RESERVOIR GROUP

Scale: 5" / 100'
Measured Depth Log

Well Name	Ruegge 3Q-4H-N165		
Location	Sec. 4 T1N R65W		
State	Colorado	**County**	Weld
Country	USA	**Rig Number**	Ensign 140
API Number	05123465600000	**AFE #**	16190993
Geographic Region	Rockies	**Field**	Wattenberg
Spud Date	7/23/2018	**Drilling Completed**	7/26/2018
Surface Coordinates	Lat/Long: 40.075281/-104.670562 SHL: Sec: 4 Twp: 1N 65W Footage: 715 FSL 2195 FWL		
Bottom Hole Coordinates	Proposed BHL: Sec: 4 Twp: 1N 65W Footages: 460 FFNLL 240 FFELL		
Ground Elevation	4,915'	**K.B. Elevation**	4,938'
Logged Interval	6,800' **To** 12,265'	**Total Depth**	12,265'
Formation	B 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

Name John Ready

Company Crestone Peak Resources

Address 370 17th Street #2170
Denver, CO 80202

CRESTONE PEAK
RESOURCES

Zone Color Coding

Oil	Condensate	Gas
Note	Core	Pressure
Error	Water	Seal

Other

Loggers: Brian Ferwerda / Nick Watkins

Services Provided: 2-Man Mudlogging / Geosteering

Equipment: ML-533

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

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

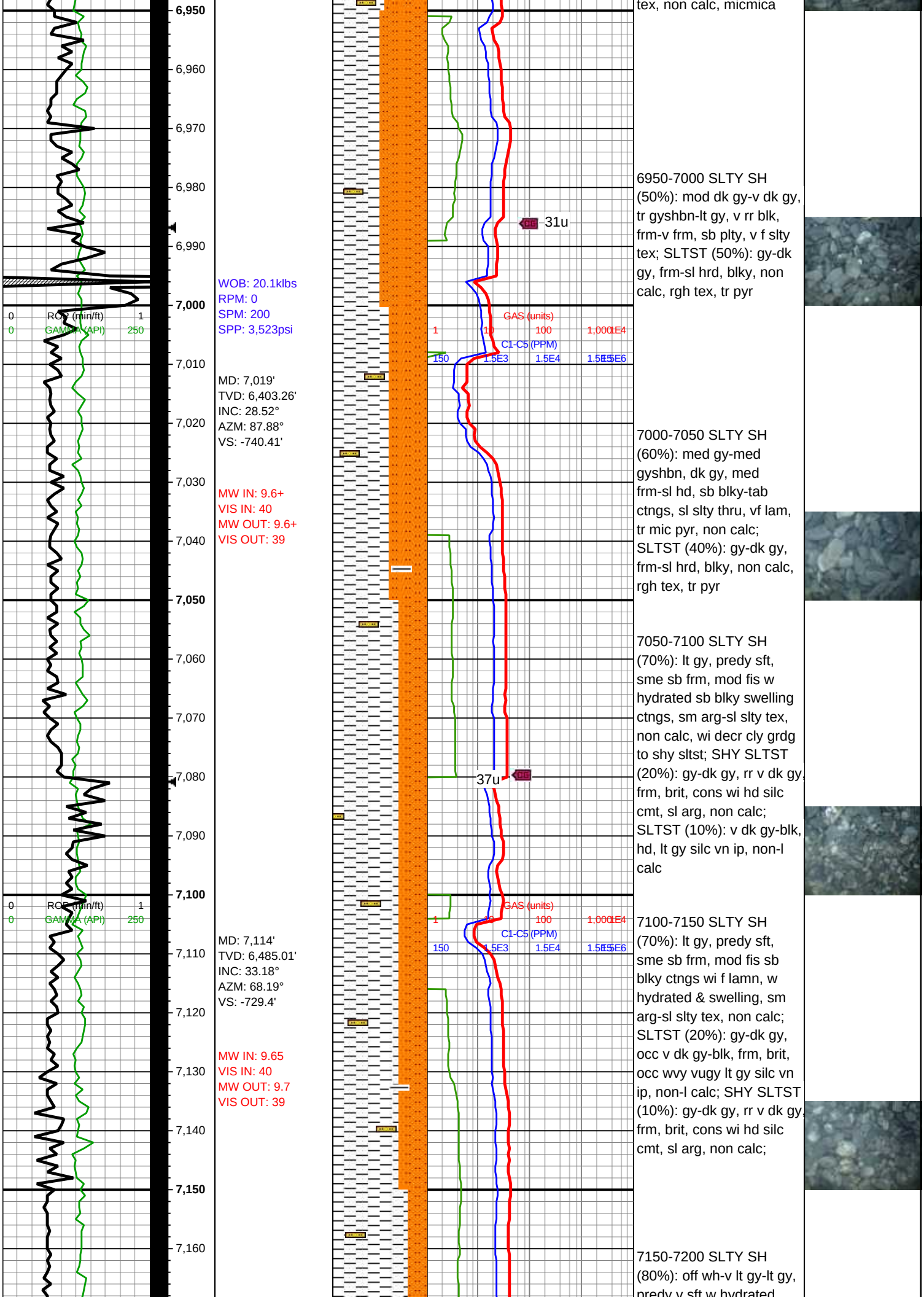
Textures

- 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)	Lithology Descriptions	Images
Crestone Peak Resources **Ruegge 3Q-4H-N165** **9 5/8" Surface Casing @ 2,555'** **Spud Date: 7/23/18** **2 man Logging Began: 7/24/18 @ 6,800'** **All Depths Correspond to Driller's Pipe Tally**		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	Bit #: 1 Type: U516M Size: 8 1/2 Depth In: 2,555' Depth Out: 12,265' Hours: 35.6 hrs Avg Ft/Hr: 221 '/hr Jets: 6x13 S/N: 37078		**SYSTEM CALIBRATED** **1% Methane = 100 Units** **100% Methane = 10000 Units**		
0 ROP (min/ft) 1 0 GAMMA (API) 250			MD: 6,830' TVD: 6,231.69' INC: 21.31° AZM: 105.72° VS: -699.21'		GAS (units) 1 10 100 1,000 1E4 C1-C5 (PPM) 150 1.5E3 1.5E4 1.5E5 1.5E6	6800-6850 SLTY SH (60%): mod dk gy-v dk gy, tr gyshbn-lt gy, v rr blk, frm-v frm, sb plty, v f slty tex; SLTST (40%): gy-dk gy, frm-sl hrd, blky, non calc, rgh tex, tr pyr	
			MW IN: 9.6 VIS IN: 42 MW OUT: 9.6 VIS OUT: 40		37u	6850-6900 SLTY SH (70%): 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 (30%): gy-dk gy, frm-sl hrd, blky, non calc, rgh tex, tr pyr	
0 ROP (min/ft) 1 0 GAMMA (API) 250			MD: 6,925' TVD: 6,319.13' INC: 24.7° AZM: 103.87° VS: -707.86'		GAS (units) 1 10 100 1,000 1E4 C1-C5 (PPM) 150 1.5E3 1.5E4 1.5E5 1.5E6	6900-6950 SLTY SH (55%): gyshbn-lt gy, mot med gy, lam dk brn, sl frm-frm, stri, blky, splt ip, vf lam, occ slty, sl micmica, non-sl calc; SLTST (45%): med gy-dk gy, blky, frm-sl hrd, rgh	



tex, non calc, micmica

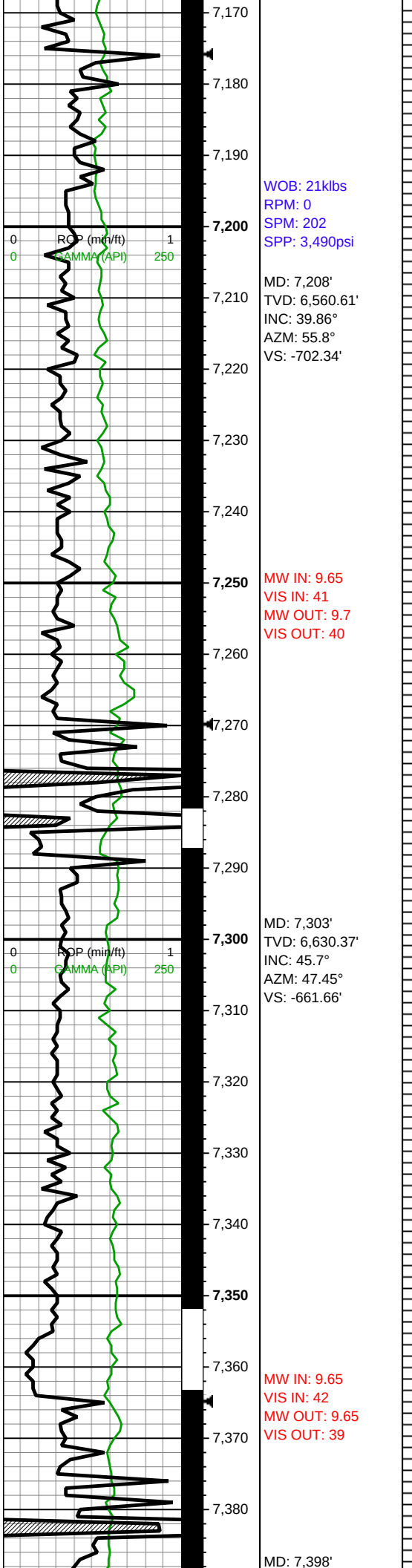
6950-7000 SLTY SH (50%): mod dk gy-v dk gy, tr gyshbn-lt gy, v rr blk, frm-v frm, sb plty, v f slty tex; SLTST (50%): gy-dk gy, frm-sl hrd, blky, non calc, rgh tex, tr pyr

7000-7050 SLTY SH (60%): 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

7050-7100 SLTY SH (70%): lt gy, predy sft, sme sb frm, mod fis w hydrated sb blky swelling ctngs, sm arg-sl slty tex, non calc, wi decr cly grdg to shy sltst; SHY SLTST (20%): gy-dk gy, rr v dk gy, frm, brit, cons wi hd silc cmt, sl arg, non calc; SLTST (10%): v dk gy-blk, hd, lt gy silc vn ip, non-l calc

7100-7150 SLTY SH (70%): lt gy, predy sft, sme sb frm, mod fis sb blky ctngs wi f lamn, w hydrated & swelling, sm arg-sl slty tex, non calc; SLTST (20%): gy-dk gy, occ v dk gy-blk, frm, brit, occ wvy vugy lt gy silc vn ip, non-l calc; SHY SLTST (10%): gy-dk gy, rr v dk gy, frm, brit, cons wi hd silc cmt, sl arg, non calc;

7150-7200 SLTY SH (80%): off wh-v lt gy-lt gy, predy v sft w hydrated



WOB: 21klbs
RPM: 0
SPM: 202
SPP: 3,490psi

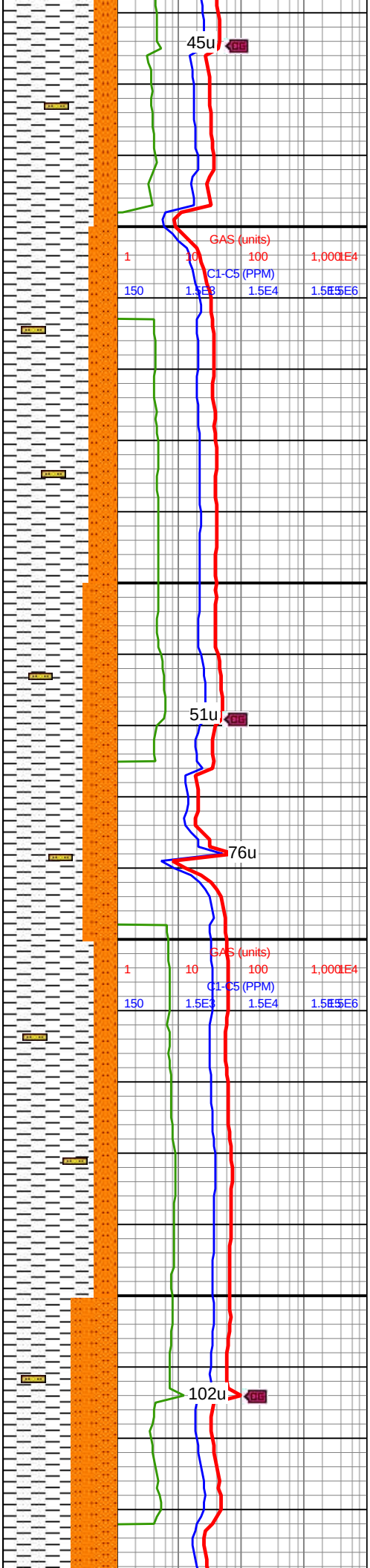
MD: 7,208'
TVD: 6,560.61'
INC: 39.86°
AZM: 55.8°
VS: -702.34'

MW IN: 9.65
VIS IN: 41
MW OUT: 9.7
VIS OUT: 40

MD: 7,303'
TVD: 6,630.37'
INC: 45.7°
AZM: 47.45°
VS: -661.66'

MW IN: 9.65
VIS IN: 42
MW OUT: 9.65
VIS OUT: 39

MD: 7,398'



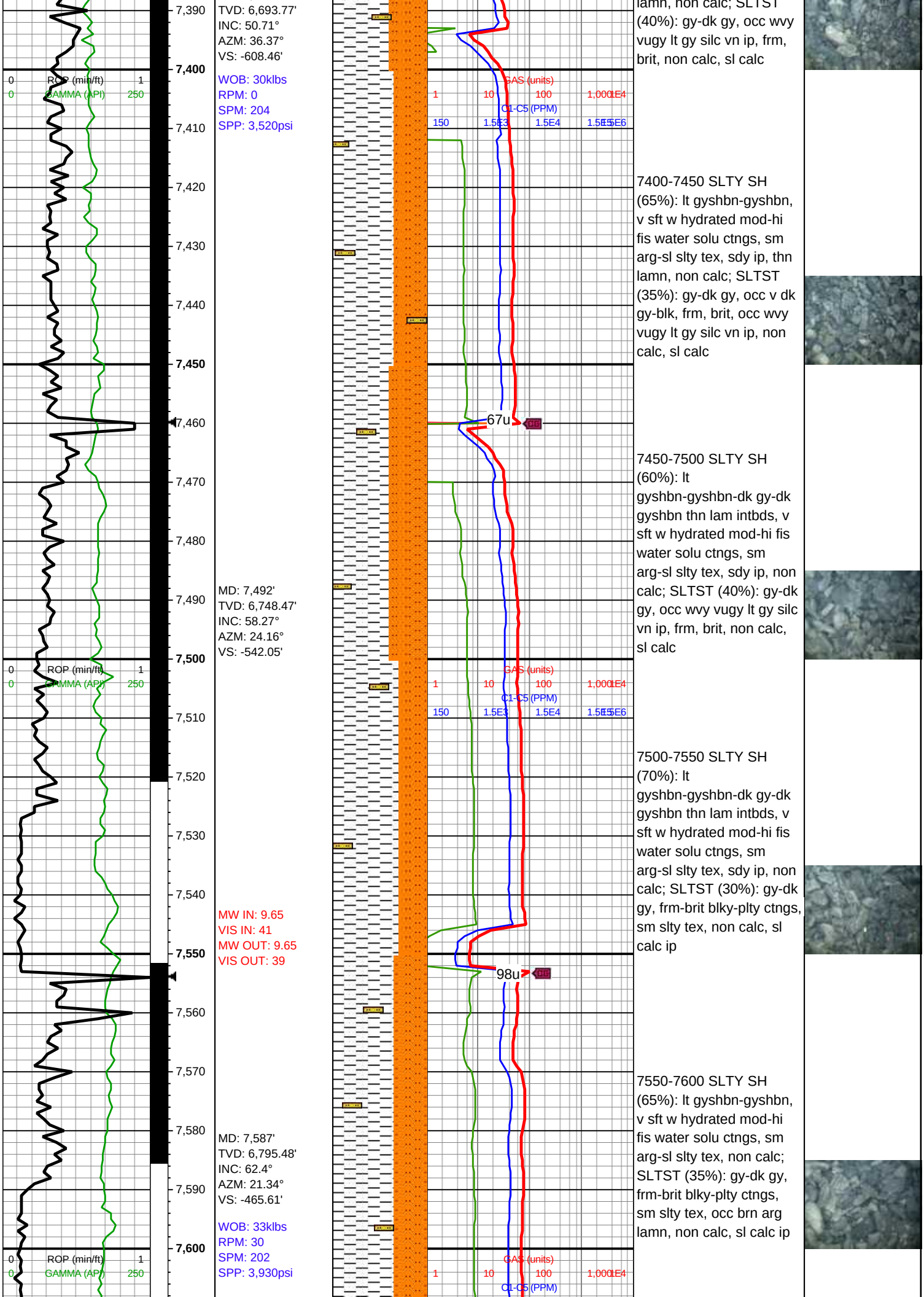
sme sb frm, mod fis sb blky ctngs wi f lamn, water solu, sm arg-sl slty tex, non calc; SLTST (20%): gy-dk gy, occ v dk gy-blk, frm, brit, occ wvy vugy lt gy silc vn ip, non calc, sl calc ip

7200-7250 SLTY SH (75%): off wh-v lt gy-lt gy, predy v sft w hydrated, sme sb frm, mod fis sb blky ctngs wi f lamn, water solu, sm arg-sl slty tex, non calc; SLTST (25%): gy-dk gy, occ v dk gy-blk, frm, brit, occ wvy vugy lt gy silc vn ip, non calc, sl calc ip

7250-7300 SLTY SH (70%): lt gy, predy sft, sme sb frm, mod fis sb blky ctngs wi f lamn, w hydrated & swelling, sm arg-sl slty tex, non calc; SLTST (20%): gy-dk gy, occ v dk gy-blk, frm, brit, occ wvy vugy lt gy silc vn ip, non-l calc; SHY SLTST (10%): gy-dk gy, rr v dk gy, frm, brit, cons wi hd silc cmt, sl arg, non calc;

7300-7350 SLTY SH (80%): lt gy, predy sft, sme sb frm, mod fis sb blky ctngs wi f lamn, w hydrated & swelling, sm arg-sl slty tex, non calc; SLTST (20%): gy-dk gy, occ v dk gy-blk, frm, brit, occ wvy vugy lt gy silc vn ip, non calc

7350-7400 SLTY SH (60%): lt gyshbn-gyshbn, v sft w hydrated mod-hi fis water solu ctngs, sm arg-sl slty tex, sdy ip, thn



lamn, non calc; SLTST (40%): gy-dk gy, occ wvy vugy lt gy silc vn ip, frm, brit, non calc, sl calc

7400-7450 SLTY SH (65%): lt gyshbn-gyshbn, v sft w hydrated mod-hi fis water solu ctngs, sm arg-sl slty tex, sdy ip, thn lamn, non calc; SLTST (35%): gy-dk gy, occ v dk gy-blk, frm, brit, occ wvy vugy lt gy silc vn ip, non calc, sl calc

7450-7500 SLTY SH (60%): lt gyshbn-gyshbn-dk gy-dk gyshbn thn lam intbds, v sft w hydrated mod-hi fis water solu ctngs, sm arg-sl slty tex, sdy ip, non calc; SLTST (40%): gy-dk gy, occ wvy vugy lt gy silc vn ip, frm, brit, non calc, sl calc

7500-7550 SLTY SH (70%): lt gyshbn-gyshbn-dk gy-dk gyshbn thn lam intbds, v sft w hydrated mod-hi fis water solu ctngs, sm arg-sl slty tex, sdy ip, non calc; SLTST (30%): gy-dk gy, frm-brit blky-plty ctngs, sm slty tex, non calc, sl calc ip

7550-7600 SLTY SH (65%): lt gyshbn-gyshbn, v sft w hydrated mod-hi fis water solu ctngs, sm arg-sl slty tex, non calc; SLTST (35%): gy-dk gy, frm-brit blky-plty ctngs, sm slty tex, occ brn arg lamn, non calc, sl calc ip

7,610
7,620
7,630
7,640
7,650
7,660
7,670
7,680
7,690
7,700
7,710
7,720
7,730
7,740
7,750
7,760
7,770
7,780
7,790
7,800
7,810
7,820

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

150 1.5E3 1.5E4 1.5E5 1.5E6

136u

GAS (units)
1 10 100 1,000 1E4
C1-C5 (PPM)
150 1.5E3 1.5E4 1.5E5 1E6

104u

MD: 7,681'
TVD: 6,838.49'
INC: 63.15°
AZM: 18.09°
VS: -386.65'

MW IN: 9.6
VIS IN: 42
MW OUT: 9.65
VIS OUT: 40

Sharon Springs
7766 MD/6874 TVD

MD: 7,775'
TVD: 6,877.48'
INC: 67.85°
AZM: 14.4°
VS: -304.31'

WOB: 13klbs
RPM: 30
SPM: 200
SPP: 3,450psi

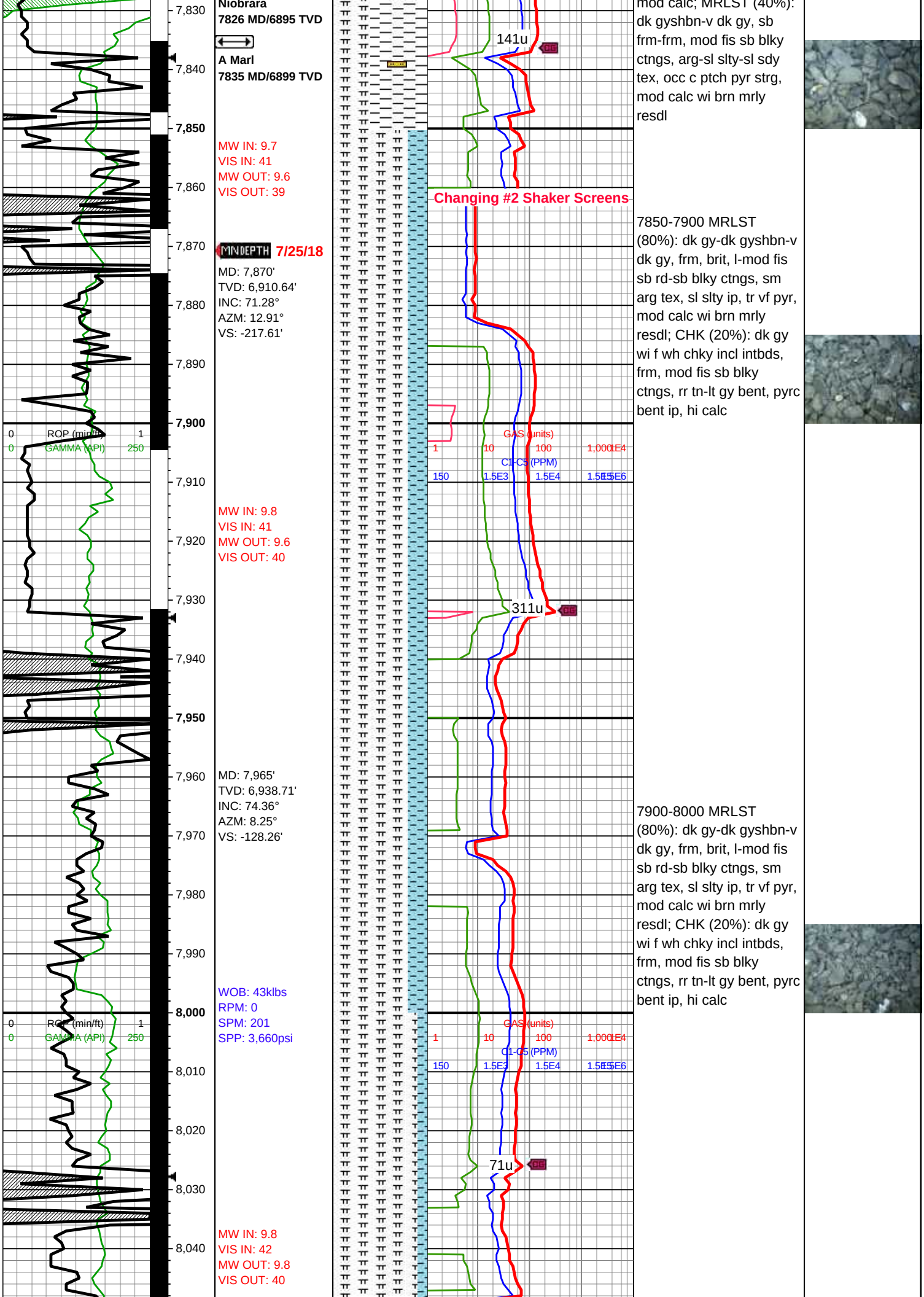
7600-7650 SLTY SH (65%): lt gyshbn-gyshbn, v sft w hydrated mod-hi fis water solu ctngs, sm arg-sl slty tex, non calc; SLTST (35%): gy-dk gy, frm-brit blky-plty ctngs, sm slty tex, occ brn arg lamn, non calc, sl calc ip

7650-7700 SLTY SH (60%):lt gy-med gy, dk gy ip, sft-med frm, mod-hi fis sb blky-tab v arg ctngs, sl slty thru, non calc; SLTST (40%): gy-dk gy, frm-sl hrd, blky-plty, slty tex, tr vf pyr, non calc, sl calc ip

7700-7750 SLTY SH (80%): lt gy, predy sft, sme sb frm, mod fis sb blky ctngs wi f lamn, w hydrated & swelling, sm arg-sl slty tex, non calc; SLTST (20%): gy-dk gy, occ v dk gy-blk, frm, brit, occ wvy vugy lt gy silc vn ip, non calc, sl calc ip

7750-7800 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

7800-7850 SLTY SH (60%): gy-gyshbn wi sp blk lith incl & rr vf pyr incl, frm, brit, sb frm ip, med-hi fis blky-tab ctngs wi wxy lstr, slty arg tex, tr tn bent-wh pyrc bent,



mod calc; MRLST (40%): dk gyshbn-v dk gy, sb frm-frm, mod fis sb blky ctngs, arg-sl slty-sl sdy tex, occ c ptch pyr strg, mod calc wi brn mrly resdl

7850-7900 MRLST (80%): dk gy-dk gyshbn-v dk gy, frm, brit, l-mod fis sb rd-sb blky ctngs, sm arg tex, sl slty ip, tr vf pyr, mod calc wi brn mrly resdl; CHK (20%): dk gy wi f wh chky incl intbds, frm, mod fis sb blky ctngs, rr tn-lt gy bent, pyrc bent ip, hi calc

7900-8000 MRLST (80%): dk gy-dk gyshbn-v dk gy, frm, brit, l-mod fis sb rd-sb blky ctngs, sm arg tex, sl slty ip, tr vf pyr, mod calc wi brn mrly resdl; CHK (20%): dk gy wi f wh chky incl intbds, frm, mod fis sb blky ctngs, rr tn-lt gy bent, pyrc bent ip, hi calc

8,050
8,060
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

MD: 8,060'
TVD: 6,960.34'
INC: 79.41°
AZM: 356.38°
VS: -35.99'

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

174u

8000-8100 MRLST (90%): dk gy-dk gyshbn-v dk gy, frm, brit, l-mod fis sb rd-sb blky ctngs, sm arg tex, sl slty ip, tr vf pyr, tr bent, mod calc wi brn mrly resdl; CHK (10%): dk gy wi f wh chky incl intbds, frm, mod fis sb blky ctngs, hi calc

MD: 8,154'
TVD: 6,975.94'
INC: 81.48°
AZM: 352.69°
VS: 56.17'

WOB: 38klbs
RPM: 31
SPM: 202
SPP: 4,180psi

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

191u

8100-8200 MRLST (80%): dk gy-dk gyshbn-v dk gy, sb frm-frm-hd, l-mod fis sb rd-sb blky ctngs, sm arg tex, sl slty tex ip, dul-wxy lstr, tr vf pyr, tr bent, mod calc wi brn mrly resdl; CHK (20%): dk gy wi f wh chky lamn & incl, frm, mod fis sb blky ctngs, hi calc

MW IN: 9.75
VIS IN: 42
MW OUT: 9.75
VIS OUT: 40

MD: 8,249'
TVD: 6,987.89'
INC: 84.07°
AZM: 354.45°
VS: 149.7'

8200-8300 MRLST (65%): 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 (35%): dk gy wi vf lt gy chky lamn & f chky incl, l-mod fis sb rd-sb blky frm-sl brit ctngs, hi calc

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
253u

8,270
8,280
8,290
8,300
8,310
8,320
8,330
8,340
8,350
8,360
8,370
8,380
8,390
8,400
8,410
8,420
8,430
8,440
8,450
8,460
8,470
8,480

MW IN: 9.75
VIS IN: 43
MW OUT: 9.75
VIS OUT: 41

MD: 8,344'
TVD: 6,994.15'
INC: 88.37°
AZM: 356.56°
VS: 244.09'

8300-8400 MRLST (50%): gyshbn-dk gyshbn, dk gy sh wi occ-com brn marl incl, occ intbdd wi f wh chky lamn, frm-brit ip mod fis sb blky-blky ctngs, sm arg-sl slty tex, mod calc wi brn mrly resdl; CHK (50%): dk gy wi vf lt gy chky lamn & f chky incl, occ intbdd wi brn marly incl, l-mod fis sb rd-sb blky frm-sl brit ctngs, hi calc

WOB: 39klbs
RPM: 31
SPM: 201
SPP: 4,110psi

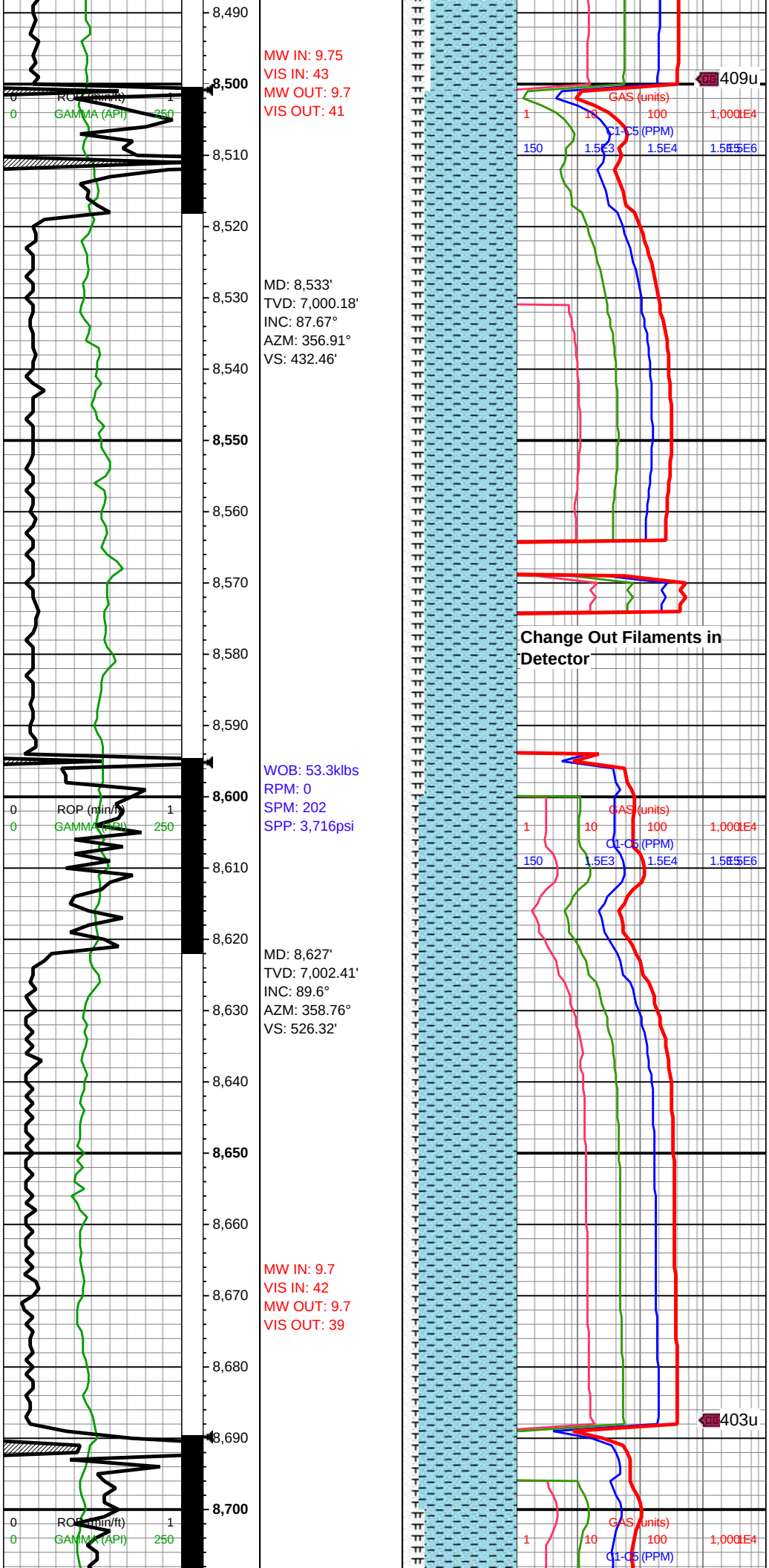
0 ROP (min/ft) 1
0 GAMMA (API) 250

GAS (units)
1 10 100 1E4
C1-C5 (PPM)
150 1.5E3 1.5E4 1.5E5 1.5E6
211u

MD: 8,438'
TVD: 6,996.86'
INC: 88.33°
AZM: 355.86°
VS: 337.78'

B Chalk
8471 MD/6998 TVD

8400-8500 CHK (75%): lt gyshbn, occ lt gy-dk gy wi occ chky incl, sft-sb frm-frm-brit, sb blky, tr vf pyr, hi calc; MRLST (25%): predy dk gy, occ



med-dk gyshbn, frm-hd-brit, sm sl slty tex, rgh tex ip, mod calc

8500-8600 CHK (80%): lt-med gy, sl brn hue ip, sb frm-frm, sb rd-sb blky, sm-sl slty tex, occ rgh tex wi rr-tr fos frags & forams, tr vf pyr, hi calc; MRLST (20%): med gy-dk gy, frm, brit, med-hi fis sb blky-sb plty ctngs, mod calc

8600-8700 CHK (85%): predy gyshbn-med gy, sme lt gy, sb blky-sb ang ctngs, fri-frm, tr intbd MRLST, sm chky tex, calc; MRLST (15%): dk gyshbn-dk gy, frm-sl hd, sb blky-ang ctngs, sl sm-rgh tex, com intbd CHK, hi calc

8,710
8,720
8,730
8,740
8,750
8,760
8,770
8,780
8,790
8,800
8,810
8,820
8,830
8,840
8,850
8,860
8,870
8,880
8,890
8,900
8,910
8,920

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

MD: 8,722'
TVD: 7,002.78'
INC: 89.96°
AZM: 2.54°
VS: 621.3'

WOB: 40.9klbs
RPM: 61
SPM: 202
SPP: 4,403psi

MD: 8,817'
TVD: 7,002.85'
INC: 89.96°
AZM: 2.97°
VS: 716.23'

MD: 8,911'
TVD: 7,002.49'
INC: 90.48°
AZM: 3.5°
VS: 810.13'

150 1.5E3 1.5E4 1.5E5 1.5E6

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

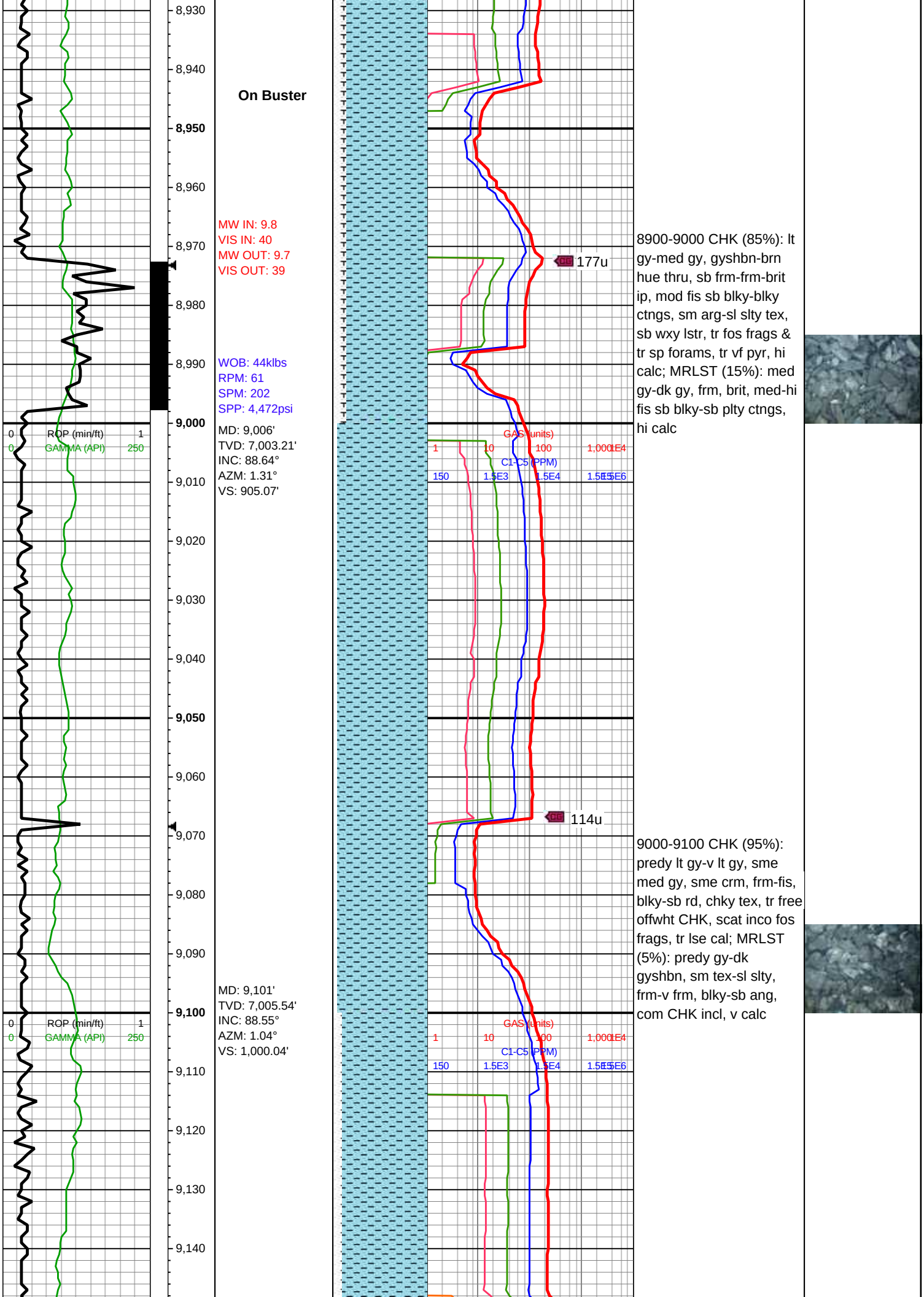
C1-C5 (PPM)
150 1.5E3 1.5E4 1.5E5 1.5E6

203u

8700-8800 CHK (80%): pred lt-med gry wi lt brn, sme sl med gy-brn, frm-sl brit, sb blky, sl sft ip, v calc, rr fos incl, tr pyr, scat cal vns; MRLST (20%): v dk gy-blk, occ gyshbn, frm-v frm, blky, calc, sl rgh tex

384u

8800-8900 CHK (80%): med gy-gyshbn, sb blky ctngs, fri-frm, tr MRLST intbd, sm chky tex, v calc; MRLST (20%): dk gyshbn-dk gy, frm-sl hd, sb blky-ang ctngs, sl sm tex-rgh ip, com CHK intbd, hi calc, tr dissm mic pyr



8900-9000 CHK (85%): lt gy-med gy, gyshbn-brn hue thru, sb frm-frm-brit ip, mod fis sb blky-blky ctngs, sm arg-sl slty tex, sb wxy lstr, tr fos frags & tr sp forams, tr vf pyr, hi calc; MRLST (15%): med gy-dk gy, frm, brit, med-hi fis sb blky-sb plty ctngs, hi calc

9000-9100 CHK (95%): predy lt gy-v lt gy, sme med gy, sme crm, frm-fis, blky-sb rd, chky tex, tr free offwht CHK, scat inco fos frags, tr lse cal; MRLST (5%): predy gy-dk gyshbn, sm tex-sl slty, frm-v frm, blky-sb ang, com CHK incl, v calc

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

9,150
9,160
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

MD: 9,195'
TVD: 7,007.92'
INC: 88.55°
AZM: 0.78°
VS: 1,094'

WOB: 40.7klbs
RPM: 61
SPM: 204
SPP: 4,524psi

MD: 9,290'
TVD: 7,010'
INC: 88.95°
AZM: 0.6°
VS: 1,188.98'

MW IN: 9.8
VIS IN: 42

339u

GAS (units)
1 10 100 1,000 1E4
C1-C5 (PPM)
150 1.5E3 1.5E4 1.5E5 1.5E6

9100-9200 CHK (90%): med gy, gyshbn, sb tab ctngs, frm, brit, tr vf lam, hi calc, scat inoc fos frags; MRLST (10%): dk gy, dk gyshbn, sb tab-blky ctngs, brit, sl hd, tr CHK intbds, tr pp mic pyr, mod calc, scat lse cal

398u

9200-9300 CHK (75%): med brn-gyshbn, sb blky-tab ctngs, mod fis, frm-brit, tr mic pyr, sm-chky tex, hi calc, scat frac fl & lse cal; MRLST (25%): dk gy-dk gyshbn, mot dk brn, ang-sb blky, frm-brit, mod fis, sl sm-sl slty tex, mod calc, tr imbd mic pyr

Change Out Bubble Jar

235u

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

MD: 9,384'
TVD: 7,011.79'
INC: 88.86°
AZM: 0.43°
VS: 1,282.96'

WOB: 39.8klbs
RPM: 61
SPM: 204
SPP: 4,530psi

MD: 9,479'
TVD: 7,013.42'
INC: 89.17°
AZM: 0.07°
VS: 1,377.95'

MD: 9,574'
TVD: 7,014.69'
INC: 89.3°
AZM: 359.46°
VS: 1,472.93'

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

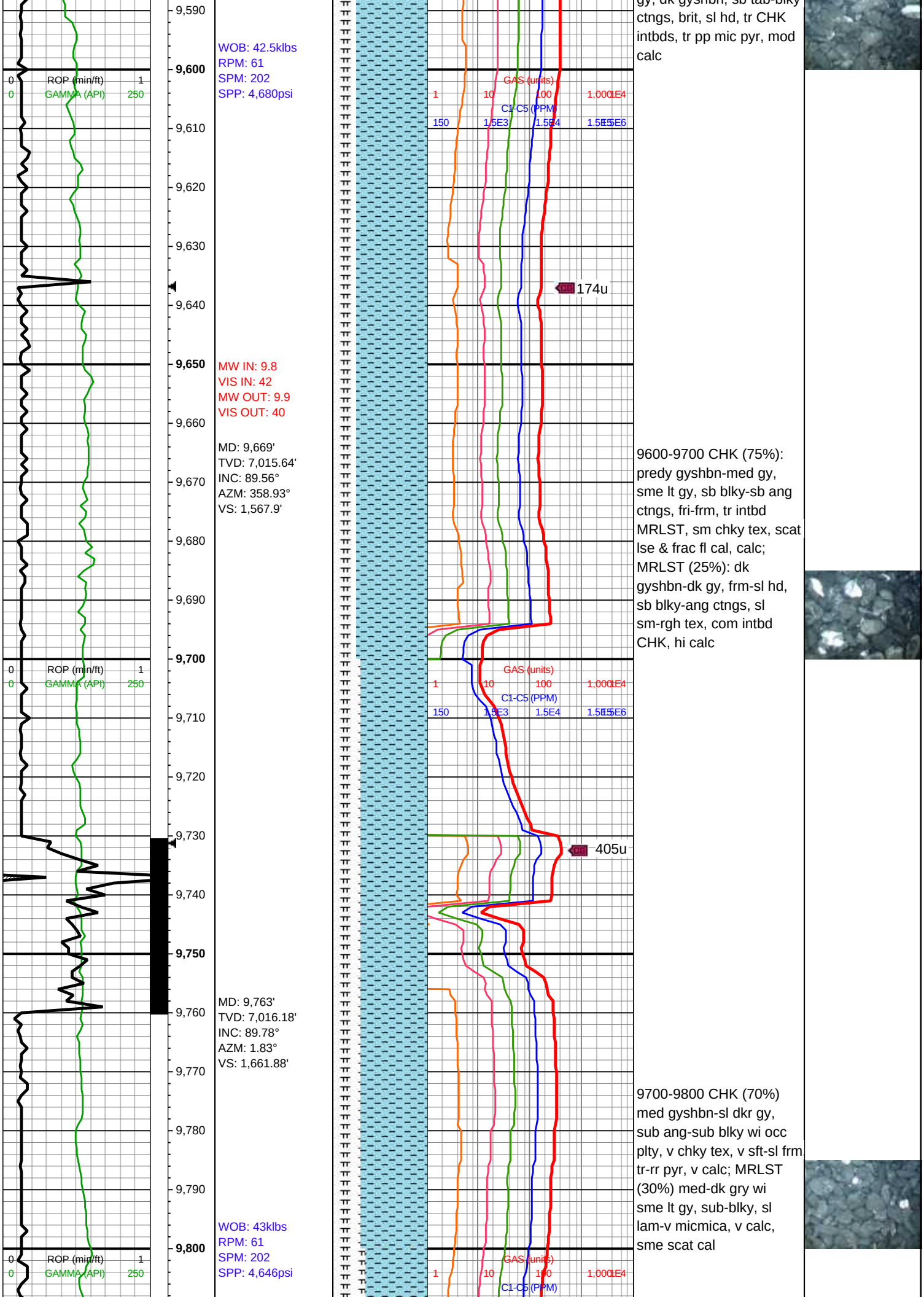
GAS (units)
1 10 100 1,000 1E4
C1-C5 (PPM)
150 1.5E3 1.5E4 1.5E5 1.5E6

396u

10500-10600 CHK (70%): med gy-gyshbn, ang-sub blky, sme plty, frm-sub brit, v calc, tr pyr; MRLST (30%) sl med-dk gry, gran, blky-sub ang, hrd, calc- v calc, micmica, tr lse cal

9400-9500 CHK (65%) med gyshbn-sl dkr gy, sub ang-sub blky wi occ plty, v chky tex, v sft-sl frm, tr-rr pyr, v calc; MRLST (35%) med-dk gry wi sme lt gy, sub-blky, sl lam-v micmica, v calc, sme scat cal

9600-9700 CHK (75%): med gy, gyshbn, sb tab ctngs, frm, brit, tr vf lam, hi calc, scat inoc fos frags; MRLST (25%): dk gy, dk gyshbn, sb tab-blky



WOB: 42.5klbs
RPM: 61
SPM: 202
SPP: 4,680psi

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

MD: 9,669'
TVD: 7,015.64'
INC: 89.56°
AZM: 358.93°
VS: 1,567.9'

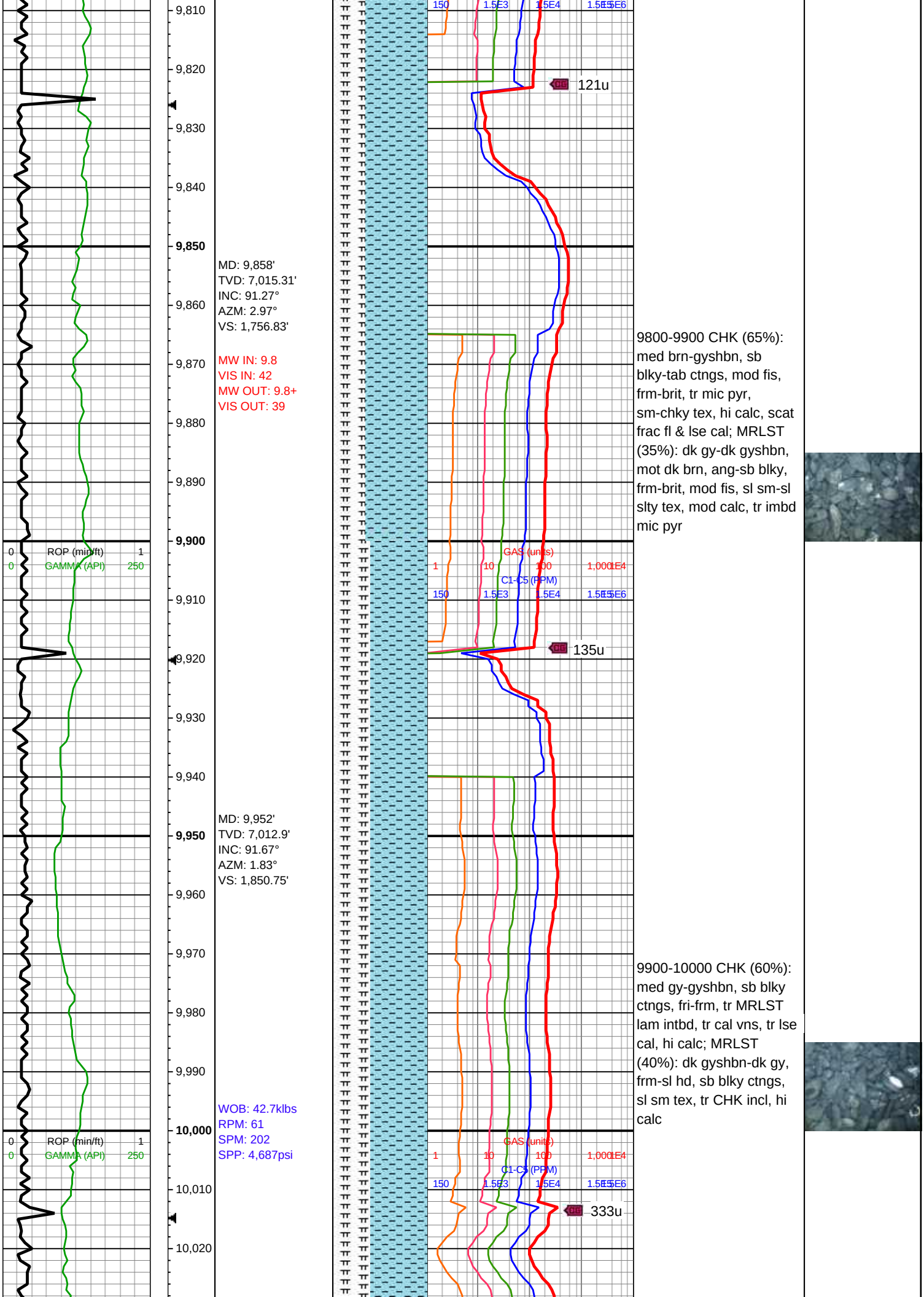
MD: 9,763'
TVD: 7,016.18'
INC: 89.78°
AZM: 1.83°
VS: 1,661.88'

WOB: 43klbs
RPM: 61
SPM: 202
SPP: 4,646psi

gy, dk gyshbn, sb tab-blky ctngs, brit, sl hd, tr CHK intbds, tr pp mic pyr, mod calc

9600-9700 CHK (75%): predy gyshbn-med gy, sme lt gy, sb blky-sb ang ctngs, fri-frm, tr intbd MRLST, sm chky tex, scat lse & frac fl cal, calc; MRLST (25%): dk gyshbn-dk gy, frm-sl hd, sb blky-ang ctngs, sl sm-rgh tex, com intbd CHK, hi calc

9700-9800 CHK (70%) med gyshbn-sl dkr gy, sub ang-sub blky wi occ plty, v chky tex, v sft-sl frm, tr-rr pyr, v calc; MRLST (30%) med-dk gry wi sme lt gy, sub-blky, sl lam-v micmica, v calc, sme scat cal



9800-9900 CHK (65%): med brn-gyshbn, sb blky-tab ctngs, mod fis, frm-brit, tr mic pyr, sm-chky tex, hi calc, scat frac fl & lse cal; MRLST (35%): dk gy-dk gyshbn, mot dk brn, ang-sb blky, frm-brit, mod fis, sl sm-sl slty tex, mod calc, tr imbd mic pyr

9900-10000 CHK (60%): med gy-gyshbn, sb blky ctngs, fri-frm, tr MRLST lam intbd, tr cal vns, tr lse cal, hi calc; MRLST (40%): dk gyshbn-dk gy, frm-sl hd, sb blky ctngs, sl sm tex, tr CHK incl, hi calc

10,030
10,040
MD: 10,047'
TVD: 7,009.25'
INC: 92.73°
10,050 AZM: 1.22°
VS: 1,945.66'
10,060
10,070
10,080
10,090
10,100
0 ROP (min/ft) 1
0 GAMMA (API) 250
MW IN: 9.8+
VIS IN: 42
10,110 MW OUT: 9.9
VIS OUT: 40
10,120
10,130
MD: 10,142'
10,140 TVD: 7,005.75'
INC: 91.49°
AZM: 2.62°
10,150 VS: 2,040.57'
10,160
10,170
10,180
10,190
WOB: 42klbs
RPM: 61
10,200 SPM: 204
SPP: 4,640psi
0 ROP (min/ft) 1
0 GAMMA (API) 250
10,210
MW IN: 9.8
VIS IN: 41
10,220 MW OUT: 9.8
VIS OUT: 39
10,230
MD: 10,236'
TVD: 7,006.22'
INC: 87.94°
AZM: 1.57°
10,240 VS: 2,134.52'

GAS (units)
1 10 100 1,000 1E4
C1-C5 (PPM)
150 1.5E3 1.5E4 1.5E5 1.5E6
597u

GAS (units)
1 10 100
512u
C1-C5 (PPM)
150 1.5E3 1.5E4 1.5E5 1.5E6

10000-10100 CHK (60%): med gy, gyshbn, sb tab ctngs, frm, brit, tr vf lam, hi calc, scat inoc fos frags; MRLST (40%): dk gy, dk gyshbn, sb tab-blky ctngs, brit, sl hd, tr CHK intbds, tr pp mic pyr, mod calc, scat lse cal

10100-10200 CHK (70%): predy gyshbn-lt gy, mot, scat offwht, sb blky-sb ang ctngs, fri-frm, sm chky tex, com inoc fos frags, calc; MRLST (30%): 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

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

10,250
10,260
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

MD: 10,331'
TVD: 7,010.33'
INC: 87.1°
AZM: 1.39°
VS: 2,229.42'

WOB: 52.2klbs
RPM: 0
SPM: 202
SPP: 4,115psi

MD: 10,425'
TVD: 7,013'
INC: 89.65°
AZM: 1.04°
VS: 2,323.37'

MW IN: 9.8+
VIS IN: 42
MW OUT: 9.8+
VIS OUT: 39

GAS (units)
1 10 100 1,000 1E4
C1-C5 (PPM)
150 1.5E3 1.5E4 1.5E5 1.5E6

586u

572u

10200-10300 CHK (75%): med gy-sl gyshbn, sme lt gy-offwht, sb blky-sb plty med fis ctngs, frm, occ-com fos frags, scat foram, tr vf-uf pyr, hi calc; MRLST (25%): dk gyshbn-dk gy, frm-sl hd-brit, mod calc, tr CHK incl

10300-10400 CHK (70%); pred lt gy-gyshbn wi occ offwht-crm, 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

10400-10500 CHK

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

10,470
10,480
10,490
10,500
10,510
10,520
10,530
10,540
10,550
10,560
10,570
10,580
10,590
10,600
10,610
10,620
10,630
10,640
10,650
10,660
10,670
10,680

MD: 10,520'
TVD: 7,013.54'
INC: 89.69°
AZM: 0.6°
VS: 2,418.36'

WOB: 41.7klbs
RPM: 61
SPM: 202
SPP: 4,773psi

MD: 10,614'
TVD: 7,013.44'
INC: 90.44°
AZM: 0.34°
VS: 2,512.36'

MW IN: 9.8
VIS IN: 41
MW OUT: 9.9
VIS OUT: 39

GAS (units)
1 10 100 1,000 1E4
C1-C5 (PPM)
150 1.5E3 1.5E4 1.5E5 1.5E6

568u

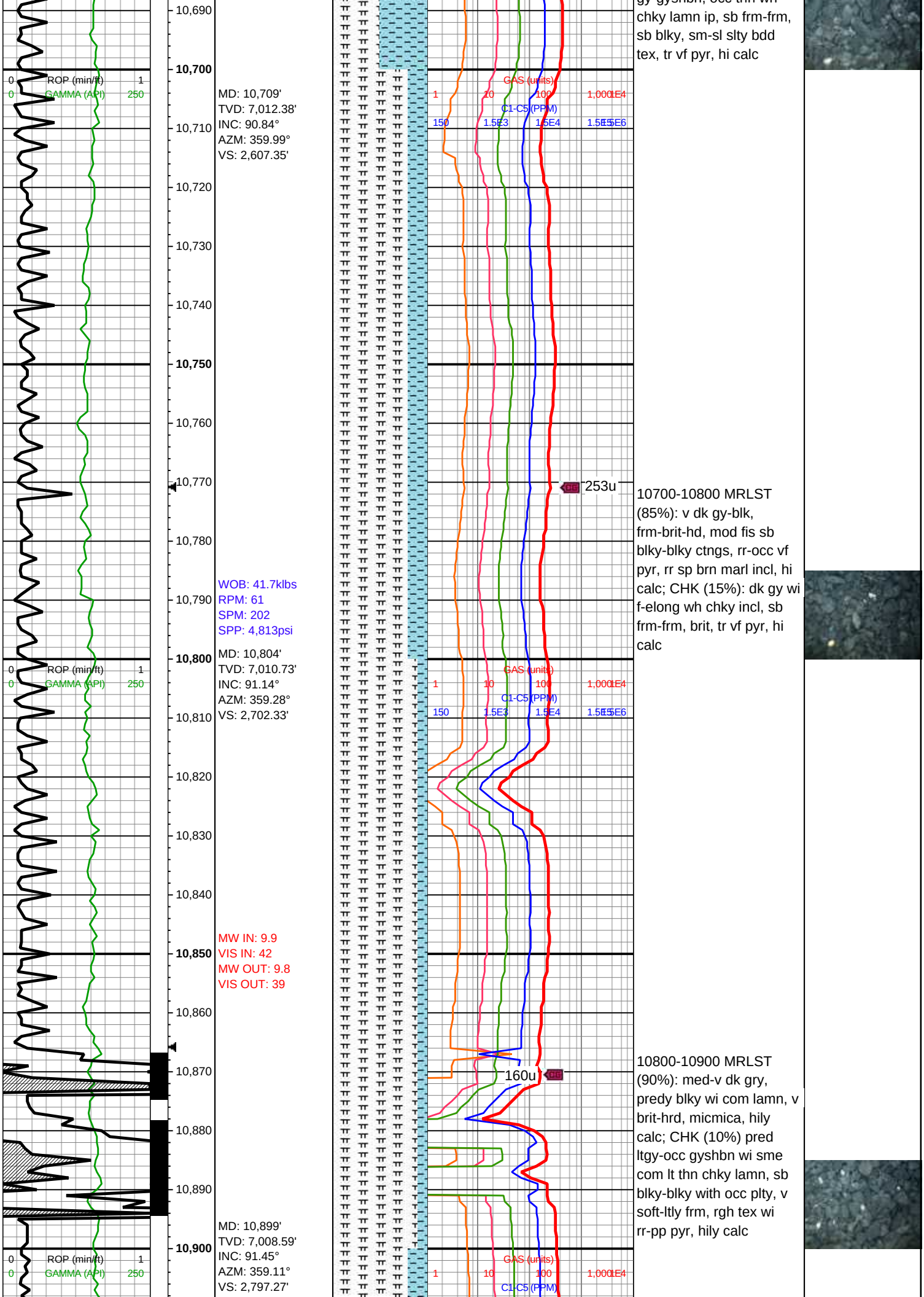
(70%): lt-med gy, occ dk gy wi f wh chky incl, frm-brit, l-mod sb rd-sb blky-blky ctngs, sm arg-sl slty tex, rr-occ tn bent, tr acic fos frags, tr vf pyr, hi calc; MRLST (30%): med gy-dk gy, frm, brit, hi fis blky-sb plty ctngs, mod calc

599u

10500-10600 CHK (60%): med gy wi sl brn hue, ang-sb plty ctngs, frm-hd wi sl rgh tex, rr calc fos frags & rr chky forams, rr-occ pyr; MRLST (40%) med gy-gyshbn, blky-sub plty, frm-sl brit, tr-rr vf-f pyr

356u

10600-10700 MRLST (50%): med gy-dk gy, frm, brit, med-hi fis sb blky-sb plty ctngs, mod calc; CHK (50%): predy med gy-gyshbn, occ thn wh


ROP (min/ft)
GAMMA (API)
GAS (units)
C1-C5 (PPM)
10,690
10,700
10,710
10,720
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
MD: 10,709'
TVD: 7,012.38'
INC: 90.84°
AZM: 359.99°
VS: 2,607.35'
WOB: 41.7klbs
RPM: 61
SPM: 202
SPP: 4,813psi
MD: 10,804'
TVD: 7,010.73'
INC: 91.14°
AZM: 359.28°
VS: 2,702.33'
MW IN: 9.9
VIS IN: 42
MW OUT: 9.8
VIS OUT: 39
MD: 10,899'
TVD: 7,008.59'
INC: 91.45°
AZM: 359.11°
VS: 2,797.27'
253u
160u
chky lamn ip, sb frm-frm, sb blky, sm-sl slty bdd tex, tr vf pyr, hi calc
10700-10800 MRLST (85%): v dk gy-blk, frm-brit-hd, mod fis sb blky-blky ctngs, rr-occ vf pyr, rr sp brn marl incl, hi calc; CHK (15%): dk gy wi f-elong wh chky incl, sb frm-frm, brit, tr vf pyr, hi calc
10800-10900 MRLST (90%): med-v dk gry, predy blky wi com lamn, v brit-hrd, micmica, hily calc; CHK (10%) pred ltgy-occ gyshbn wi sme com lt thn chky lamn, sb blky-blky with occ plty, v soft-ltly frm, rgh tex wi rr-pp pyr, hily calc

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

MD: 10,994'
TVD: 7,007.49'
INC: 89.87°
AZM: 358.93°
VS: 2,892.23'

WOB: 35klbs
RPM: 61
SPM: 203
SPP: 4,630psi

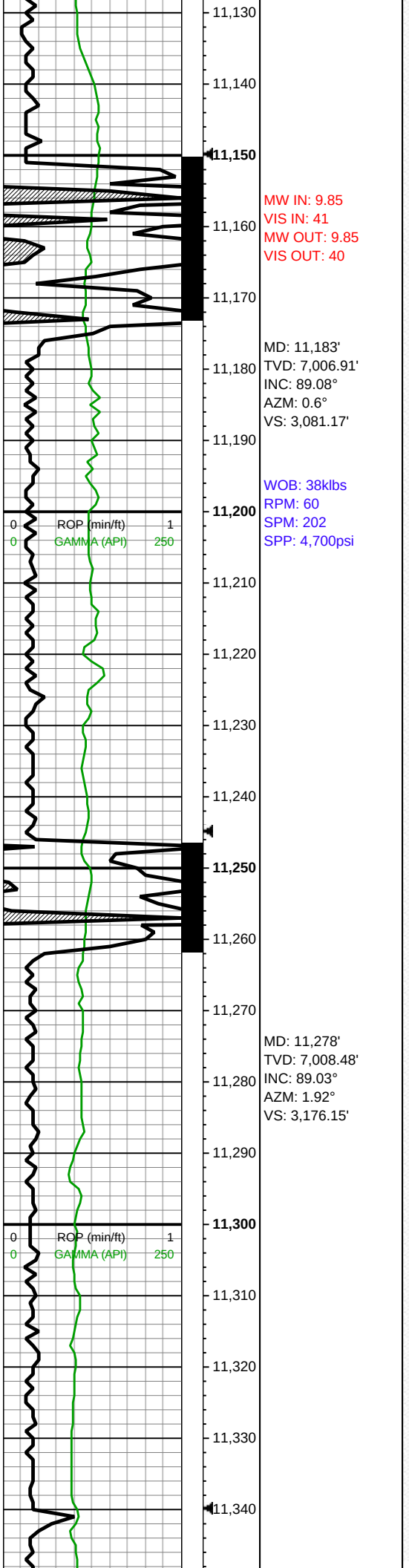
MD: 11,088'
TVD: 7,006.88'
INC: 90.88°
AZM: 358.93°
VS: 2,986.19'

309u

395u

10900-11000 MRLST (80%): dk gy-v dk gy, frm-hd, mod fis sb blky-blky-ireg blky ctngs, sl slty-bumpy text, rr brn marl incl, mod calc wi brn mrly resdl; CHK (20%): dk gy wi f wh chky lamn, frm-brit sb rd-sb blky mod fis ctngs, tr pyr strg, hi calc

11000-11100 MRLST (50%): dk gy-v dk gy, frm-hd, mod fis sb blky-blky-ireg blky ctngs, sl slty-bumpy text, rr brn marl incl, mod calc wi brn mrly resdl; CHK (50%): dk gy wi f wh chky lamn, frm-brit sb rd-sb blky mod fis ctngs, tr pyr strg, hi calc

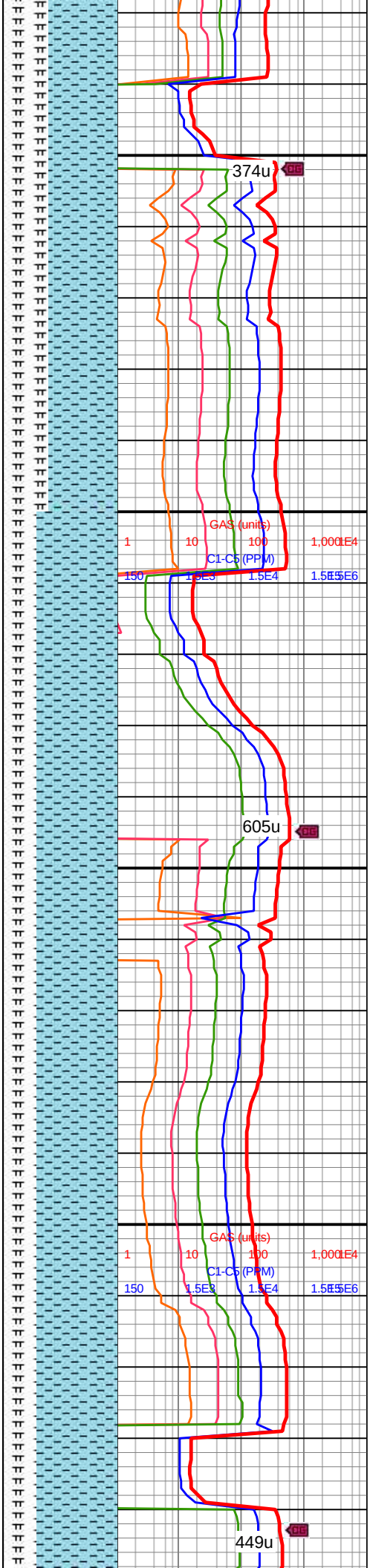


MW IN: 9.85
VIS IN: 41
MW OUT: 9.85
VIS OUT: 40

MD: 11,183'
TVD: 7,006.91'
INC: 89.08°
AZM: 0.6°
VS: 3,081.17'

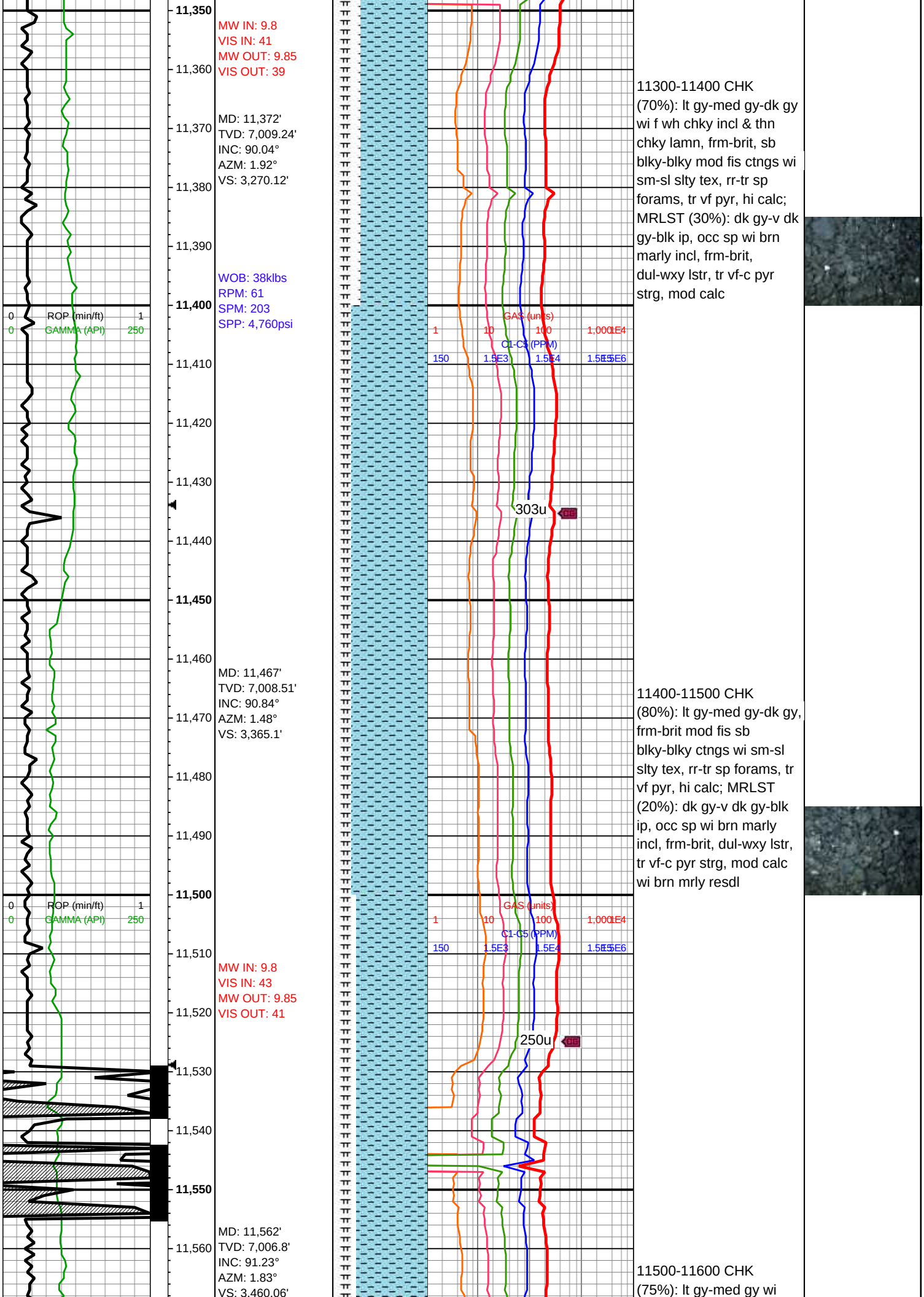
WOB: 38klbs
RPM: 60
SPM: 202
SPP: 4,700psi

MD: 11,278'
TVD: 7,008.48'
INC: 89.03°
AZM: 1.92°
VS: 3,176.15'



11100-11200 CHK (60%): gy-dk gy wi occ f wh chky incl & v thn chky lamn, frm-brit sb rd-sb blky mod fis ctngs, dul rthy-o tex, rr-occ forams, rr fos frags, tr vf-c pyr strg, hi calc; MRLST (40%): dk gy-v dk gy spec wi brn mrly incl ip, frm-hd mod fis sb blky-blky ctngs, sl slty-bumpy text, rr-tr bent, mod calc wi brn mrly resdl

11200-11300 CHK (70%): gy-dk gy wi occ f wh chky incl, frm-brit sb rd-sb blky mod fis ctngs, rr-occ forams, rr fos frags, slty-bumpy tex wi f wh intbdd chky lamn ip, hi calc; MRLST (30%): dk gy-v dk gy-dk gyshbn sh wi occ brn mrly incl, frm-hd, sb blky-blky mod fis ctngs, sl slty tex, rr-tr tn bent, tr vf-c pyr strg, mod calc wi brn mrly resdl



MW IN: 9.8
VIS IN: 41
MW OUT: 9.85
VIS OUT: 39

MD: 11,372'
TVD: 7,009.24'
INC: 90.04°
AZM: 1.92°
VS: 3,270.12'

WOB: 38klbs
RPM: 61
SPM: 203
SPP: 4,760psi

11300-11400 CHK (70%): lt gy-med gy-dk gy wi f wh chky incl & thn chky lamn, frm-brit, sb blky-blky mod fis ctngs wi sm-sl slty tex, rr-tr sp forams, tr vf pyr, hi calc; MRLST (30%): dk gy-v dk gy-blk ip, occ sp wi brn marly incl, frm-brit, dul-wxy lstr, tr vf-c pyr strg, mod calc

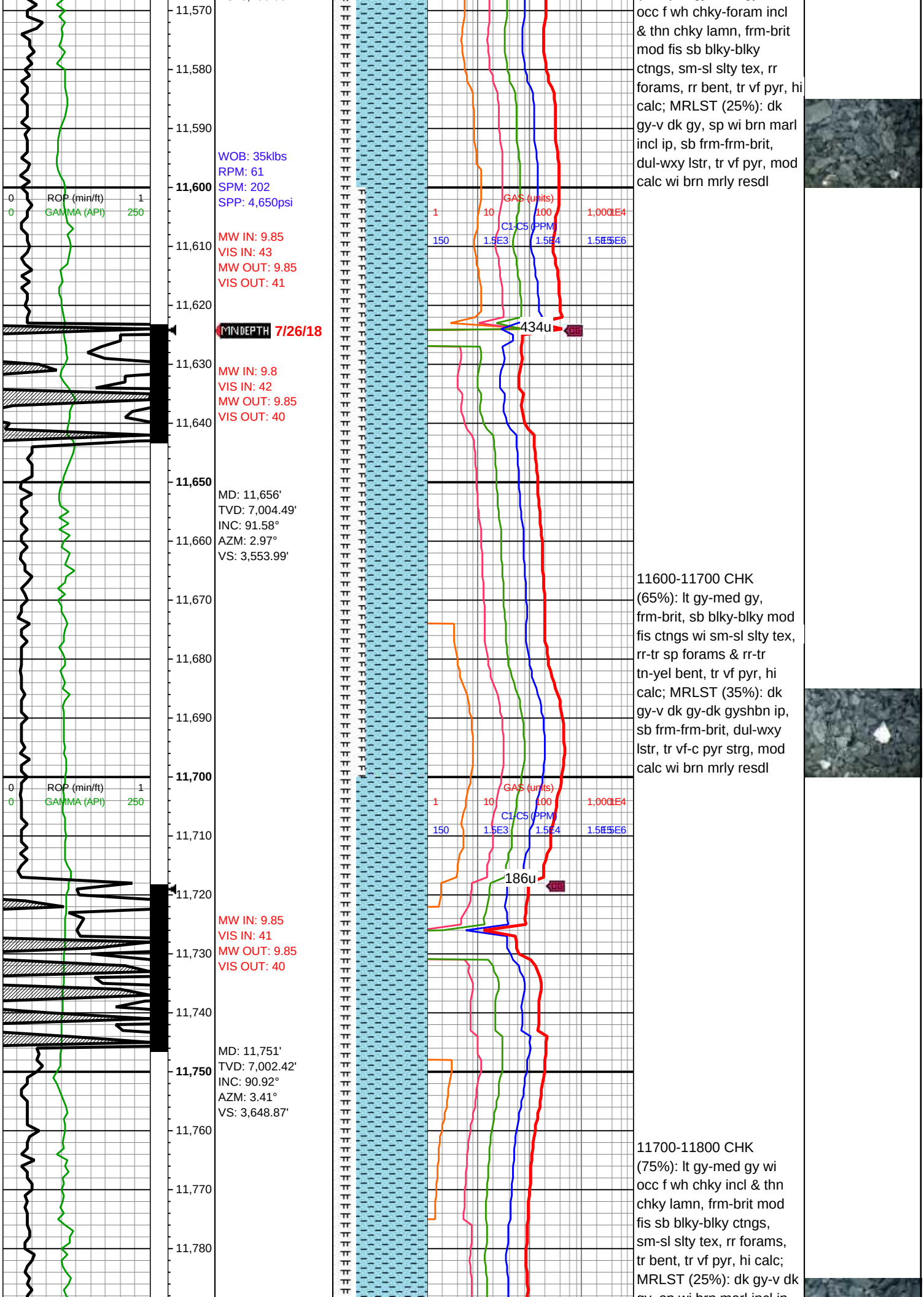
MD: 11,467'
TVD: 7,008.51'
INC: 90.84°
AZM: 1.48°
VS: 3,365.1'

11400-11500 CHK (80%): lt gy-med gy-dk gy, frm-brit mod fis sb blky-blky ctngs wi sm-sl slty tex, rr-tr sp forams, tr vf pyr, hi calc; MRLST (20%): dk gy-v dk gy-blk ip, occ sp wi brn marly incl, frm-brit, dul-wxy lstr, tr vf-c pyr strg, mod calc wi brn mrly resdl

MW IN: 9.8
VIS IN: 43
MW OUT: 9.85
VIS OUT: 41

MD: 11,562'
TVD: 7,006.8'
INC: 91.23°
AZM: 1.83°
VS: 3,460.06'

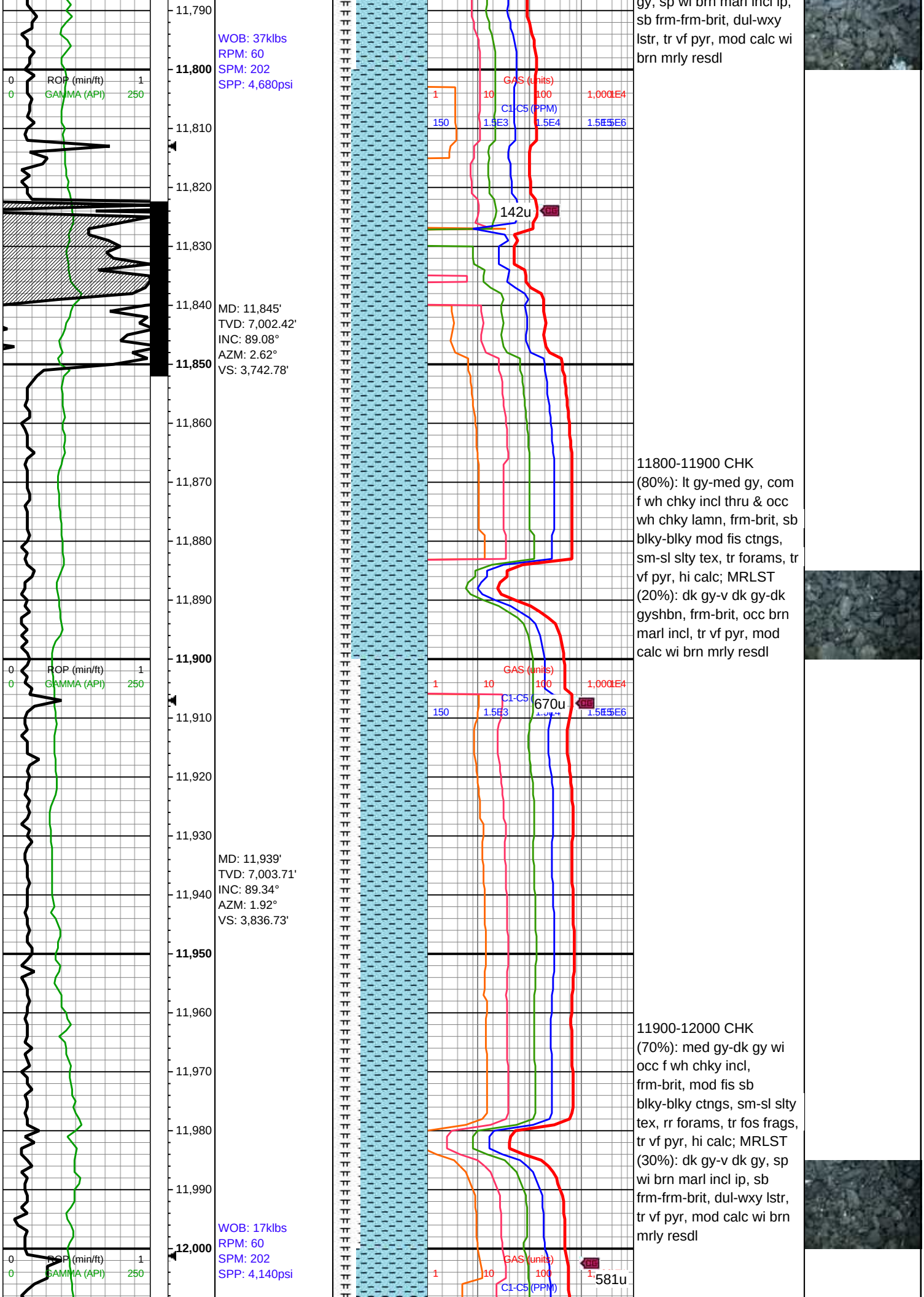
11500-11600 CHK (75%): lt gy-med gy wi



occ f wh chky-foram incl & thn chky lamn, frm-brit mod fis sb blky-blky ctngs, sm-sl slty tex, rr forams, rr bent, tr vf pyr, hi calc; MRLST (25%): dk gy-v dk gy, sp wi brn marl incl ip, sb frm-frm-brit, dul-wxy lstr, tr vf pyr, mod calc wi brn mrly resdl

11600-11700 CHK (65%): lt gy-med gy, frm-brit, sb blky-blky mod fis ctngs wi sm-sl slty tex, rr-tr sp forams & rr-tr tn-yel bent, tr vf pyr, hi calc; MRLST (35%): dk gy-v dk gy-dk gyshbn ip, sb frm-frm-brit, dul-wxy lstr, tr vf-c pyr strg, mod calc wi brn mrly resdl

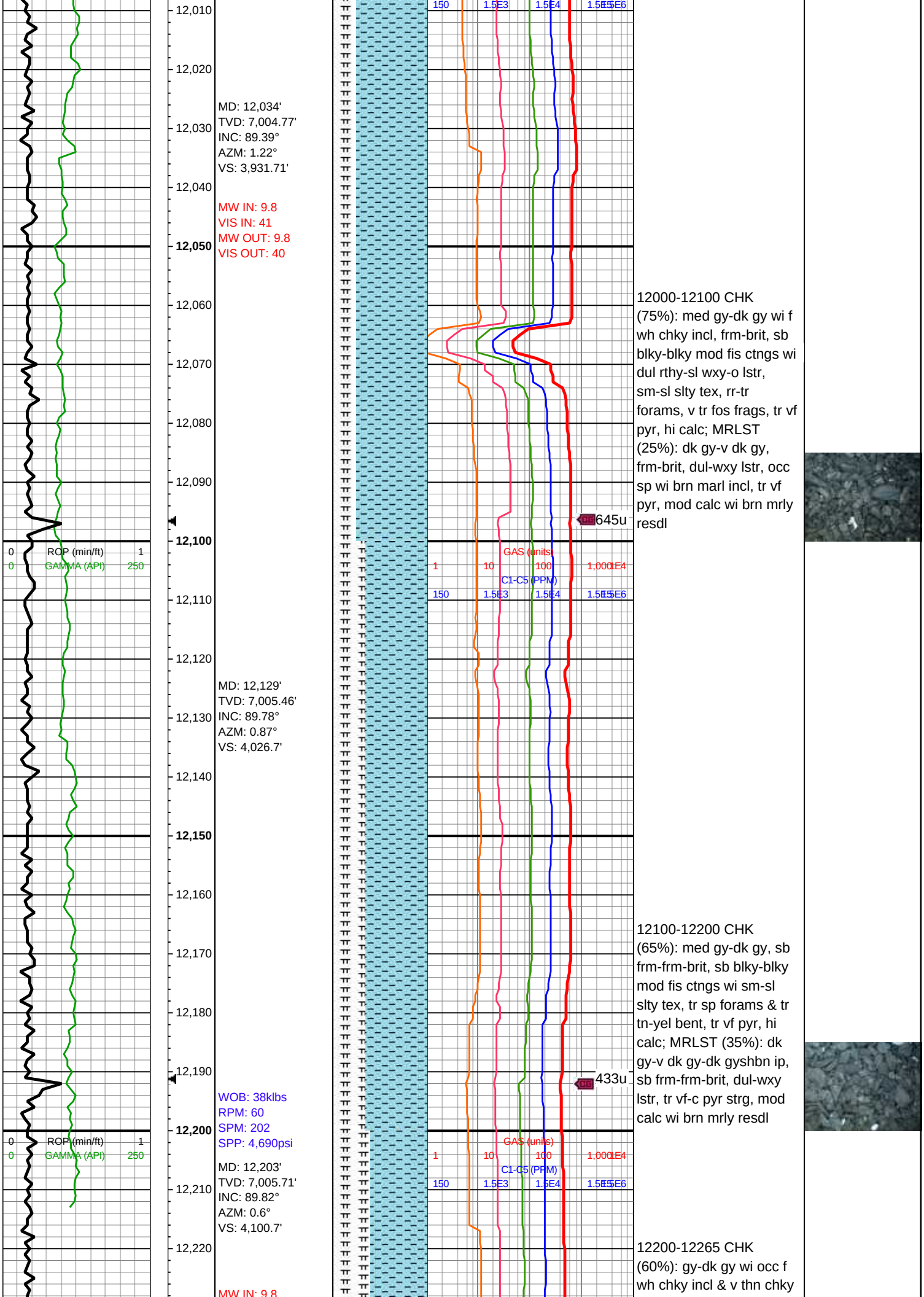
11700-11800 CHK (75%): lt gy-med gy wi occ f wh chky incl & thn chky lamn, frm-brit mod fis sb blky-blky ctngs, sm-sl slty tex, rr forams, tr bent, tr vf pyr, hi calc; MRLST (25%): dk gy-v dk

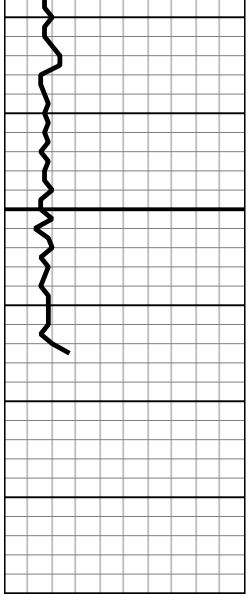


gy, sp wi brn marl incl ip, sb frm-frm-brit, dul-wxy lstr, tr vf pyr, mod calc wi brn mrly resdl

11800-11900 CHK (80%): lt gy-med gy, com f wh chky incl thru & occ wh chky lamn, frm-brit, sb blky-blky mod fis ctngs, sm-sl slty tex, tr forams, tr vf pyr, hi calc; MRLST (20%): dk gy-v dk gy-dk gyshbn, frm-brit, occ brn marl incl, tr vf pyr, mod calc wi brn mrly resdl

11900-12000 CHK (70%): med gy-dk gy wi occ f wh chky incl, frm-brit, mod fis sb blky-blky ctngs, sm-sl slty tex, rr forams, tr fos frags, tr vf pyr, hi calc; MRLST (30%): dk gy-v dk gy, sp wi brn marl incl ip, sb frm-frm-brit, dul-wxy lstr, tr vf pyr, mod calc wi brn mrly resdl


12,010
12,020
12,030
12,040
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
MD: 12,034'
TVD: 7,004.77'
INC: 89.39°
AZM: 1.22°
VS: 3,931.71'
MW IN: 9.8
VIS IN: 41
MW OUT: 9.8
VIS OUT: 40
MD: 12,129'
TVD: 7,005.46'
INC: 89.78°
AZM: 0.87°
VS: 4,026.7'
WOB: 38klbs
RPM: 60
SPM: 202
SPP: 4,690psi
MD: 12,203'
TVD: 7,005.71'
INC: 89.82°
AZM: 0.6°
VS: 4,100.7'
MW IN: 9.8
0 ROP (min/ft) 1
0 GAMMA (API) 250
0 ROP (min/ft) 1
0 GAMMA (API) 250
150 1.5E3 1.5E4 1.5E5 1.5E6
GAS (units)
1 10 100 1,000 1E4
C1-C5 (PPM)
150 1.5E3 1.5E4 1.5E5 1.5E6
645u
433u
12000-12100 CHK (75%): med gy-dk gy wi f wh chky incl, frm-brit, sb blky-blky mod fis ctngs wi dul rthy-sl wxy-o lstr, sm-sl slty tex, rr-tr forams, v tr fos frags, tr vf pyr, hi calc; MRLST (25%): dk gy-v dk gy, frm-brit, dul-wxy lstr, occ sp wi brn marl incl, tr vf pyr, mod calc wi brn mrly resdl
12100-12200 CHK (65%): med gy-dk gy, sb frm-frm-brit, sb blky-blky mod fis ctngs wi sm-sl slty tex, tr sp forams & tr tn-yel bent, tr vf pyr, hi calc; MRLST (35%): dk gy-v dk gy-dk gyshbn ip, sb frm-frm-brit, dul-wxy lstr, tr vf-c pyr strg, mod calc wi brn mrly resdl
12200-12265 CHK (60%): gy-dk gy wi occ f wh chky incl & v thn chky



12,230
VIS IN: 41
MW OUT: 9.8
VIS OUT: 40

12,240

12,250

Bit Projection
MD: 12,265'
TVD: 7,005.91'
INC: 89.82°
AZM: 0.6°
VS: 4,162.7'

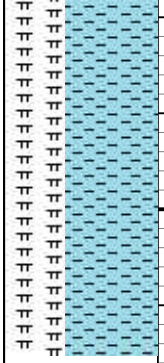
12,260

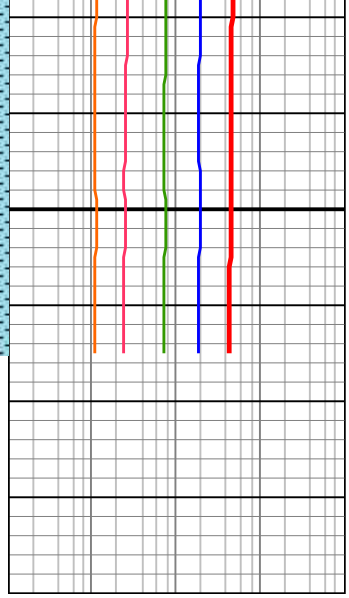
12,270

Reach TD @ 04:25 hrs on 6/26/18

12,280

12,290





lamn, sb frm-frm-brit sb rd-sb blky mod fis ctngs, dul rthy-o tex, rr-occ forams, tr vf-c pyr strg, hi calc; MRLST (40%): dk gy-v dk gy spec wi brn mrly incl ip, frm-hd mod fis sb blky-blky ctngs, sl slty-bumpy text, rr-tr bent, mod calc wi brn mrly resdl