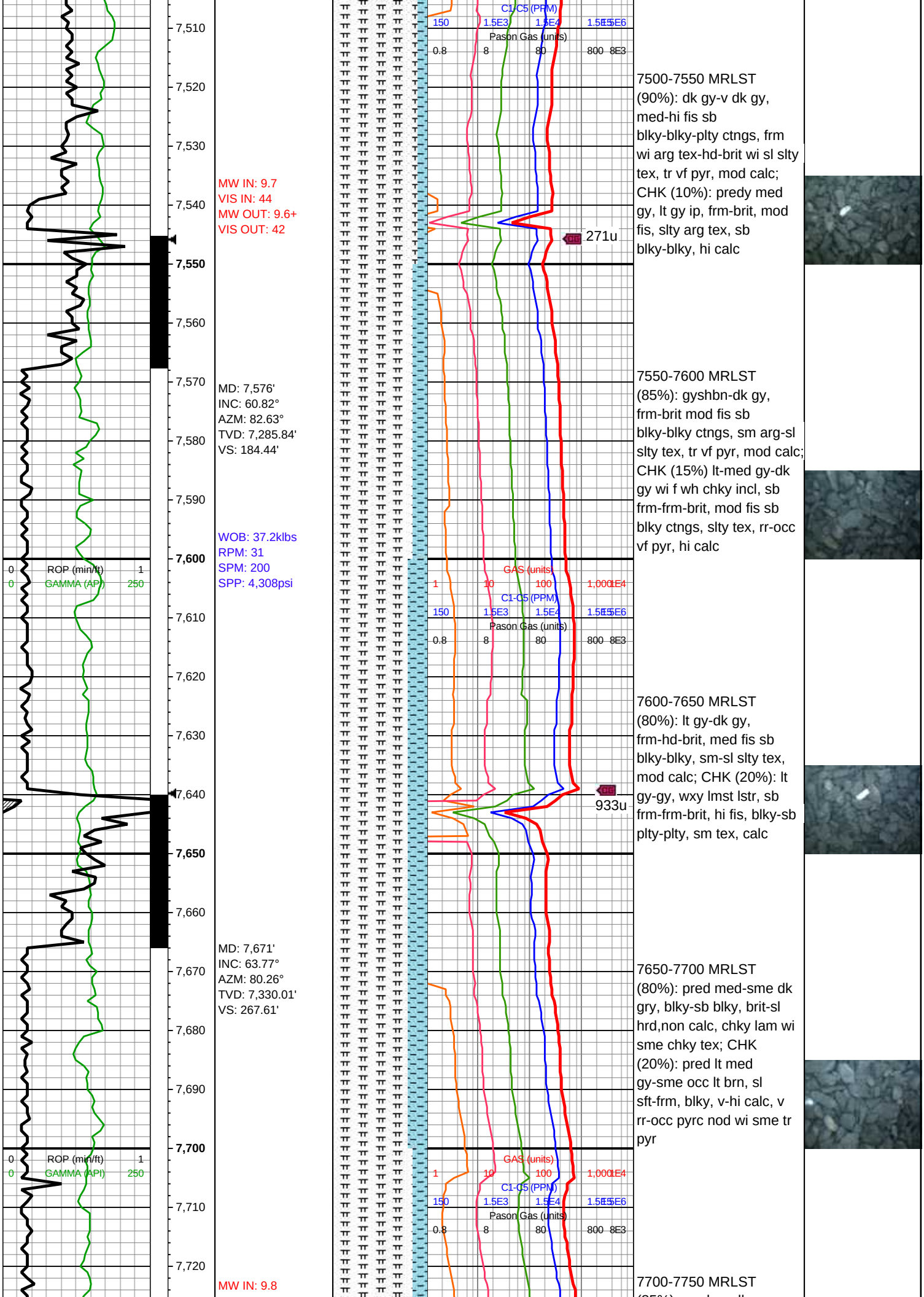
fis sb blky-blky med gy slty sh, slty thru, non calc; SLTST (30%): gy-dk gy, frm-brit, blky-plty, slty tex, non calc

7300-7350 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, non calc; SLTST (25%): gy-dk gy, frm-brit, blky-plty, slty tex, non calc

7350-7400 SLTY SH (100%): gy-gyshbn wi sp blk lith incl, frm, brit, sb frm ip, med-hi fis blky-tab ctngs wi wxy lstr, slty arg tex, tr tn bent, mod calc

7400-7450 MRLST (75%): dk gy-dk gyshbn, sb blky-splt ctngs, sl hd, brit, mnr chk intbds, tr dissm mic pyr, mod-hi calc; CHK (25%): med gy-gyshbn, mot, sb blky-sb tab ctngs, sl frm-frm, brit, mnr vf lam, hi calc

7450-7500 MRLST (85%): dk gy-dk gyshbn, sl hd, sb blky-splt ctngs, mnr Chk intbds, tr dissm mic pyr, mod calc; CHK (15%): lt gy-gyshbn, sb blky-sb tab ctngs, sl frm-brit, tr vf lam, hi calc



7500-7550 MRLST (90%): dk gy-v dk gy, med-hi fis sb blky-blky-plty ctngs, frm wi arg tex-hd-brit wi sl slty tex, tr vf pyr, mod calc; CHK (10%): predy med gy, lt gy ip, frm-brit, mod fis, slty arg tex, sb blky-blky, hi calc

7550-7600 MRLST (85%): gyshbn-dk gy, frm-brit mod fis sb blky-blky ctngs, sm arg-sl slty tex, tr vf pyr, mod calc; CHK (15%) lt-med gy-dk gy wi f wh chky incl, sb frm-frm-brit, mod fis sb blky ctngs, slty tex, rr-occ vf pyr, hi calc

7600-7650 MRLST (80%): lt gy-dk gy, frm-hd-brit, med fis sb blky-blky, sm-sl slty tex, mod calc; CHK (20%): lt gy-gy, wxy lmst lstr, sb frm-frm-brit, hi fis, blky-sb plty-plty, sm tex, calc

7650-7700 MRLST (80%): pred med-sme dk gry, blky-sb blky, brit-sl hrd,non calc, chky lam wi sme chky tex; CHK (20%): pred lt med gy-sme occ lt brn, sl sft-frm, blky, v-hi calc, v rr-occ pyrc nod wi sme tr pyr

7700-7750 MRLST

VIS IN: 43
MW OUT: 9.6+
VIS OUT: 41

B Chalk
7763 MD/7368' TVD

MD: 7,765'
INC: 67.1°
AZM: 83.25°
TVD: 7,369.09'
VS: 352.22'

WOB: 37.2klbs
RPM: 31
SPM: 200
SPP: 4,365psi

MD: 7,859'
INC: 68.91°
AZM: 85.71°
TVD: 7,404.29'
VS: 438.97'

MW IN: 9.9
VIS IN: 39
MW OUT: 9.9
VIS OUT: 39

TOOH for tool failure @

7,730 7,740 **7,750** 7,760 7,770 7,780 7,790 **7,800** 7,810 7,820 7,830 **7,850** 7,860 7,870 7,880 7,890 **7,900** 7,910 7,920 7,930 7,940

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 (units)
0.8 8 80 800 8E3

1048u

1414u

504u

(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

7750-7800 CHK (70%): v lt gy-lt gy, med gy ip, sft-sb frm-frm mod fis sb blky-blky ctngs, sm chky-sl slty arg tex, hi calc; MRLST (30%): dk gy-blk wi occ brn marl incl, frm, brit, mod fis sb blky-blky ctngs, sm sl slty tex, mod calc

7800-7850 MRLST (60%): v dk gy-blk, frm-hd-brit, sm arg-sl slty tex, rr f wh chky incl ip, mod calc; CHK (40%): lt gy-med gy occ dk gy, sb frm-frm, blky, sm arg-sl slty tex, tr-rr vf pyr strg ip, rr fos incl, hi calc

7850-7900 MRLST (75%): med gy-dk gy-occ blk, frm-hd-brit, med fis sb blky-blky, sm-sl slty tex, mod calc; CHK (25%): lt gy-dk gy, tn hue thru, wxy lmst lstr, sb frm-frm-brit, hi fis, blky-sb plty-plty, sm tex, hi calc

7900-7950 MRLST (80%): dk gy-dk gyshbn, sl hd, sb blky-splt ctngs, mnr Chk intbds, tr dissm mic pyr, mod calc; CHK (20%): lt gy-gyshbn, sb blky-sb tab ctngs, sl

failure @ 10:00hrs 8/7/18 and fish for MWD tool

MNDEPTH

8/8-8/10/18 Reumed Drilling 12:00hrs 8/10/18

C Chalk

7975 MD/7433' TVD

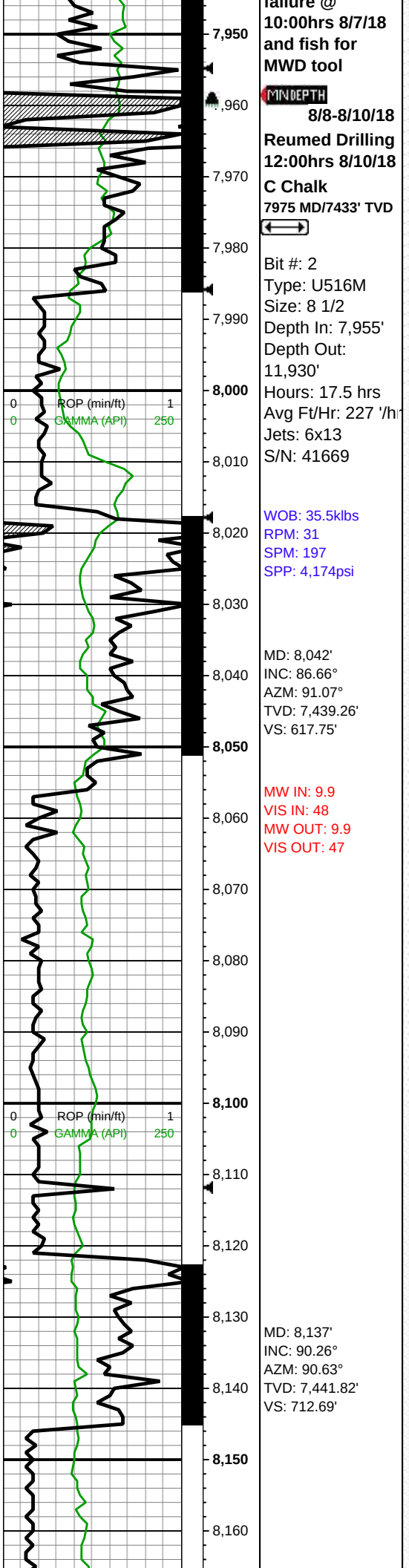
Bit #: 2
Type: U516M
Size: 8 1/2
Depth In: 7,955'
Depth Out: 11,930'
Hours: 17.5 hrs
Avg Ft/Hr: 227 '/hr
Jets: 6x13
S/N: 41669

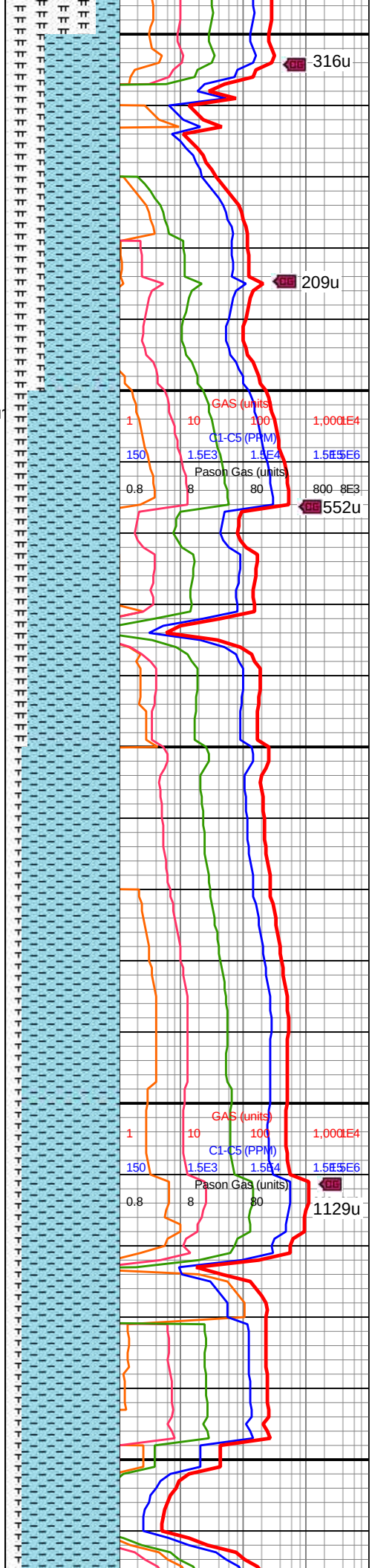
WOB: 35.5klbs
RPM: 31
SPM: 197
SPP: 4,174psi

MD: 8,042'
INC: 86.66°
AZM: 91.07°
TVD: 7,439.26'
VS: 617.75'

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

MD: 8,137'
INC: 90.26°
AZM: 90.63°
TVD: 7,441.82'
VS: 712.69'





frm-brit, tr vf lam, hi calc

7950-8000 CHK (65%): lt gy-med gy, sb frm-frm-brit, mod fis sb rd-sb blky ctngs, rr-occ forams & inoc fos frags, tr vf pyr, hi calc; MRLST (35%): dk gy-dk gyshbn, frm, brit, mod fis sb blky-blky ctngs, tr vf pyr, hi calc

8000-8050 CHK(80%): 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 (20%): dk gyshbn-dk gy, frm-sl hd-brit, mod calc, tr CHK incl

8050-8100 CHK (85%): predy gyshbn-lt gy, mot, scat offwht, sb blky-sb ang ctngs, fri-frm, sm chky tex, com inoc fos frags, calc; MRLST (15%): dk gyshbn-dk gy, frm-sl hd, sb blky-ang ctngs, sl sm-rgh tex, com intbd CHK, scat pyrc nod, scat frac fl cal, hi calc

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
8,310
8,320
8,330
8,340
8,350
8,360
8,370
8,380

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

WOB: 40.1klbs
RPM: 60
SPM: 198
SPP: 4,520psi

MD: 8,231'
INC: 90.75°
AZM: 90.19°
TVD: 7,440.99'
VS: 806.68'

MD: 8,325'
INC: 90.31°
AZM: 89.4°
TVD: 7,440.12'
VS: 900.68'

MW IN: 9.8
VIS IN: 45

GAS (units)
1 10 100 1,000 1E4
C1-C5 (PPM)
150 1.5E3 1.5E4 1.5E5 1.5E6
Pason Gas (units)
0.8 8 80 800 8E3

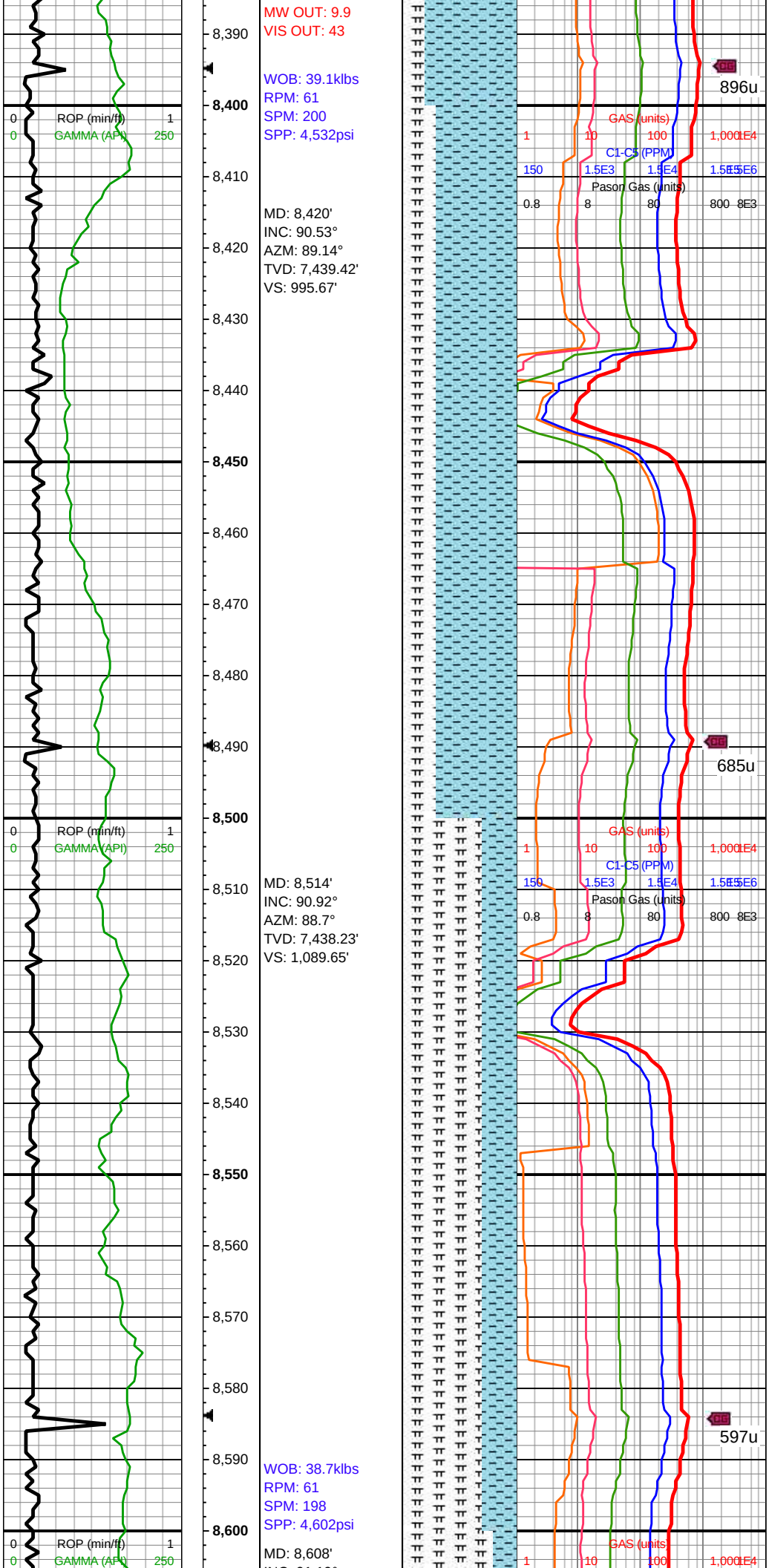
1.739u

1.972u

8100-8200 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-v micmica, v calc, sme scat cal

8200-8300 CHK (75%); pred lt gy-gyshbn wi occ offwht-crm, sub blky-blky wi rr plty, v frm-frm, rr lam, scat pp-occ pyr; MRLST (25%) pred med-dk gy wi sme v dk gry, occ plty-blky, v hrd, sme pp pyr, com micmica

8300-8400 CHK (80%): lt gy-med gy wi sme wh chky incl thru, sb frm-frm, l-mod fis sb rd-sb blky ctngs, sl slty tex, tr vf pyr,



hi calc; MRLST (20%): dk gy-dk gyshbn, frm-hd-brit, mod fis sb ang-sb blky-blky ctngs, sl slty-slty tex, tr vf pyr, mod calc

8400-8500 CHK (70%); pred lt gy-gyshbn wi occ med brn, sub blky-blky wi rr plty, v frm-frm, rr lam, scatt pp-occ pyr; MRLST (30%) pred med-dk gy wi sme v dk gry, occ plty-blky, v hrd, sme pp pyr, com micmica

8500-8600 MRSLT (70%): dk gy-md gy, v frm-mod hd, blk-sb ang ctngs, sl slty tex,hi calc; CHK (30%): lt gy-med gy, frm-v frm,mod plty-blky ctngs, rthy tex, hi calc

INC: 91.19°
AZM: 88.61°
TVD: 7,436.5'
VS: 1,183.61'

8,610
8,620
8,630
8,640
8,650
8,660
8,670
8,680
8,690
8,700

MD: 8,703'
INC: 87.98°
AZM: 89.23°
TVD: 7,437.19'
VS: 1,278.58'

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

8,710
8,720
8,730
8,740
8,750
8,760
8,770
8,780
8,790
8,800

MD: 8,797'
INC: 88.37°
AZM: 88.61°
TVD: 7,440.18'
VS: 1,372.51'

WOB: 39.2klbs
RPM: 61
SPM: 200
SPP: 4,528psi

8,810
8,820

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

C1-C5 (PPM)
150 1.5E3 1.5E4 1.5E5 1.5E6
Pason Gas (units)
0.8 8 80 800 8E3

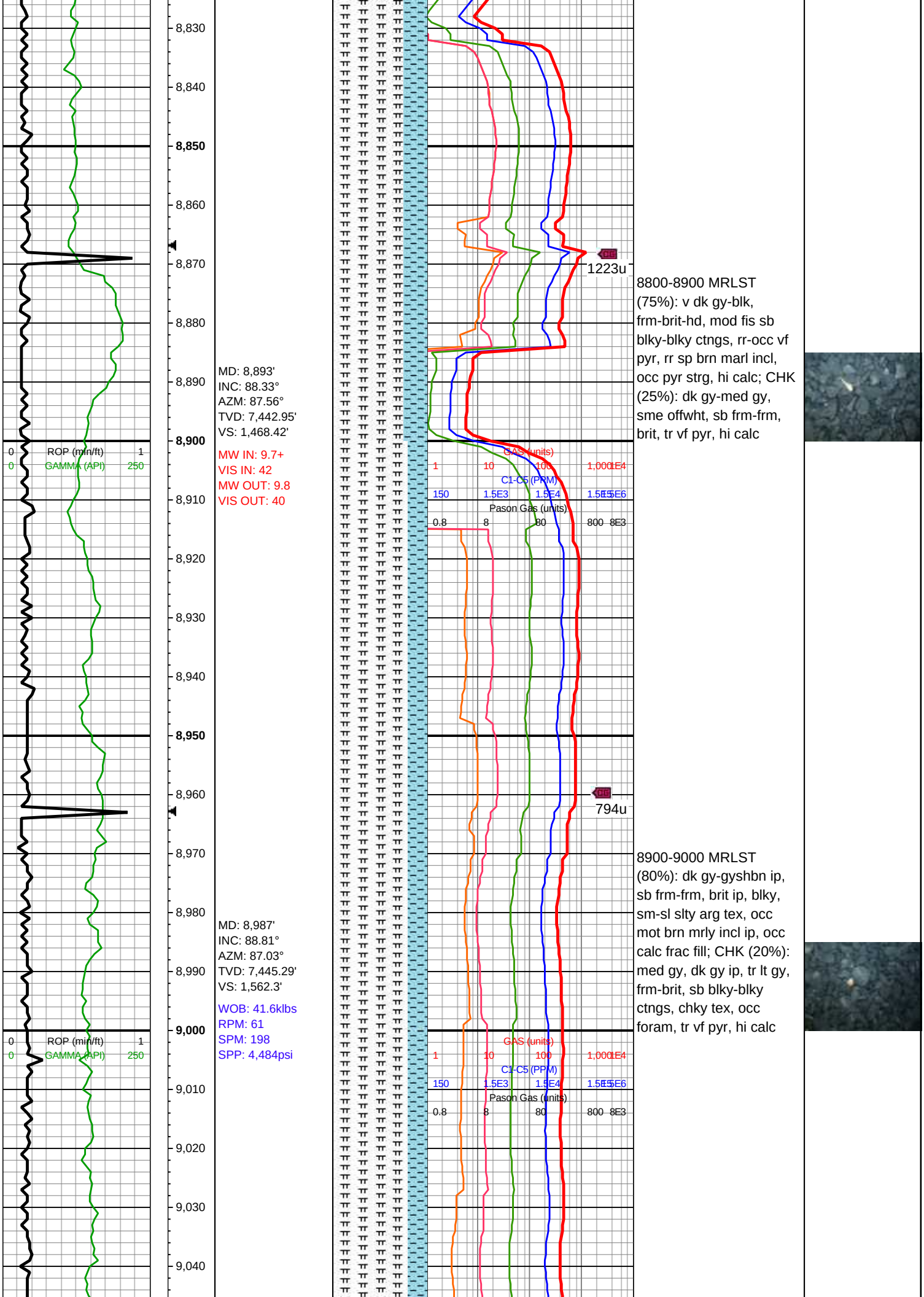
701u

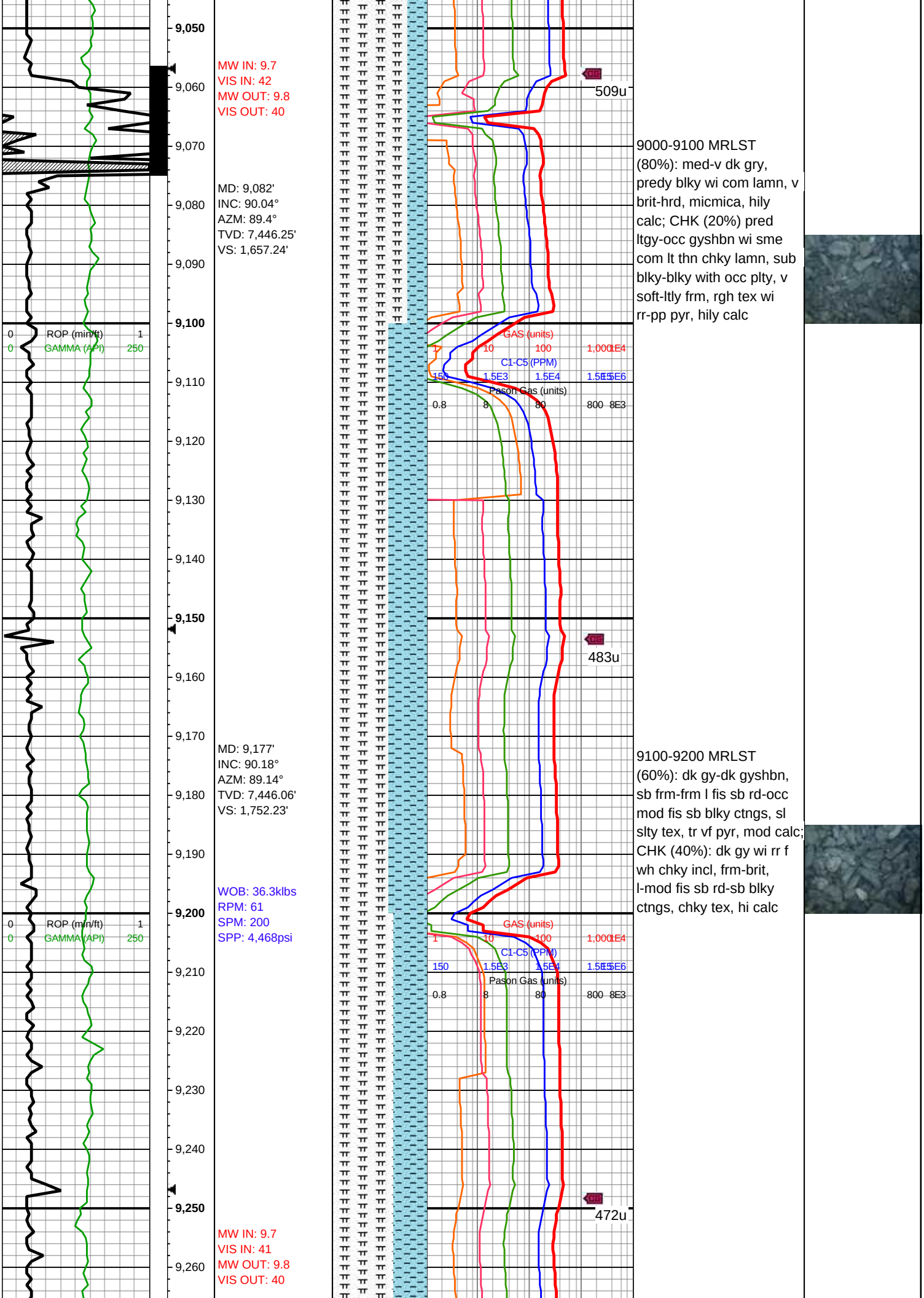
GAS (units)
1 10 100 1,000 1E4

527u

8600-8700 MRLST (80%) pred med gry wi sme dk gry, v hrd, sme sl lt gy chky lam, occ micmica; CHK (20%) lt-med gyshbn wi sme med brn, sub blky-plty, frm-sl brit, occ-rr lam

8700-8800 MRLST (85%): 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 (15%): lt gy, occ dk gy, sft-sb frm-frm, sb blky, chky tex, rr foram, tr vf pyr, hi calc


8,830
8,840
8,850
8,860
8,870
8,880
8,890
8,900
8,910
8,920
8,930
8,940
8,950
8,960
8,970
8,980
8,990
9,000
9,010
9,020
9,030
9,040
0 ROP (min/ft) 1
0 GAMMA (API) 250
MD: 8,893'
INC: 88.33°
AZM: 87.56°
TVD: 7,442.95'
VS: 1,468.42'
MW IN: 9.7+
VIS IN: 42
MW OUT: 9.8
VIS OUT: 40
GAS (units)
1 10 100 1,000 1E4
C1-C5 (PPM)
150 1.5E3 1.5E4 1.5E5 1.5E6
Pason Gas (units)
0.8 8 80 800 8E3
1223u
8800-8900 MRLST (75%): v dk gy-blk, frm-brit-hd, mod fis sb blky-blky ctngs, rr-occ vf pyr, rr sp brn marl incl, occ pyr strg, hi calc; CHK (25%): dk gy-med gy, sme offwht, sb frm-frm, brit, tr vf pyr, hi calc
794u
8900-9000 MRLST (80%): 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 (20%): med gy, dk gy ip, tr lt gy, frm-brit, sb blky-blky ctngs, chky tex, occ foram, tr vf pyr, hi calc
MD: 8,987'
INC: 88.81°
AZM: 87.03°
TVD: 7,445.29'
VS: 1,562.3'
WOB: 41.6klbs
RPM: 61
SPM: 198
SPP: 4,484psi


9,050
9,060
9,070
9,080
9,090
9,100
9,110
9,120
9,130
9,140
9,150
9,160
9,170
9,180
9,190
9,200
9,210
9,220
9,230
9,240
9,250
9,260
0 ROP (min/ft) 1
0 GAMMA (API) 250
MW IN: 9.7
VIS IN: 42
MW OUT: 9.8
VIS OUT: 40
MD: 9,082'
INC: 90.04°
AZM: 89.4°
TVD: 7,446.25'
VS: 1,657.24'
509u
GAS (units)
1 10 100 1,000 1E4
C1-C5 (PPM)
150 1.5E3 1.5E4 1.5E5 1.5E6
Pason Gas (units)
0.8 8 80 800 8E3
9000-9100 MRLST (80%): med-v dk gry, predy blky wi com lamn, v brit-hrd, micmica, hily calc; CHK (20%) pred ltgy-occ gyshbn wi sme com lt thn chky lamn, sub blky-blky with occ plty, v soft-ltly frm, rgh tex wi rr-pp pyr, hily calc
483u
MD: 9,177'
INC: 90.18°
AZM: 89.14°
TVD: 7,446.06'
VS: 1,752.23'
9100-9200 MRLST (60%): dk gy-dk gyshbn, sb frm-frm l fis sb rd-occ mod fis sb blky ctngs, sl slty tex, tr vf pyr, mod calc; CHK (40%): dk gy wi rr f wh chky incl, frm-brit, l-mod fis sb rd-sb blky ctngs, chky tex, hi calc
WOB: 36.3klbs
RPM: 61
SPM: 200
SPP: 4,468psi
472u
MW IN: 9.7
VIS IN: 41
MW OUT: 9.8
VIS OUT: 40

MD: 9,271'
INC: 90.44°
AZM: 89.75°
TVD: 7,445.56'
VS: 1,846.23'

9,270
9,280
9,290
9,300
9,310
9,320
9,330
9,340
9,350
9,360
9,370
9,380
9,390
9,400
9,410
9,420
9,430
9,440
9,450
9,460
9,470
9,480

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 (units)
0.8 8 80 800 8E3

9200-9300 MRLST (65%): dk gy-gyshbn, mot, sl hd-frm, sb blky-sb ang ctngs, tr intbd CHK, calc; CHK (35%): predy gyshbn, mot-sl stri, sb blky ctngs, sl frm-brit, tr MRLST incl, sm chky tex, v calc

737u

MD: 9,367'
INC: 90.62°
AZM: 89.67°
TVD: 7,444.67'
VS: 1,942.22'

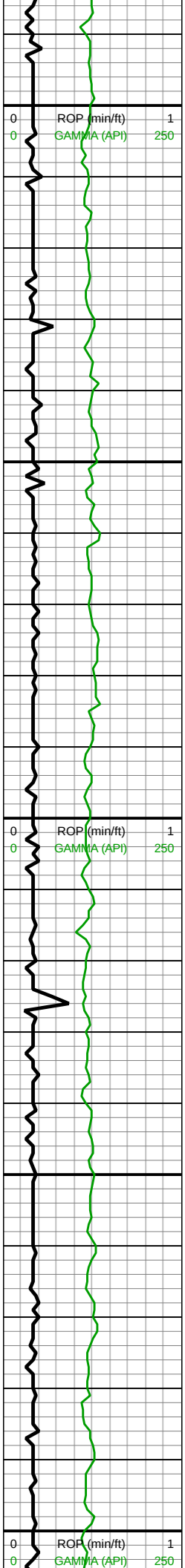
WOB: 37klbs
RPM: 61
SPM: 200
SPP: 4,697psi

9300-9400 MRLST (65%): dk gy-dk gyshbn, sb blky-splt ctngs, brit, sl hd-frm, mnr CHK intbds, tr pp mic pyr, mod calc; CHK (5%): med brn-gyshbn, mot, sl frm-frm, sb blky-sb tab ctngs, brit, tr CHK incl, mnr vf lam, v calc

1100u

MD: 9,461'
INC: 90.79°
AZM: 90.02°
TVD: 7,443.51'
VS: 2,036.22'

9400-9500 MRLST (60%): v dk gy-dk gyshbn ip, frm-v frm, blky, v calc, rgh tex, mot-stri, sme fy



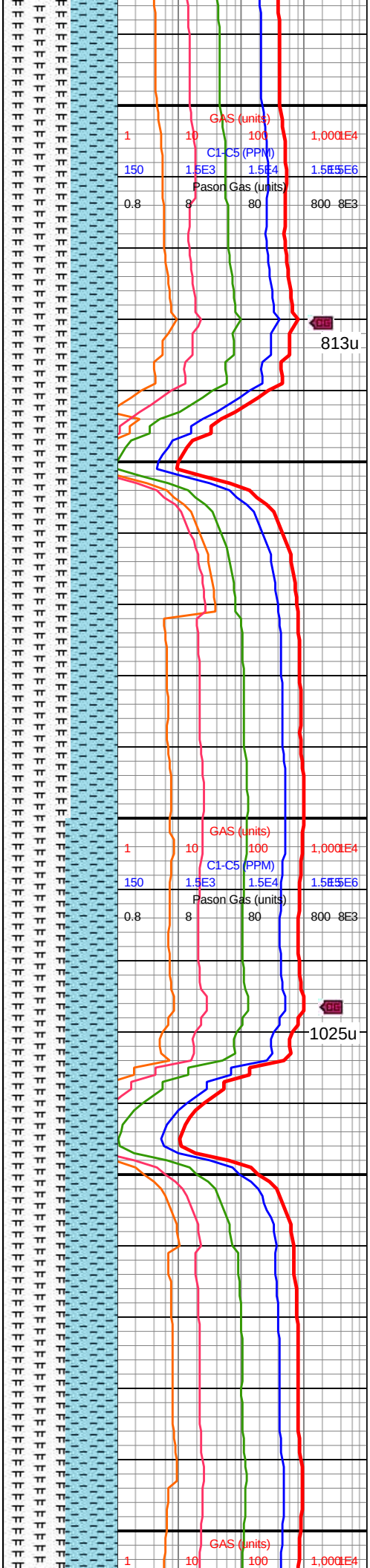
9,490
9,500
9,510
9,520
9,530
9,540
9,550
9,560
9,570
9,580
9,590
9,600
9,610
9,620
9,630
9,640
9,650
9,660
9,670
9,680
9,690
9,700

MW IN: 9.7
VIS IN: 41
MW OUT: 9.8
VIS OUT: 39

MD: 9,556'
INC: 90.53°
AZM: 89.67°
TVD: 7,442.42'
VS: 2,131.21'

WOB: 38.5klbs
RPM: 61
SPM: 200
SPP: 4,701psi

MD: 9,650'
INC: 90.18°
AZM: 90.28°
TVD: 7,441.83'
VS: 2,225.21'



lam, tr pp pyr; CHK (40%): dk gy-brn, com lt gy-mot, blky, sft, fri, chky tex, occ stri, rr mic fos

9500-9600 MRLST (60%): pred v dk gy-blk, occ gyshbn, frm-v frm, blky, calc, rgh tex; CHK (40%): 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

9600-9700 MRLST (55%): 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 (45%): med gy, dk gy ip, tr lt gy, frm-brit, sb blky-blky ctngs, chky tex, occ foram, tr vf pyr, hi calc

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

MD: 9,744'
INC: 90.53°
AZM: 91.86°
TVD: 7,441.25'
VS: 2,319.18'

WOB: 40.8klbs
RPM: 61
SPM: 202
SPP: 4,770psi

MD: 9,838'
INC: 90.04°
AZM: 90.72°
TVD: 7,440.78'
VS: 2,413.15'

9,710
9,720
9,730
9,740
9,750
9,760
9,770
9,780
9,790
9,800
9,810
9,820
9,830
9,850
9,860
9,870
9,880
9,890
9,900
9,910
9,920

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

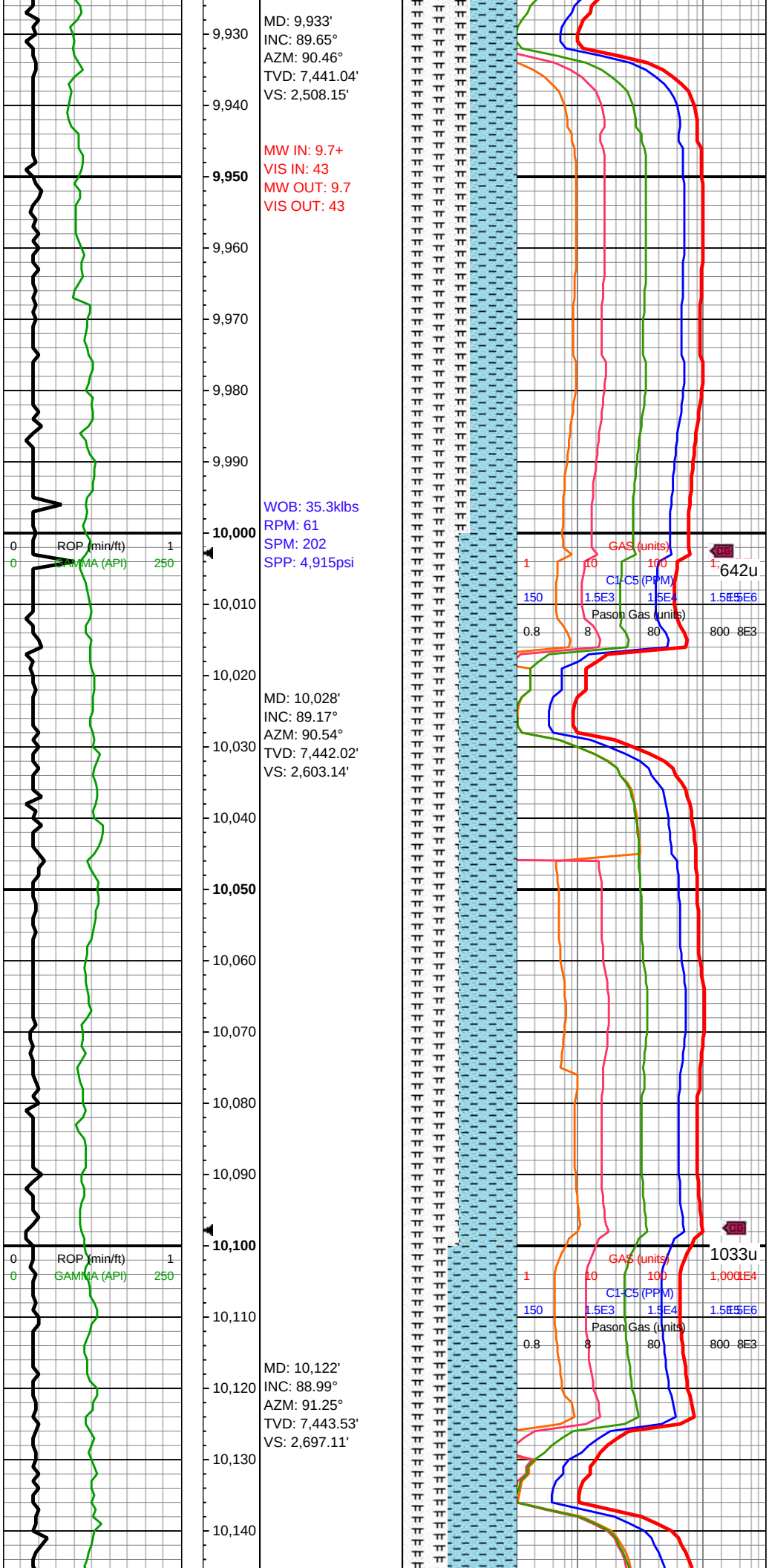
C1-C5 (PPM)
150 1.5E3 1.5E4 1.5E5 1.5E6
Pason Gas (units)
0.8 8 80 800 8E3
989u

GAS (units)
1 10 100 1,000 1E4
C1-C5 (PPM)
150 1.5E3 1.5E4 1.5E5 1.5E6
Pason Gas (units)
0.8 8 80 800 8E3
891u

GAS (units)
1 10 100 1,000 1E4
C1-C5 (PPM)
150 1.5E3 1.5E4 1.5E5 1.5E6
Pason Gas (units)
0.8 8 80 800 8E3
1483u

9700-9800 MRLST (55%): dk gy-dk gyshbn, sl hd-v frm, mod fis, sb blky-tab ctngs, sm arg tex, mod calc, tr pp mic pyr; CHK (45%): med brn-gyshbn, frm-sft, mod fis, tab-sb blky, tr free CHK, v calc

9800-9900 CHK (50%): med gy-lt gy, sme offwht, dk gy ip, tr lt gyshbn, frm-brit, sb blky-blky ctngs, occ foram, tr vf pyr, hi calc; MRLST (50%): dk gy-gyshbn ip, sb frm-frm, brit ip, blky, sm-sl slty arg tex, mot, v calc



MD: 9,933'
INC: 89.65°
AZM: 90.46°
TVD: 7,441.04'
VS: 2,508.15'

MW IN: 9.7+
VIS IN: 43
MW OUT: 9.7
VIS OUT: 43

WOB: 35.3klbs
RPM: 61
SPM: 202
SPP: 4,915psi

9900-10000 MRLST (60%): dk gy-dk gyshbn, sb blky-splt ctngs, brit, sl hd-frm, mnr CHK intbds, tr pp mic pyr, mod calc; CHK (40%): med brn-gyshbn, mot, sl frm-frm, sb blky-sb tab ctngs, brit, tr CHK incl, mnr vf lam, v calc

MD: 10,028'
INC: 89.17°
AZM: 90.54°
TVD: 7,442.02'
VS: 2,603.14'

10000-10100 CHK (50%): med brn-dk gyshbn, tr free chk, mot, frm-sl sft, blky-sb rd, chky tex, scat-com mic fos frags, v calc; MRLST (50%): predy dk gy-dk gyshbn, sm tex, frm-sl hrd, blky-sb rd, tr imbd pp pyr, tr lam CHK, calc

MD: 10,122'
INC: 88.99°
AZM: 91.25°
TVD: 7,443.53'
VS: 2,697.11'

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

10,150
10,160
10,170
10,180
10,190
10,200
10,210
10,220
10,230
10,240
10,250
10,260
10,270
10,280
10,290
10,300
10,310
10,320
10,330
10,340
10,350
10,360

WOB: 38.6klbs
RPM: 61
SPM: 199
SPP: 5,090psi

MD: 10,217'
INC: 89.08°
AZM: 91.25°
TVD: 7,445.13'
VS: 2,792.07'

MD: 10,312'
INC: 88.37°
AZM: 91.95°
TVD: 7,447.24'
VS: 2,887.01'

MNDEPTH 8/11/18

GAS (units)
1 10 100 1,000 1E4
C1-C5 (PPM)
150 1.5E3 1.5E4 1.5E5 1.5E6
Pason Gas (units)
0.8 8 80 800 8E3

CB
742u

CB
777u

10100-10200 CHK (60%): lt gy-gyshbn-med gy wi occ f wh chky incl thru, frm-brit sb blky-blky ctngs, chky tex, occ cryptoxln, rr-tr foram, tr fos frags, v calc; MRLST (40%): med gyshbn-dk gy, frm-brit, blky-sb blky, sm arg-sl slty tex, mod calc

10200-10300 CHK (50%): gy-lt gy, sme gyshbn, frm-brit, sb blky-blky, mod fis, mot wi occ f wh chky incl, chky rthy tex, hi calc; MRLST (50%): dk gy-med gy, frm-brit, sb blky-blky, pred sm-sl slty tex, com intbd chk, tr intbd mic pyr, mod calc

10,370
10,380
10,390
10,400
10,410
10,420
10,430
10,440
10,450
10,460
10,470
10,480
10,490
10,500
10,510
10,520
10,530
10,540
10,550
10,560
10,570
10,580

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

WOB: 37.6klbs
RPM: 61
SPM: 197
SPP: 4,905psi

MD: 10,407'
INC: 87.89°
AZM: 92.21°
TVD: 7,450.34'
VS: 2,981.89'

MW IN: 10
VIS IN: 43
MW OUT: 10.1
VIS OUT: 43

MD: 10,501'
INC: 86.84°
AZM: 91.86°
TVD: 7,454.66'
VS: 3,075.72'

MW IN: 10.0+
VIS IN: 43
MW OUT: 10.0
VIS OUT: 43

GAS (units)
1 10 100 1,000 1E4
C1-C5 (PPM)
150 1.5E3 1.5E4 1.5E5 1.5E6
Pason Gas (units)
0.8 8 80 800 8E3

560u

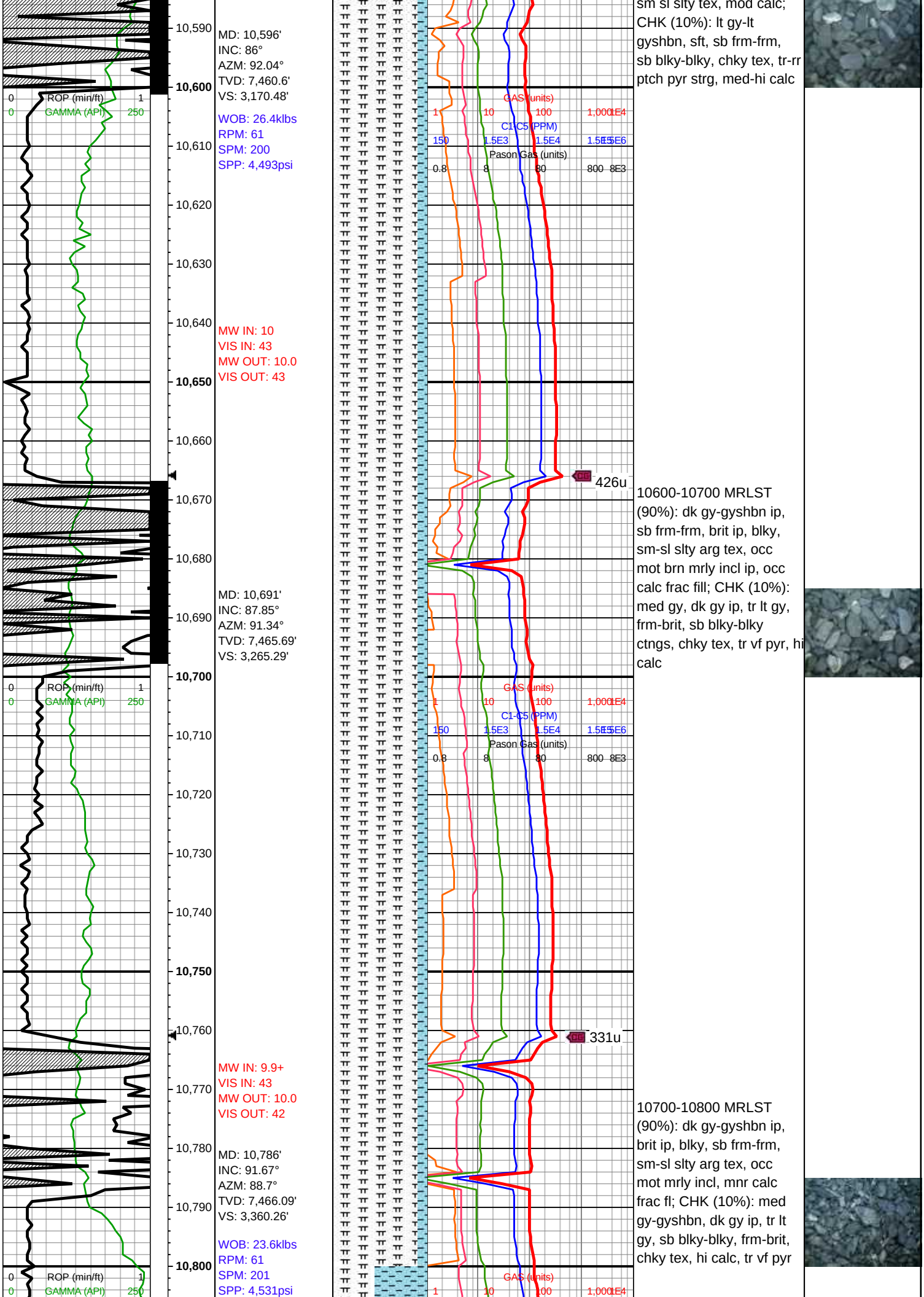
421u

407u

10300-10400 MRLST (50%): dk gy-v dk gy, frm-brit, med-hi fis blky ctngs, rr vf pyr, mod calc wi brn mrly resdl; CHK (50%): lt gy-gy, sb frm-frm, rd-sb rd-sb blky l-mod fis ctngs, f wh chky incl, rr vf pyr, hi calc

10400-10500 MRLST (85%): dk gyshbn, frm, sb blky-sb ang, l-mod fis ctngs, slty-sl rgh mot tex, arg, com CHK intbd lam, mod calc; CHK (15%): lt gy-med gy, wh chky incl, sb frm-frm-brit, mod fis, sb blky-blky ctngs, sl slty tex, hi calc

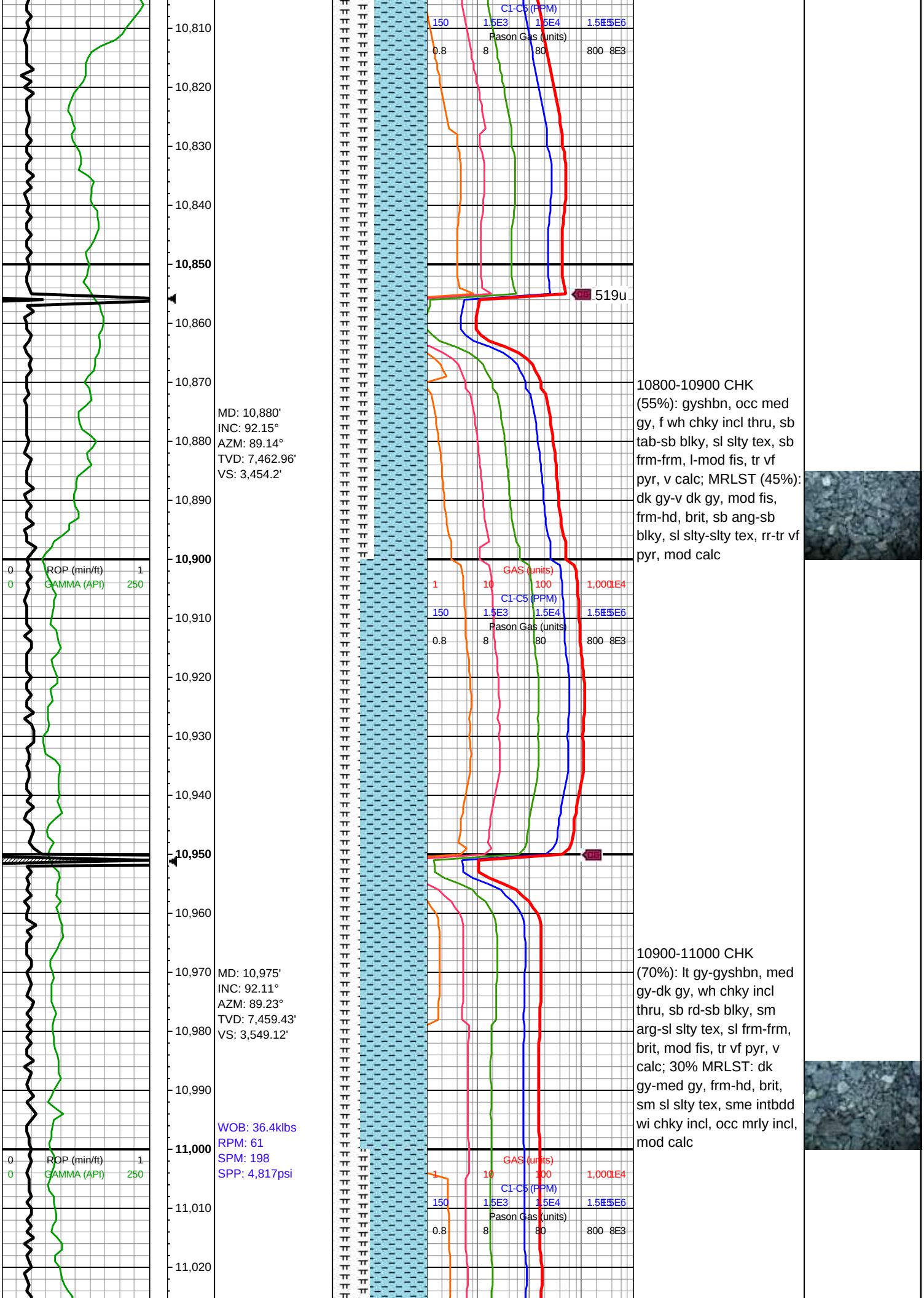
10500-10600 MRLST (90%): gyshbn-dk gy, frm-hd, occ sft, predy brit,



sm sl slty tex, mod calc; CHK (10%): lt gy-lt gyshbn, sft, sb frm-frm, sb blky-blky, chky tex, tr-rr ptch pyr strg, med-hi calc

10600-10700 MRLST (90%): 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 (10%): med gy, dk gy ip, tr lt gy, frm-brit, sb blky-blky ctngs, chky tex, tr vf pyr, hi calc

10700-10800 MRLST (90%): dk gy-gyshbn ip, brit ip, blky, sb frm-frm, sm-sl slty arg tex, occ mot mrly incl, mnr calc frac fl; CHK (10%): med gy-gyshbn, dk gy ip, tr lt gy, sb blky-blky, frm-brit, chky tex, hi calc, tr vf pyr



MD: 10,880'
INC: 92.15°
AZM: 89.14°
TVD: 7,462.96'
VS: 3,454.2'

10800-10900 CHK (55%): gyshbn, occ med gy, f wh chky incl thru, sb tab-sb blky, sl slty tex, sb frm-frm, l-mod fis, tr vf pyr, v calc; MRLST (45%): dk gy-v dk gy, mod fis, frm-hd, brit, sb ang-sb blky, sl slty-slty tex, rr-tr vf pyr, mod calc

MD: 10,975'
INC: 92.11°
AZM: 89.23°
TVD: 7,459.43'
VS: 3,549.12'

WOB: 36.4klbs
RPM: 61
SPM: 198
SPP: 4,817psi

10900-11000 CHK (70%): lt gy-gyshbn, med gy-dk gy, wh chky incl thru, sb rd-sb blky, sm arg-sl slty tex, sl frm-frm, brit, mod fis, tr vf pyr, v calc; 30% MRLST: dk gy-med gy, frm-hd, brit, sm sl slty tex, sme intbdd wi chky incl, occ mrly incl, mod calc

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
11,170
11,180
11,190
11,200
11,210
11,220
11,230
11,240

MW IN: 9.9
VIS IN: 43
MW OUT: 10.0
VIS OUT: 41

MD: 11,069'
INC: 91.63°
AZM: 89.4°
TVD: 7,456.36'
VS: 3,643.07'

MD: 11,164'
INC: 91.85°
AZM: 89.23°
TVD: 7,453.47'
VS: 3,738.02'

WOB: 36.6klbs
RPM: 61
SPM: 199
SPP: 4,838psi

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 (units)
0.8 8 80 800 8E3

209u
358u
406u

11000-11100 CHK (60%): lt gy-gyshbn, med gy, f wh chky incl thru, chky tex, frm-brit, sb blky-blky, v calc, tr pp mic pyr; MRLST (40%): med gy-dk gy, blky-sb blky, frm-brit, sm arg-sl slty tex, mod calc

11100-11200 CHK (55%): lt-med gry wi lt brn, sme sl med gy-brn, frm-sl brit, sb blky-sb tab, v calc, tr imbd mic pyr; MRLST (45%): dk gy-med gy, blky, frm-v frm, sl rgh tex, mod calc, tr micmica

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

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
11,390
11,400
11,410
11,420
11,430
11,440
11,450
11,460

MD: 11,259'
INC: 91.8°
AZM: 89.4°
TVD: 7,450.45'
VS: 3,832.96'

GAS (units)
1 10 100 1,000 1E4
C1-C5 (PPM)
150 1.5E3 1.5E4 1.5E5 1.5E6
Pason Gas (units)
0.8 8 80 800 8E3

377u

11200-11300 CHK (60%): med gy-lt gy, sme offwht, tr lt gyshbn, sm chky tex, frm-brit, sb blky-blky, hi calc, tr dissm pyrc cls; MRLST (40%): dk gy-med gy, mot, tab-blky, sm-sl slty arg tex, sb frm-frm, brit ip, v calc

MD: 11,353'
INC: 91.76°
AZM: 89.93°
TVD: 7,447.53'
VS: 3,926.92'

MW IN: 9.9
VIS IN: 43
MW OUT: 10.0
VIS OUT: 42

WOB: 37klbs
RPM: 71
SPM: 198
SPP: 4,838psi

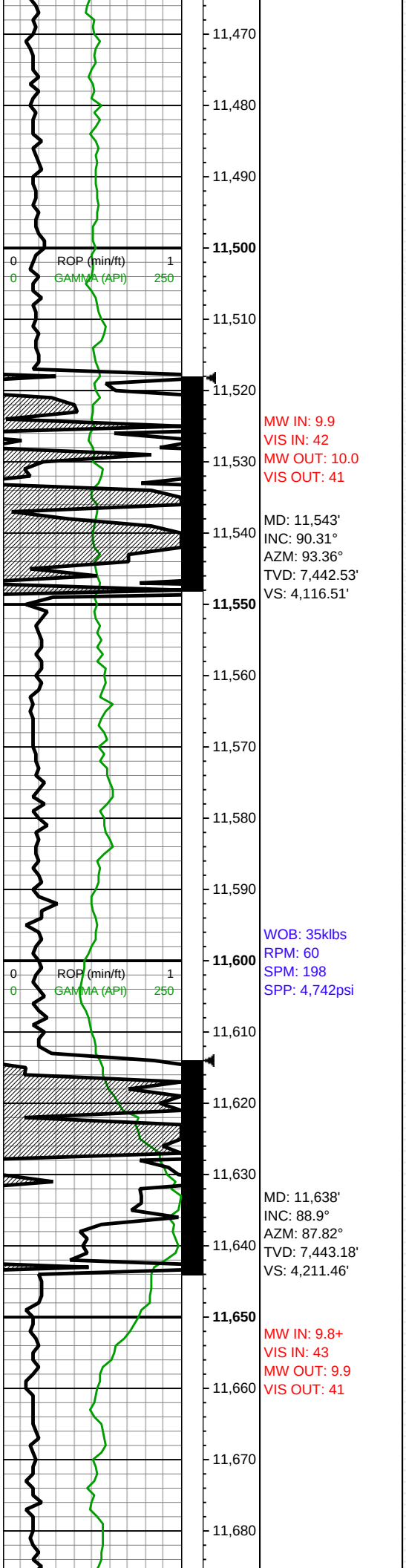
0 ROP (min/ft) 1
0 GAMMA (API) 250

GAS (units)
1 10 100 1,000 1E4
C1-C5 (PPM)
150 1.5E3 1.5E4 1.5E5 1.5E6
Pason Gas (units)
0.8 8 80 800 8E3

503u

11300-11400 CHK (65%): med gy-lt gy, mot, sl frm, brit, sb blky-tab, mod fis, hi calc, tr free CHK frags; MRLST (35%): dk gy, dk gyshbn, sb blky-blky, sb frm-frm, brit ip, mod fis, slty tex, tr vf pyr, wh chky incl ip, mod calc

MD: 11,448'
INC: 91.98°
AZM: 94.5°
TVD: 7,444.43'
VS: 4,021.76'



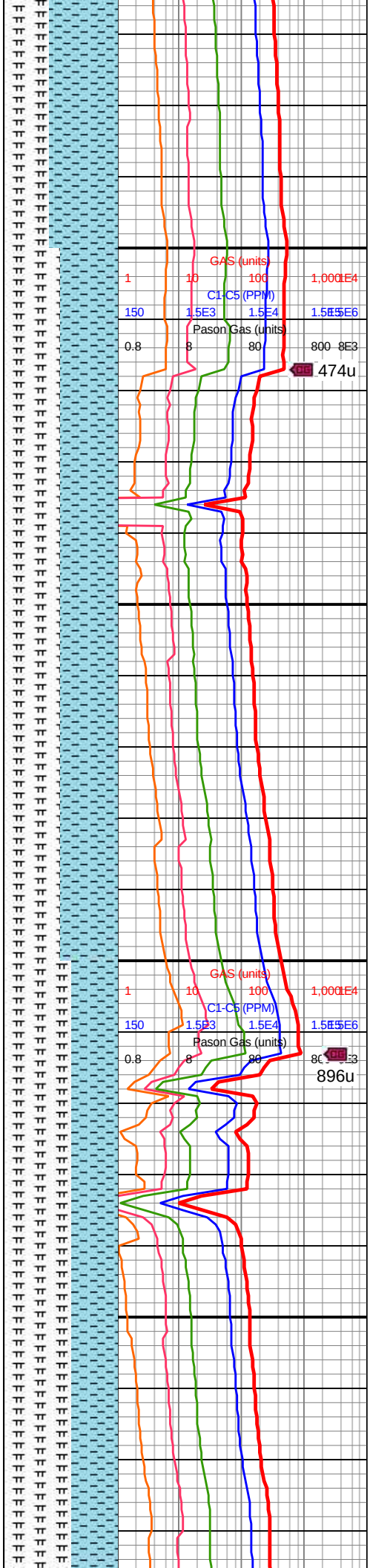
MW IN: 9.9
VIS IN: 42
MW OUT: 10.0
VIS OUT: 41

MD: 11,543'
INC: 90.31°
AZM: 93.36°
TVD: 7,442.53'
VS: 4,116.51'

WOB: 35klbs
RPM: 60
SPM: 198
SPP: 4,742psi

MD: 11,638'
INC: 88.9°
AZM: 87.82°
TVD: 7,443.18'
VS: 4,211.46'

MW IN: 9.8+
VIS IN: 43
MW OUT: 9.9
VIS OUT: 41



11400-11500 CHK (60%): gyshbn-lt gy, mot med gy, chky rthy tex, frm-brit, sb blky-blky, mod fis, mot wh chky incl, 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

11500-11600 MRLST (50%): predy dk gy-dk gyshbn, sl slty-sm tex, frm-sl hrd, blky-sb tab, tr lam CHK, v calc, tr imbd/pp pyr; CHK (50%): med gy-gyshbn, mot, frm-sl sft, chky tex, blky-sb splt, v calc

11600-11700 MRLST (60%): dk gy-v dk gy, frm-brit, med-hi fis blky ctngs, rr vf pyr, mod calc wi brn mrly resdl; CHK

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

11,690
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

MD: 11,732'
INC: 88.59°
AZM: 87.73°
TVD: 7,445.24'
VS: 4,305.37'

WOB: 34.4klbs
RPM: 61
SPM: 200
SPP: 4,817psi

MD: 11,826'
INC: 88.02°
AZM: 87.56°
TVD: 7,448.02'
VS: 4,399.26'

MW IN: 9.8+
VIS IN: 42
MW OUT: 9.9
VIS OUT: 40

Note: Power Outage in shacks, No data while rig continues driling and circulating

GAS (units)
1 10 100 1,000 1E4
1E5 1E6
800 8E3

Note: Power Outage in shacks, No data while rig continues driling and circulating

GAS (units)
1 10 100 1,000 1E4
C1-C5 (PPM)
150 1.5E3 1.5E4 1.5E5 1E6
Pason Gas (units)
0.8 8 80 800 8E3

Note: Power Outage in shacks, No data while rig

wi brn mnly resdl, CHK (40%): lt gy-gy, sb frm-frm, rd-sb rd-sb blky l-mod fis ctngs, f wh chky incl, rr vf pyr, hi calc

11700-11800 MRLST (70%): dk gy-gyshbn ip, sb frm-frm, brit ip, blky, sm-sl slty arg tex, mot, v calc; CHK (30%): med gy-lt gy, sme offwht, dk gy ip, tr lt gyshbn, frm-brit, sb blky-blky ctngs, tr-rr mic fos frags, tr vf pyr, hi calc

11800-11930 MRLST (75%): dk gy-dk gyshbn,

while rig continues driling and circulating

11,910

11,920

11,930

11,940

11,950

MD: 11,930'
INC: 88.02°
AZM: 87.56°
TVD: 7,451.62'
VS: 4,503.12'

TD Well 12:00 hrs 8/11/18 @ 11,930' MD

while rig continues driling and circulating

son Gas (units)

0.8 8 80 800 8E3

sb blky-splt ctngs, brit, sl hd-frm, mnr CHK intbds, tr pp mic pyr, mod calc; CHK (25%): med brn-gyshbn, mot, sl frm-frm, sb blky-sb tab ctngs, brit, tr CHK incl, mnr vf lam, v calc