



## RESERVOIR GROUP

Scale: 5" / 100'  
Measured Depth Log

**Well Name** BEF West 17

**Location** Section 2, Township 1S, Range 66W

**State** Colorado

**County** Adams

**Country** USA

**Rig Number** True 33

**API Number** 05-001-10223

**AFE #** 10223

**Geographic Region** Rockies

**Field** Wattenberg

**Spud Date** 12/24/2018

**Drilling Completed** 1/26/2018

**Surface Coordinates** 2120' FNL & 321' FEL, Sec. 2, T1S, R66W

Latitude: 39.99472, Longitude: -104.7347

**Bottom Hole Coordinates** 1349' FNL & 460' FWL, Sec. 2, T1S, R66W

**Ground Elevation** 5,049'

**K.B. Elevation** 5,076'

**Logged Interval** 7,450 To 12,267'

**Total Depth** 12,267'

**Formation** Niobrara C

**Type of Drilling Fluid** Water Based Mud

### Operator

**Company** Petro Operating Company, LLC

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

**Petro Operating  
Company, LLC**

### Geologist

**Name** Michael Domenick

**Company** Petro Operating Company, LLC

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

**Petro Operating  
Company, LLC**

Other

Loggers: Byron Pitulski/Greg Diefenbach  
Services Provided: 2 Man Logging, Geosteering  
Equipment: ML-585  
Start Date 01/23/2018  
Release Date: 01/26/2018  
Job #: 1855RK1812

Zone Color Coding

Oil

Note

Error

Condensate

Core

Water

Gas

Pressure

Seal

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

Acc

F FOSSIL

GASTROPOD

ARGILLITE GRA

ALGAE

OOLITE

BENTONITE

BITUMENOUS S

BRECCIA FRAG

CALCAREOUS

CARBONACEO

CHTKD

CHTLT

COAL - THIN BE

DOLOMITIC

FELDSPAR

FERRUGINOUS

FERRUGINOUS

FORAMINIFERA

ANHYDRITIC

ARGILLITE GRA

BENTONITE

BITUMENOUS S

BRECCIA FRAG

CALCAREOUS

CARBONACEO

CHTKD

CHTLT

COAL - THIN BE

DOLOMITIC

FELDSPAR

FERRUGINOUS

FERRUGINOUS

FORAMINIFERA

ANHYDRITIC

Other

OIL SHOW

DEAD

EVEN

QUESTIONABLE

SPOTTED STAINING

BIT

CASING

CONNECTION (LEFT)

CONNECTION (RIGHT)

CONNECTION GAS

CORE - LOST

CORE - RECOVERED

DST INTERVAL

FAULT

MOLDIC

ORGANIC

PINPOINT

VUGGY

ENGINEERING

BIT

CASING

CONNECTION (LEFT)

CONNECTION (RIGHT)

CONNECTION GAS

CORE - LOST

CORE - RECOVERED

DST INTERVAL

FAULT

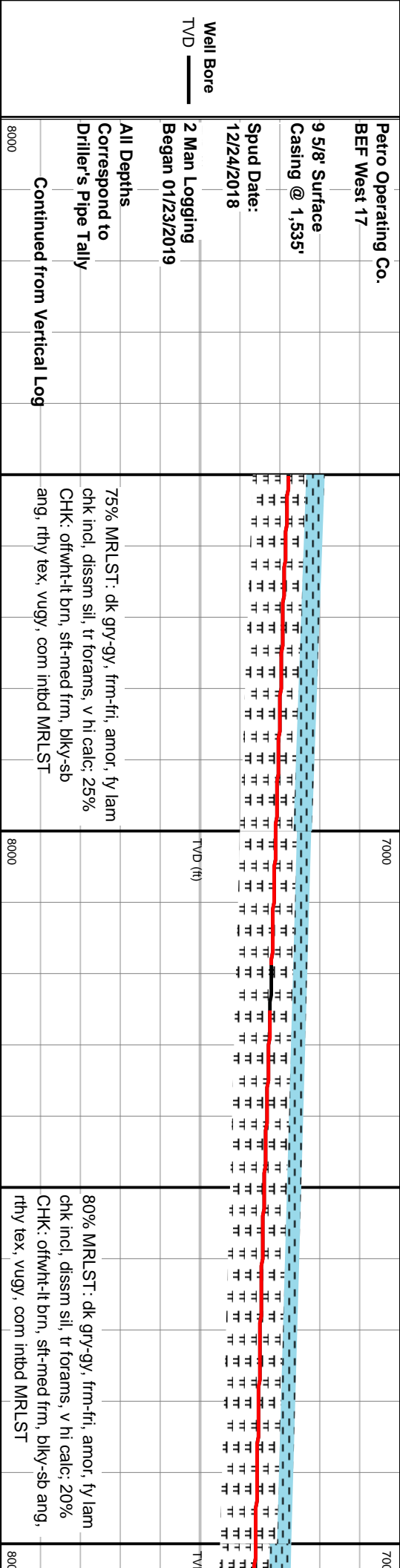
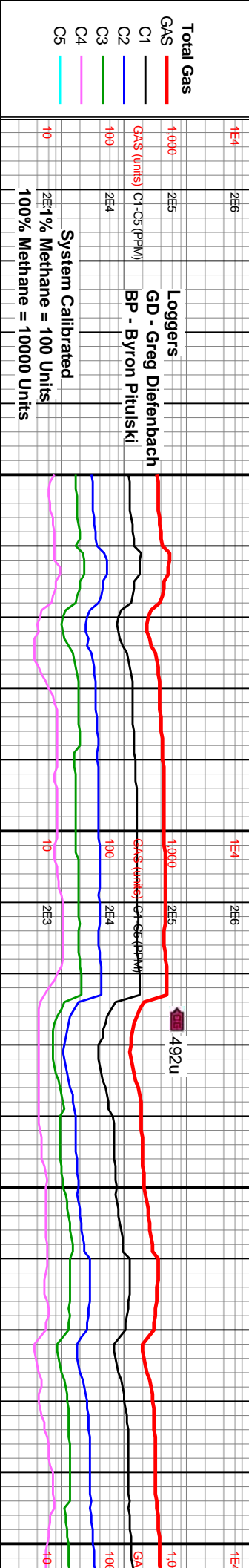
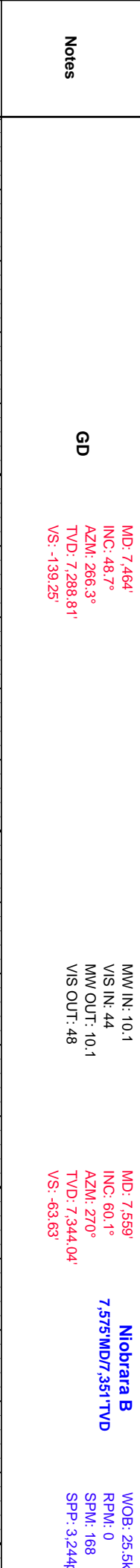
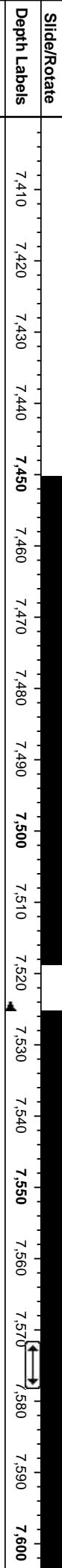
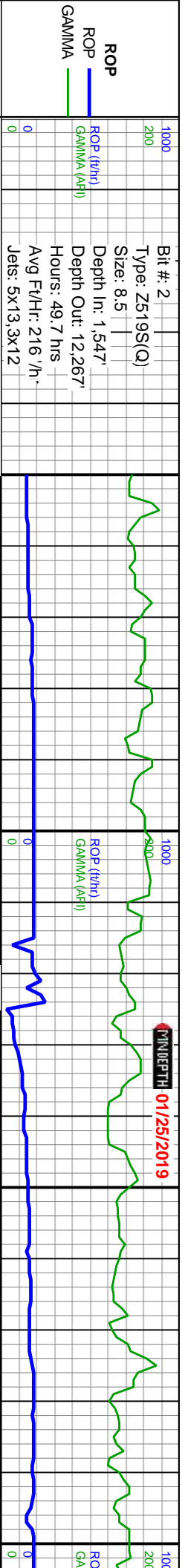
MOLDIC

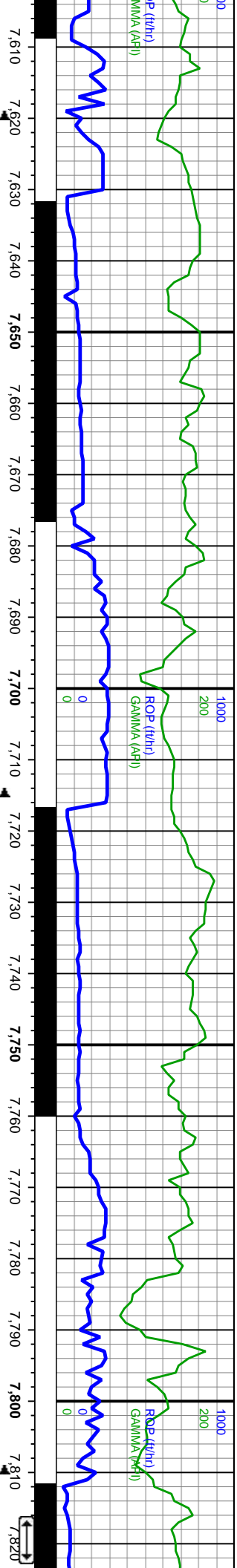
## Accessories

[illegible]

## Symbols

FORMATION TOP	AS SHOW	PTH MN DEPTH	ANGULAR	L LITHOGRAPHIC
VERSE FAULT	SHOW	RRAL FAULT	R ROUNDED	MX MICROXIN
VERTURNED STRATA		a SUBANG	P SUBRND	MS MUDSTONE
VERSE FAULT				PS PACKSTONE
				MS WACKSTONE
NEWALL CORE (LEFT)				
NEWALL CORE (RIGHT)				
URVEY				
RIP GAS				
RELINE TESTED - LEFT				
RELINE TESTED - RT				
GRAINSTONE				





lbs

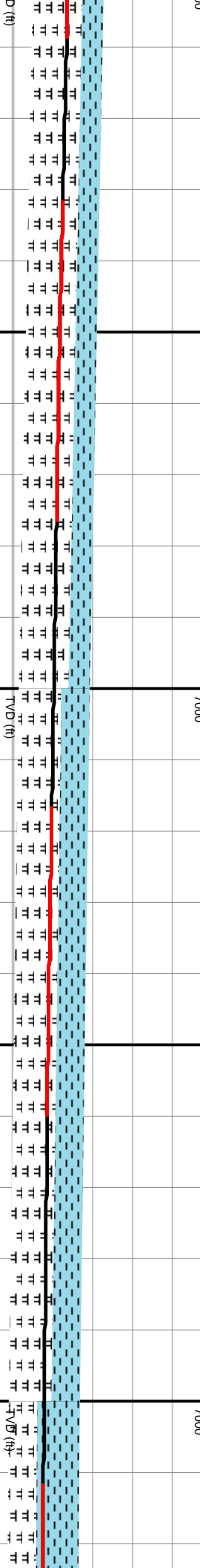
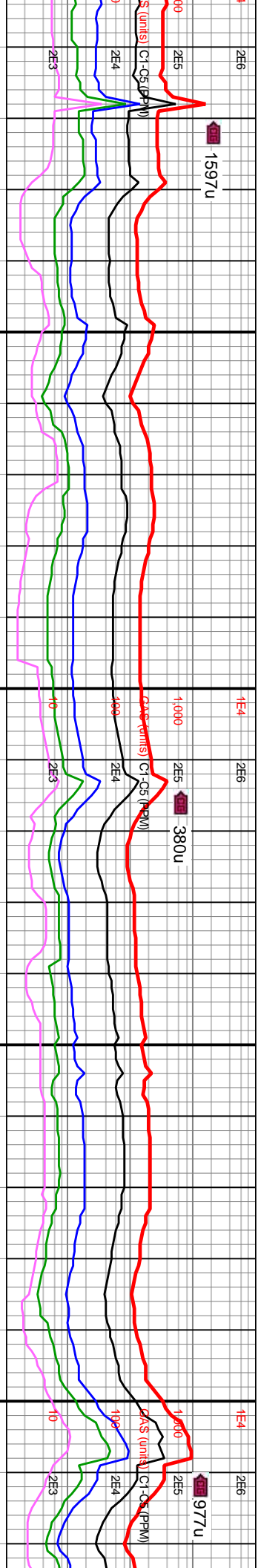
MD: 7.653'  
INC: 69.8°  
AZM: 271.9°  
TVD: 7,383.79'  
VS: 20.48

MMW IN: 10  
VIS IN: 44  
MMW OUT: 10  
VIS OUT: 46

MD: 7.748'  
INC: 76.2°  
AZM: 269.8°  
TVD: 7,411.56'  
VS: 110.23'

WOB: 32.2kbs  
RPM: 31  
SPM: 168  
SPP: 3.412psi

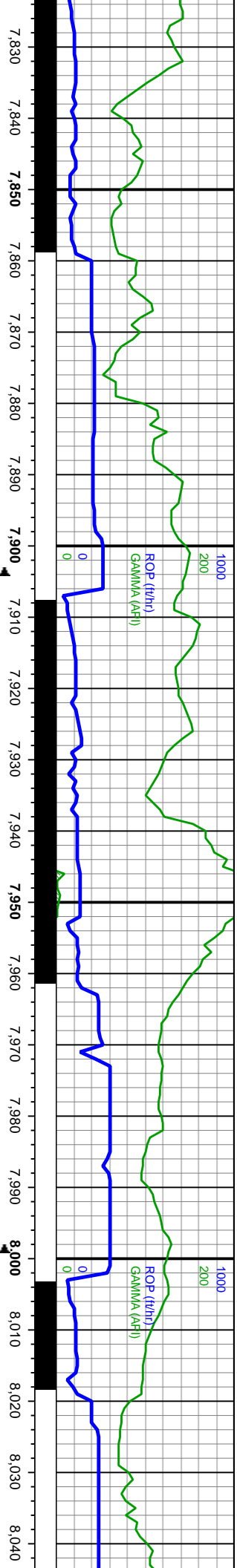
Niobrara  
7.818MD/7.42



70% MRLST: dk gry-gy, frm-fri, amor, fy lam  
chk incl, dissm sil, tr forams, v hi calc; 30%  
CHK: offwht-lt brn, sft-med frm, blk-y-sb ang,  
rthy tex, vugy, com intbd MRLST

60% MRLST: dk gry-gy, frm-fri, amor, fy lam  
chk incl, dissm sil, tr forams, v hi calc; 40%  
CHK: offwht-lt brn, sft-med frm, blk-y-sb ang,  
rthy tex, vugy, com intbd MRLST





MD: 7,842'  
INC: 81.5°  
AZM: 268.8°  
TVD: 7,429.73'  
VS: 200.96'

MW IN: 10  
VIS IN: 45  
MW OUT: 9.9  
VIS OUT: 47

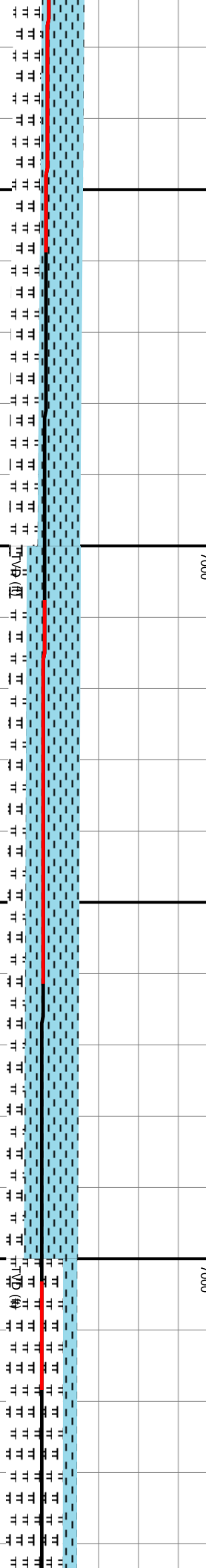
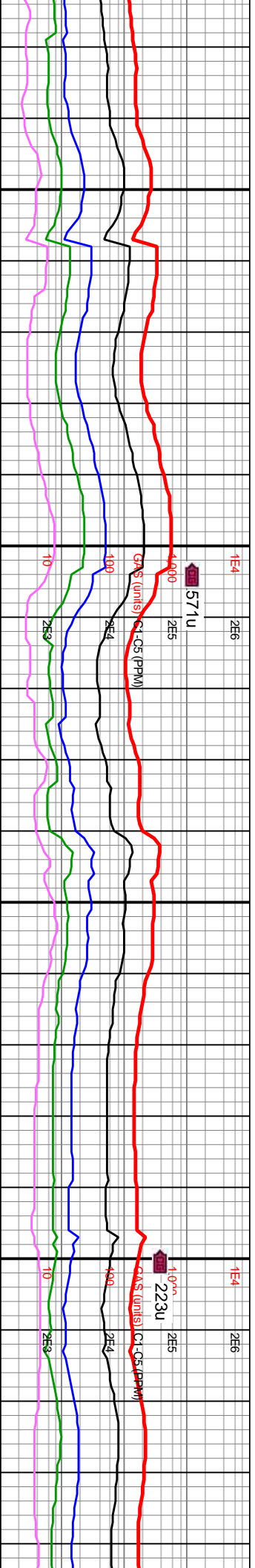
MD: 7,937'  
INC: 86.4°  
AZM: 269.8°  
TVD: 7,439.74'  
VS: 293.9'

**Land Curve**  
7,952MD/7,440TVD

MW IN: 9.9  
VIS IN: 43  
MW OUT: 9.9  
VIS OUT: 45

WOB: 22.3kbs  
RPM: 0  
SPM: 168  
SPP: 2.77psi

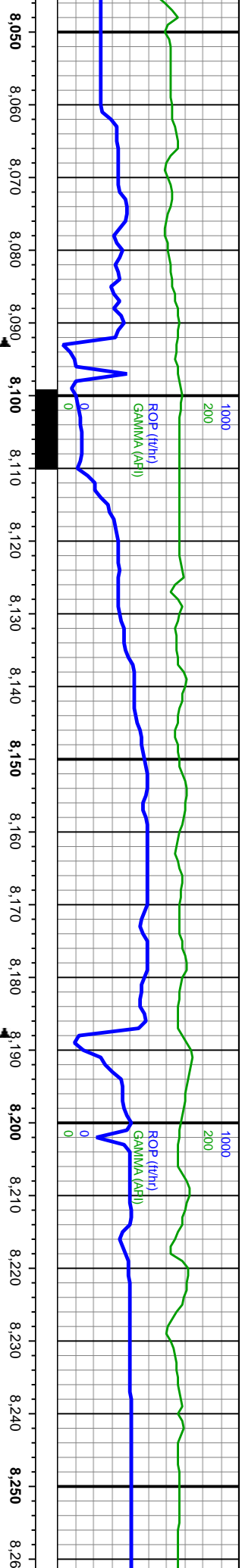
MD: 8,032'  
INC: 88.5°  
AZM: 270.3°  
TVD: 7,443.96'  
VS: 387.51'



60% CHK: offwhit-lt brn, sft-med frm, blk-y-sb ang, rthy tex, vugy, com intbd MRLST; 40% MRLST: dk gry-gy, frm-frt, amor, fy lam chk incl, dissim sil, tr forams, v hi calc

75% CHK: offwhit-lt brn, sft-med frm, blk-y-sb ang, rthy tex, vugy, com intbd MRLST; 25% MRLST: dk gry-gy, frm-frt, amor, fy lam chk incl, dissim sil, tr forams, v hi calc



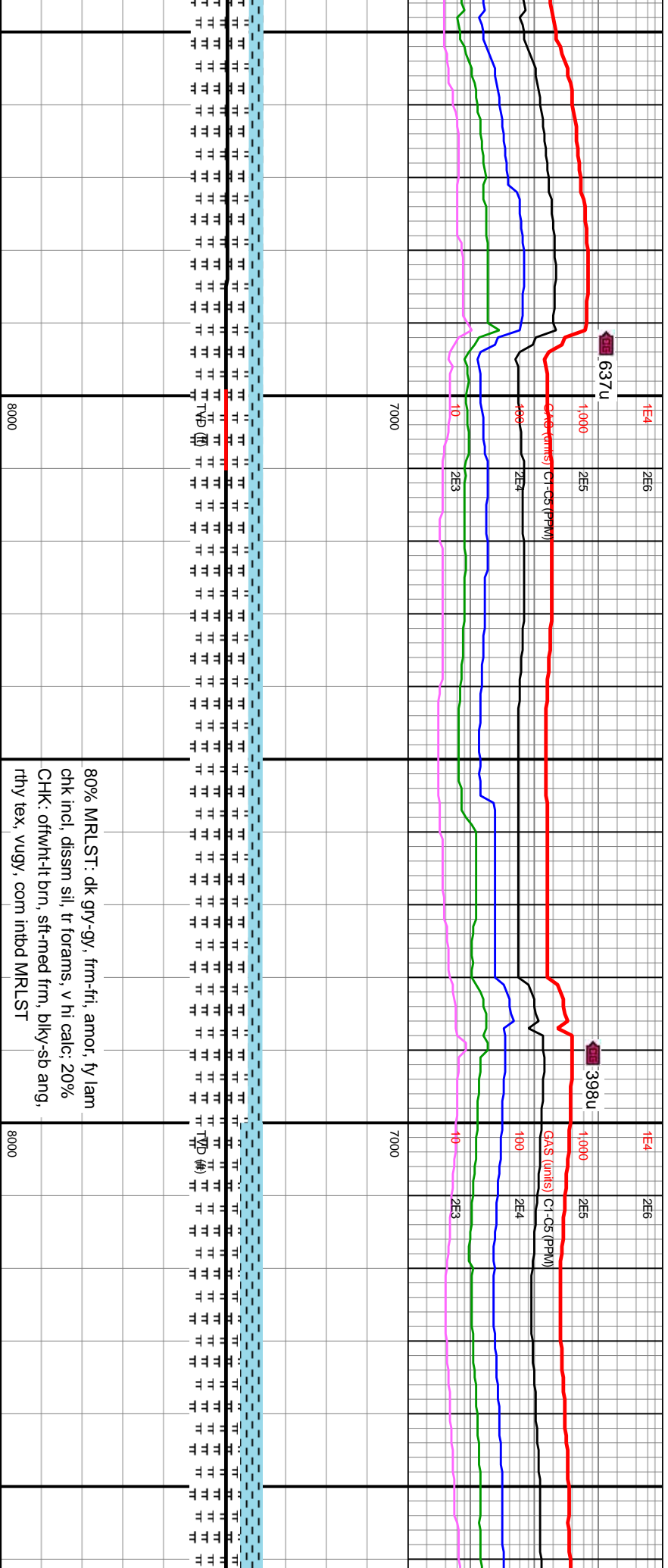


MD: 8,126'  
INC: 90°  
AZM: 270.3°  
TVD: 7,445.19'  
VS: 480.28'

WOB: 36kbs  
RPM: 61  
SPM: 170  
SPP: 3,581psi

MD: 8,221'  
INC: 90.3°  
AZM: 270.7°  
TVD: 7,444.94'  
VS: 574.11'

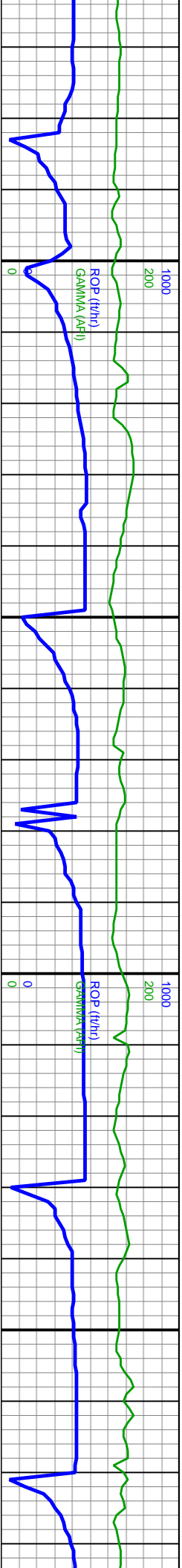
MW IN: 9.9  
VIS IN: 40  
MW OUT: 9.7  
VIS OUT: 38



80% MRLST: dk gry-gy, frm-fri, amor, fy lam  
chk incl, dissil, tr forams, v hi calc; 20%  
CHK: ofwht-lt brn, sft-med frm, biky-sb ang,  
rthy tex, vugy, com intbd MRLST

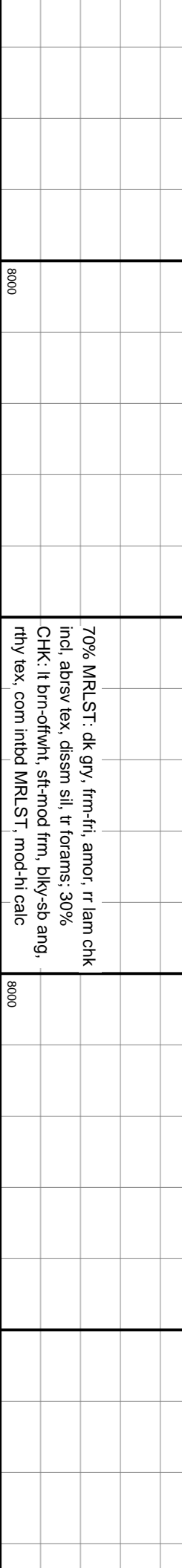
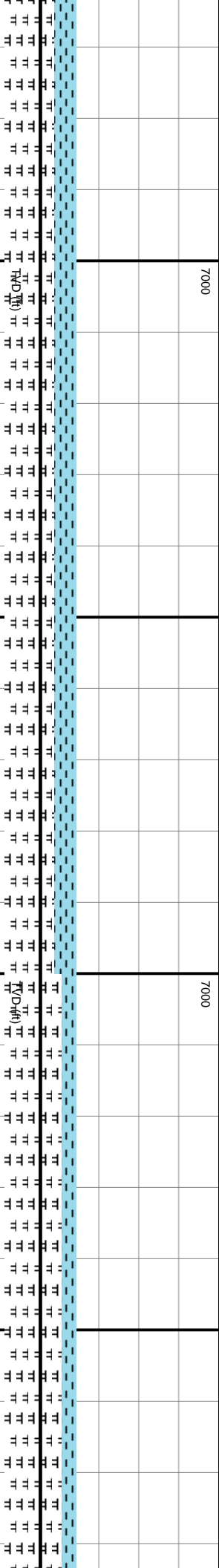
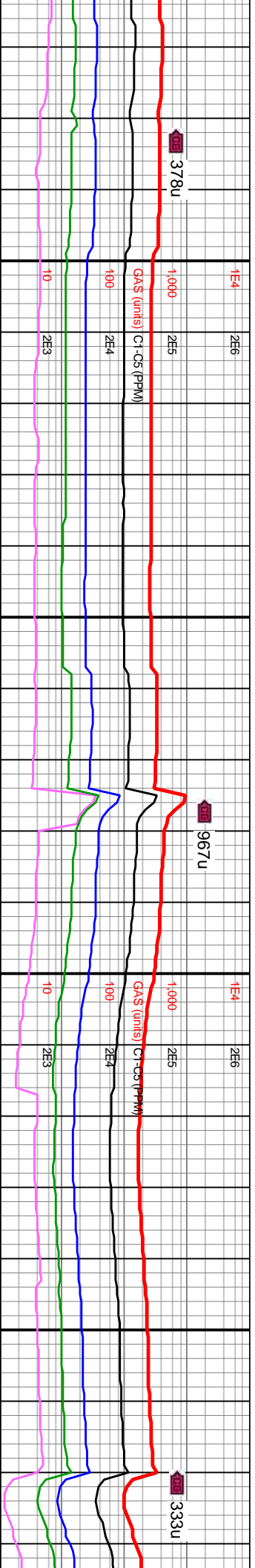






MD: 8,316'  
INC: 89.8°  
AZM: 269.8°  
TVD: 7,444.86'  
VS: 667.87'

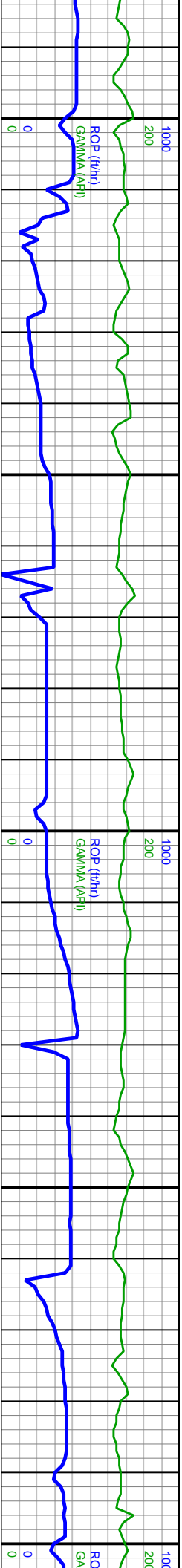
WOB: 27klbs  
RPM: 61  
SPM: 172  
SPP: 3.673psi  
MD: 8,411'  
INC: 89.3°  
AZM: 269.6°  
TVD: 7,445.61'  
VS: 761.47'



70% MRLST: dk gry, frm-fri, amor, rr lam chk  
incl, abrsv tex, dissil, tr forams; 30%  
CHK: lt brn-offwht, sft-mod frm, blkysb ang,  
rthy tex, com intbd MRLST, mod-hi calc





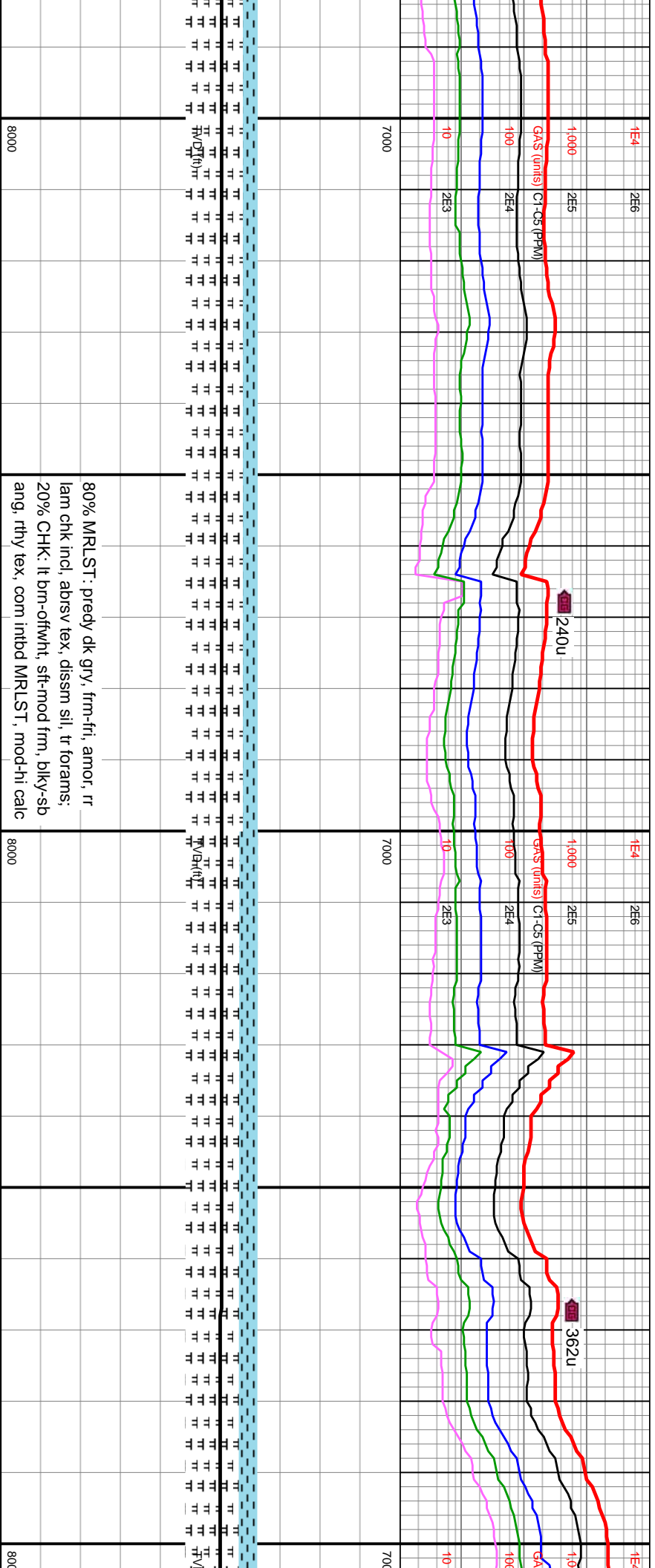


MD: 8,505'  
INC: 89.5°  
AZM: 271.2°  
TVD: 7,446.59'  
VS: 854.27'

MD: 8,600'  
INC: 89.4°  
AZM: 271.2°  
TVD: 7,447.5'  
VS: 948.27'

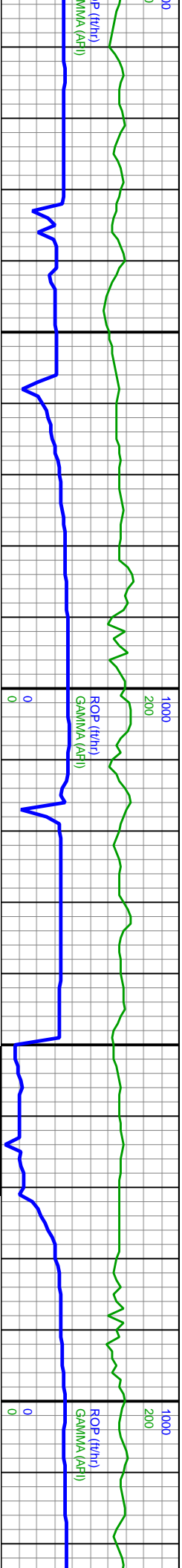
MMW IN: 9.8+  
VIS IN: 42  
MMW OUT: 9.7  
VIS OUT: 41

MD: 8,694'  
INC: 89.4°  
AZM: 271.9°  
TVD: 7,448.49'  
VS: 1,041.36'



80% MRLST: predy dk gry, frm-fri, amor, rr  
lam chk incl, abrsv tex, dissim sil, tr forams;  
20% CHK: lt brn-offwht, sft-mod frm, bkly-sb  
ang, rthy tex, com intbd MRLST, mod-hi calc



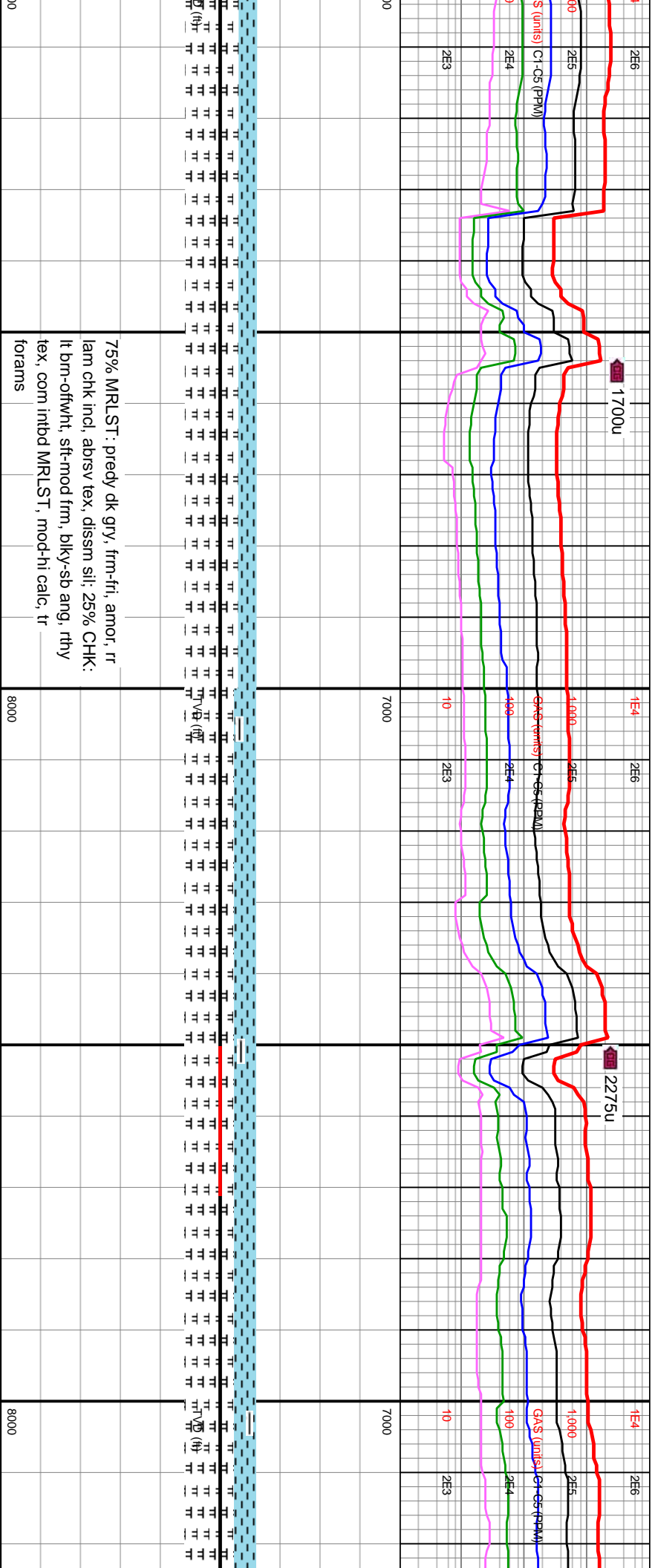


MD: 8,789'  
INC: 90.3°  
AZM: 272.8°  
TVD: 7,448.74'  
VS: 1,135.61'

WOB: 28klbs  
RPM: 61  
SPM: 170  
SPP: 3,791psi

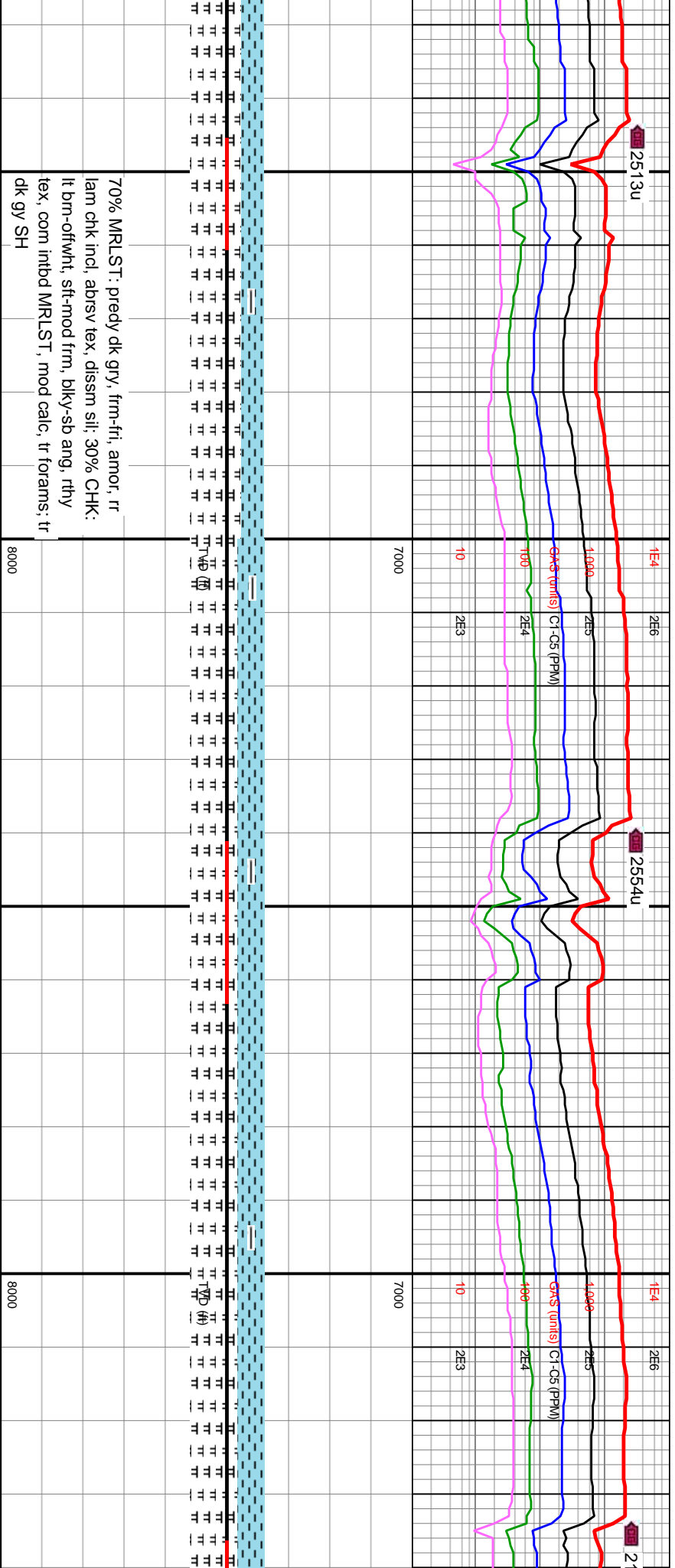
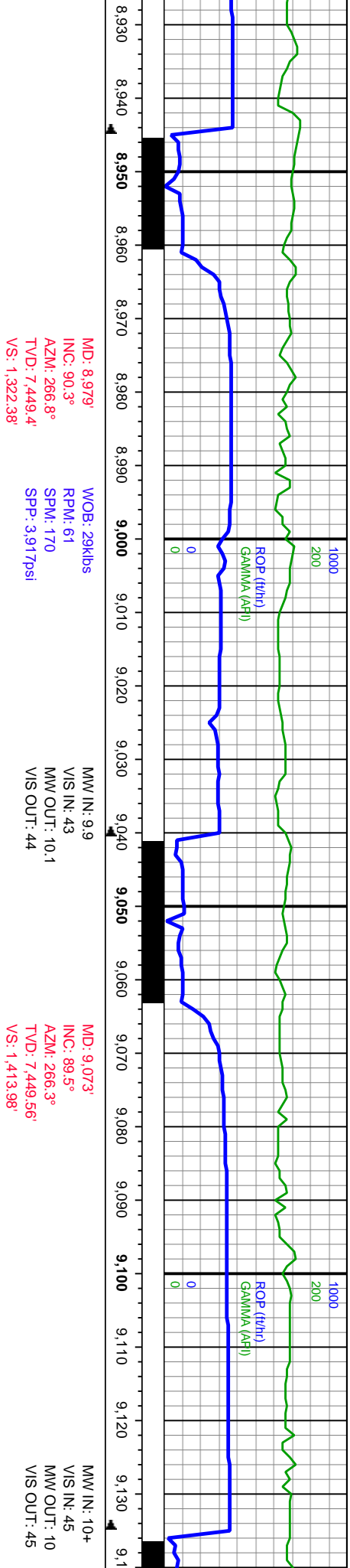
MD: 8,884'  
INC: 89.3°  
AZM: 268.4°  
TVD: 7,449.07'  
VS: 1,229.44'

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



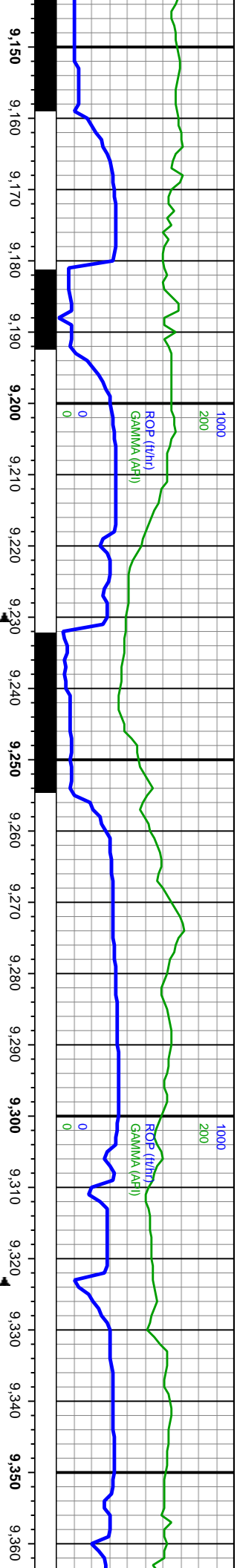
75% MRLST: predy dk gry, frm-fri, amor, r  
lam chk incl, abrsv tex, dissil sil; 25% CHK:  
lt brn-offwht, sft-mod frm, biky-sb ang, rthy  
tex, com intbd MRLST, mod-hi calc, tr  
forams





70% MRLST: predy dk gry, frm-fri, amor, rr  
lam chk incl, abrsv tex, dissm sli; 30% CHK:  
lt brn-offwht, sft-mod frm, bkly-sb ang, rthy  
tex, com intbd MRLST, mod calc, tr forams; tr  
dk gy SH





MD: 9,168'  
INC: 90.7°  
AZM: 265.4°  
TVD: 7,449.4'  
VS: 1,506.29'

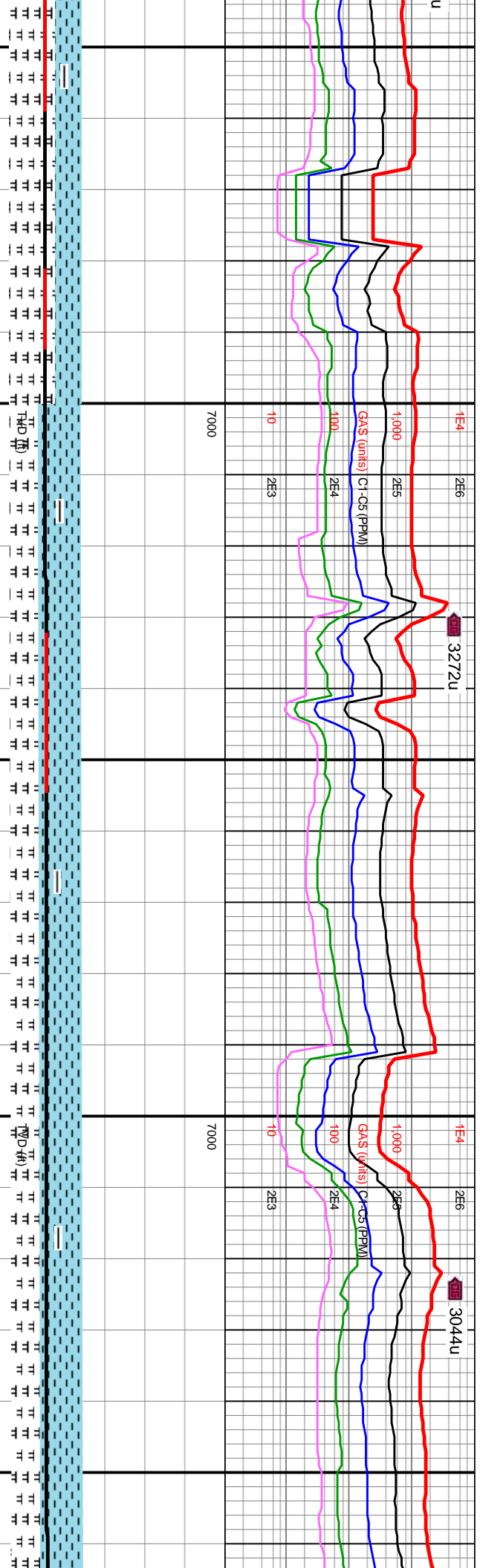
WOB: 22kbs  
RPM: 61  
SPM: 170  
SPP: 3.721psi

MW IN: 10.1  
VIS IN: 45  
MW OUT: 10.1  
VIS OUT: 44

MD: 9,262'  
INC: 91.7°  
AZM: 268.1°  
TVD: 7,447.43'  
VS: 1,597.94'

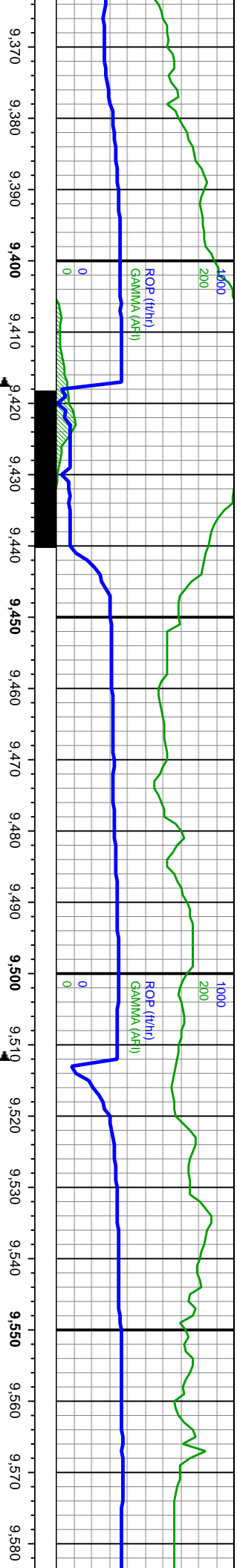
MW IN: 10.1  
VIS IN: 45  
MW OUT: 10.1  
VIS OUT: 45

MD: 9,357'  
INC: 91.6°  
AZM: 267.5°  
TVD: 7,444.69'  
VS: 1,690.92'



<p>65% MRLST: dk gry, frm-fri, amor, fy lam chk incl, abrsv tex, dissm sli; 35% CHK: lt brn-offwht, sft-mod frm, blk-ysb ang, rthy tex, com inbd MRLST, hi calc, tr forams; tr dk gy SH</p>	<p>60% CHK: l ang, rthy tex MRLST: dk abrsv tex, d gy SH</p>
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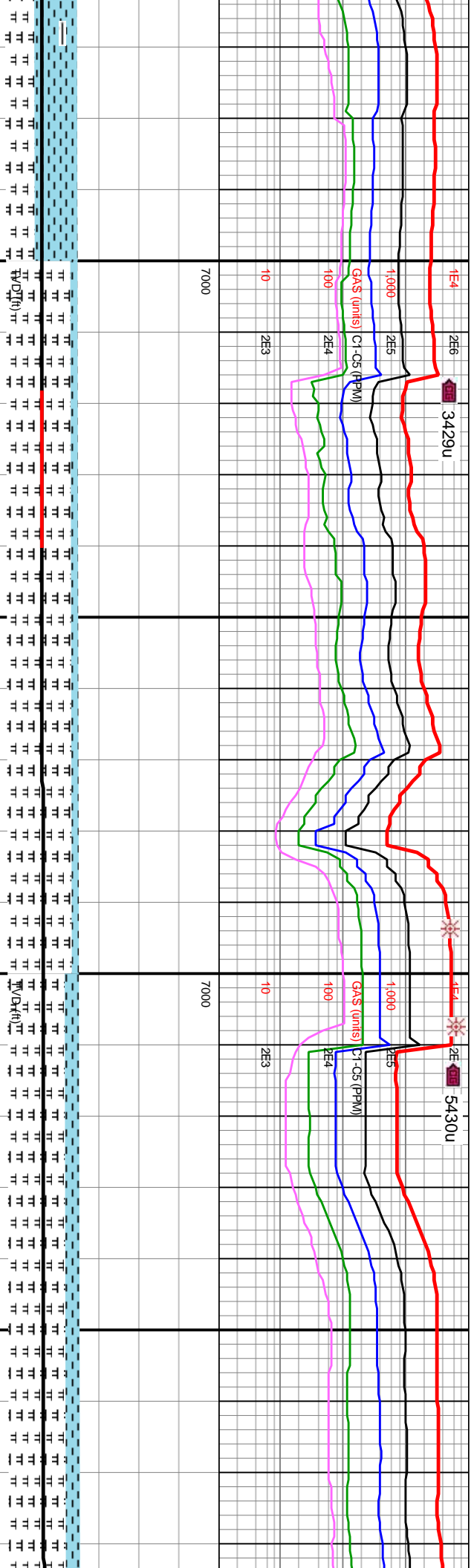
WOB: 27klbs  
RPM: 61  
SPM: 170  
SPP: 3.86psi

MD: 9.451'  
INC: 91.8°  
AZM: 268.8°  
TVD: 7.441.91'  
VS: 1.783.03'

MD: 9.545'  
INC: 92.5°  
AZM: 267.9°  
TVD: 7.438.38'  
VS: 1.875.18'

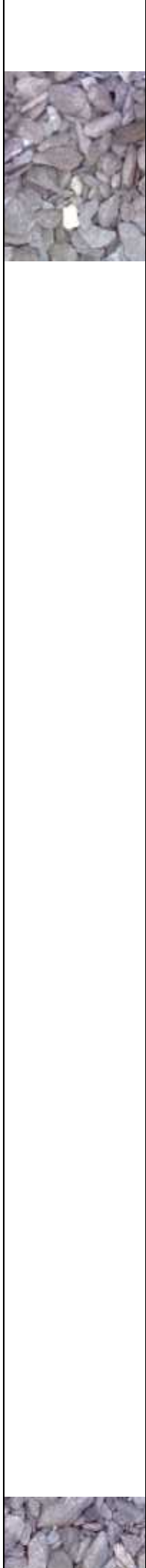
MW IN: 10.1  
VIS IN: 44  
MW OUT: 10  
VIS OUT: 45

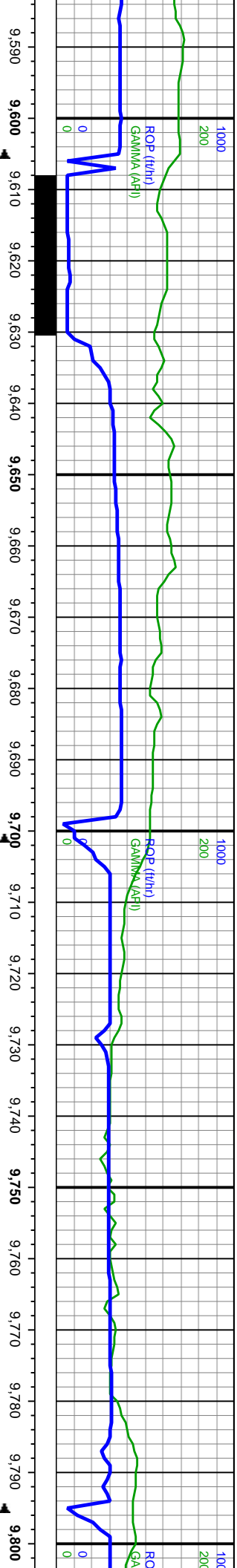
MW IN: 10+  
VIS IN: 48  
MW OUT: 9.9  
VIS OUT: 49



t brn-offwht, sft-mod frm, biky-sb  
x, com intbd MRLST; 40%  
gry, frm-fri, amor, fy lam chk incl,  
ssm sil, hi calc, tr forams; tr dk

90% MRLST; dk gry, frm-fri, an  
incl, abrsv tex, dissil; 10% 6  
brn-offwht, sft-mod frm, biky-sb  
com intbd MRLST, hi calc, tr fo





WOB: 18klbs  
RPM: 16  
SPM: 170  
SPP: 3.536psi

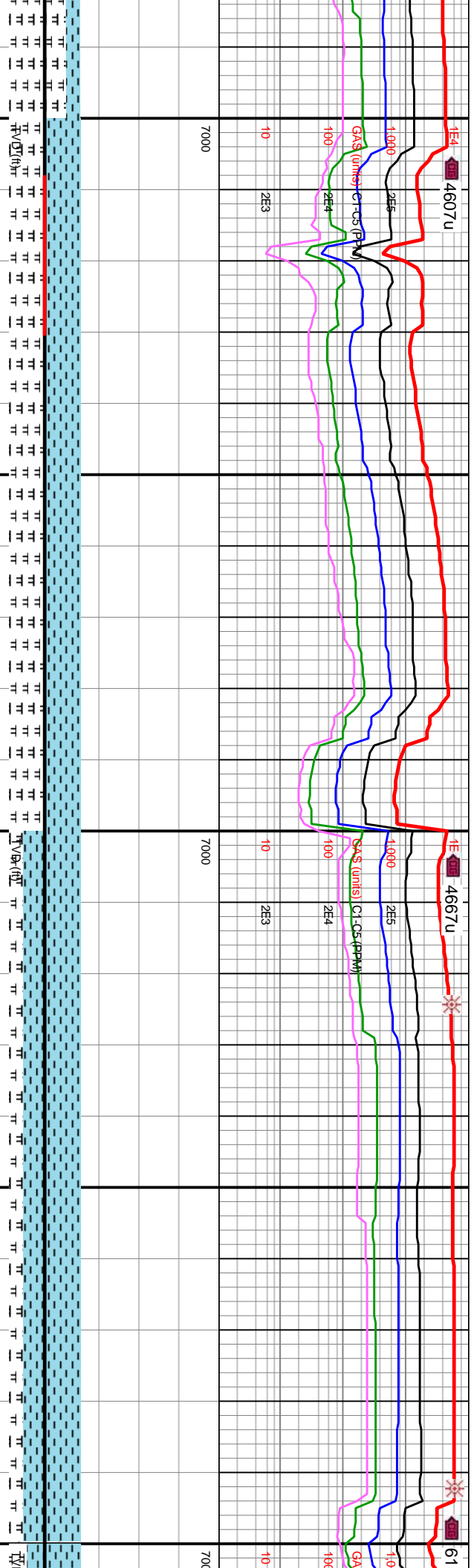
MD: 9.640'  
INC: 90.2°  
AZM: 269.5°  
TVD: 7.436.14'  
VS: 1.968.46'

GD

MD: 9.734'  
INC: 90.4°  
AZM: 268.2°  
TVD: 7.435.65'  
VS: 2.060.83'

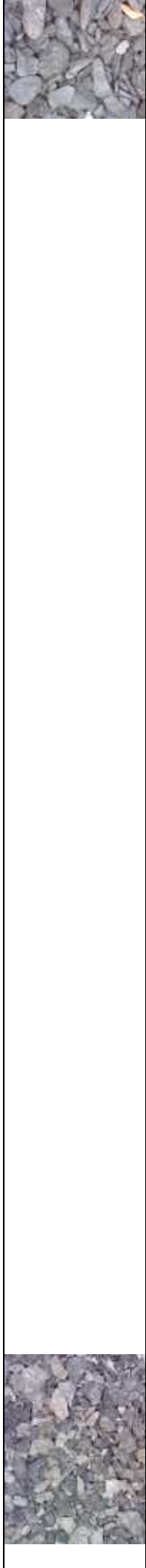
MM IN: 10  
VIS IN: 49  
MM OUT: 10  
VIS OUT: 46

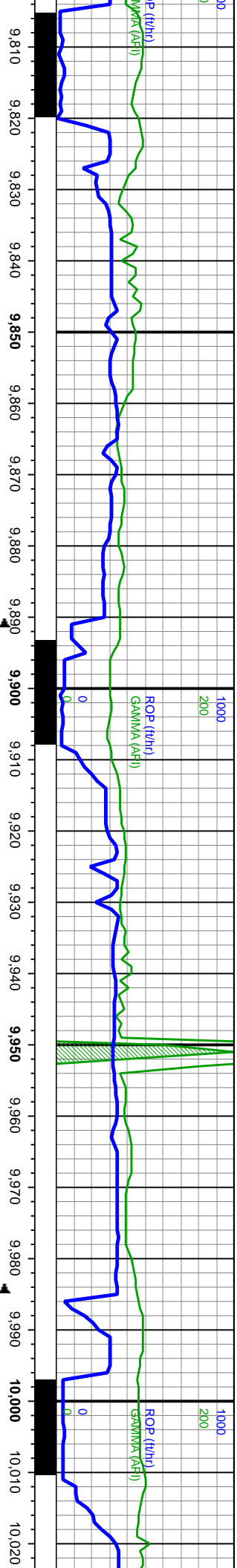
WOB: 13.2  
RPM: 61  
SPM: 169  
SPP: 3.34



nor, fy lam chk  
CHK: It  
ang, rthy tex,  
rams

80% CHK: It brn-offwht, sft-mod frm, blk-y-sb  
ang, rthy tex, com intbd MRLST, hi calc, tr  
forams: 20% MRLST: dk gry, frm-fri, amor, fy  
lam chk incl, abrsv tex, dissm sil





MD: 9,829'  
INC: 90.9°  
AZM: 269.6°  
TVD: 7,434.57'  
VS: 2,154.19'

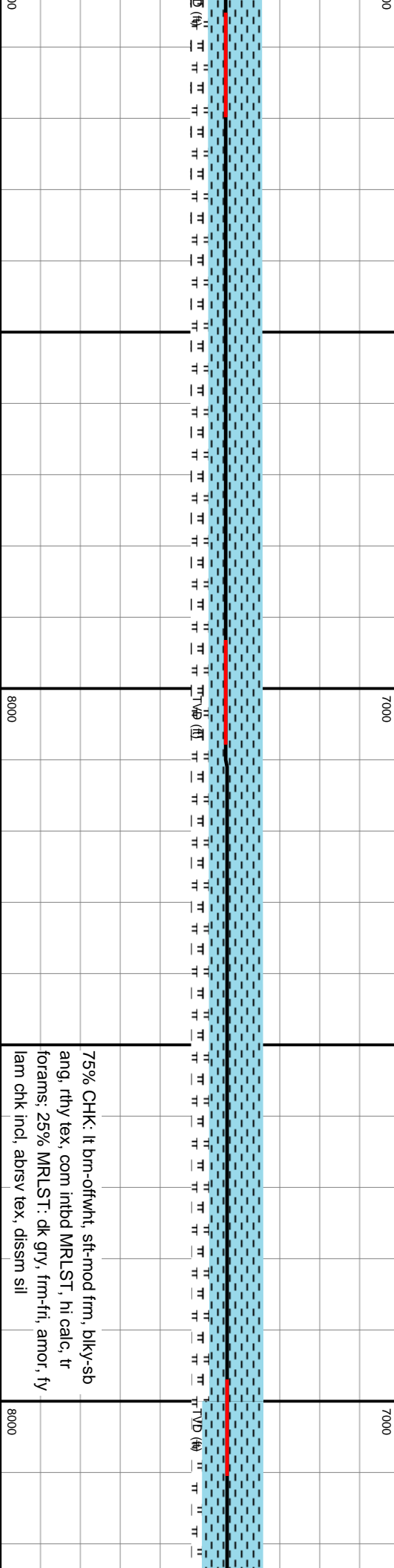
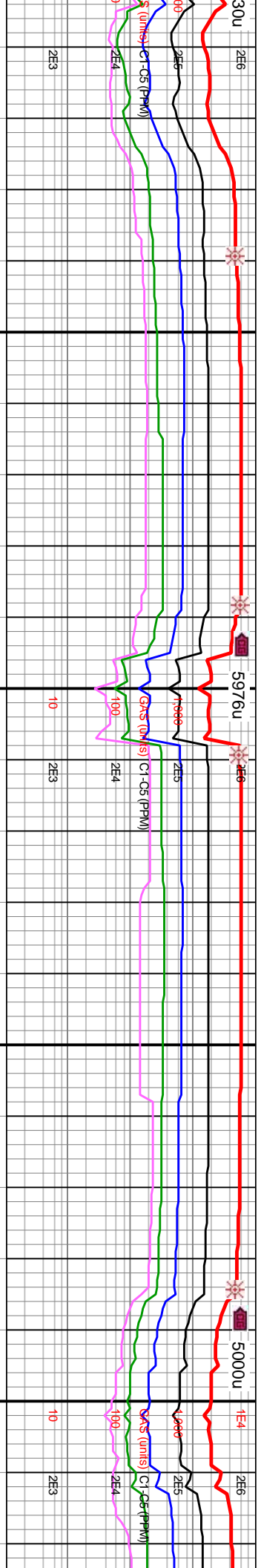
MMW IN: 10.2  
VIS IN: 50  
MMW OUT: 10  
VIS OUT: 53

MD: 9,924'  
INC: 90°  
AZM: 269.6°  
TVD: 7,433.82'  
VS: 2,247.77'

MMW IN: 10  
VIS IN: 47  
MMW OUT: 10.2  
VIS OUT: 52

MD: 10,018'  
INC: 90.1°  
AZM: 270.9°  
TVD: 7,433.72'  
VS: 2,340.54'

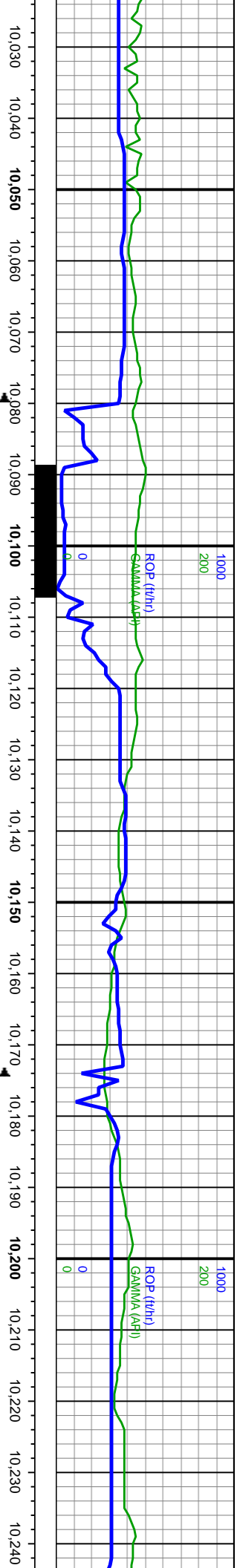
WOB: 3.4klbs  
RPM: 25  
SPM: 169  
SPP: 2,982psi



75% CHK: lt brn-offwht, sft-mod frm, blk-y-sb  
ang, rthy tex, com intbd MRLST, hi calc, tr  
forams; 25% MRLST: dk gry, frm-fri, amor, fy  
lam chk incl, abrsv tex, dissim sil







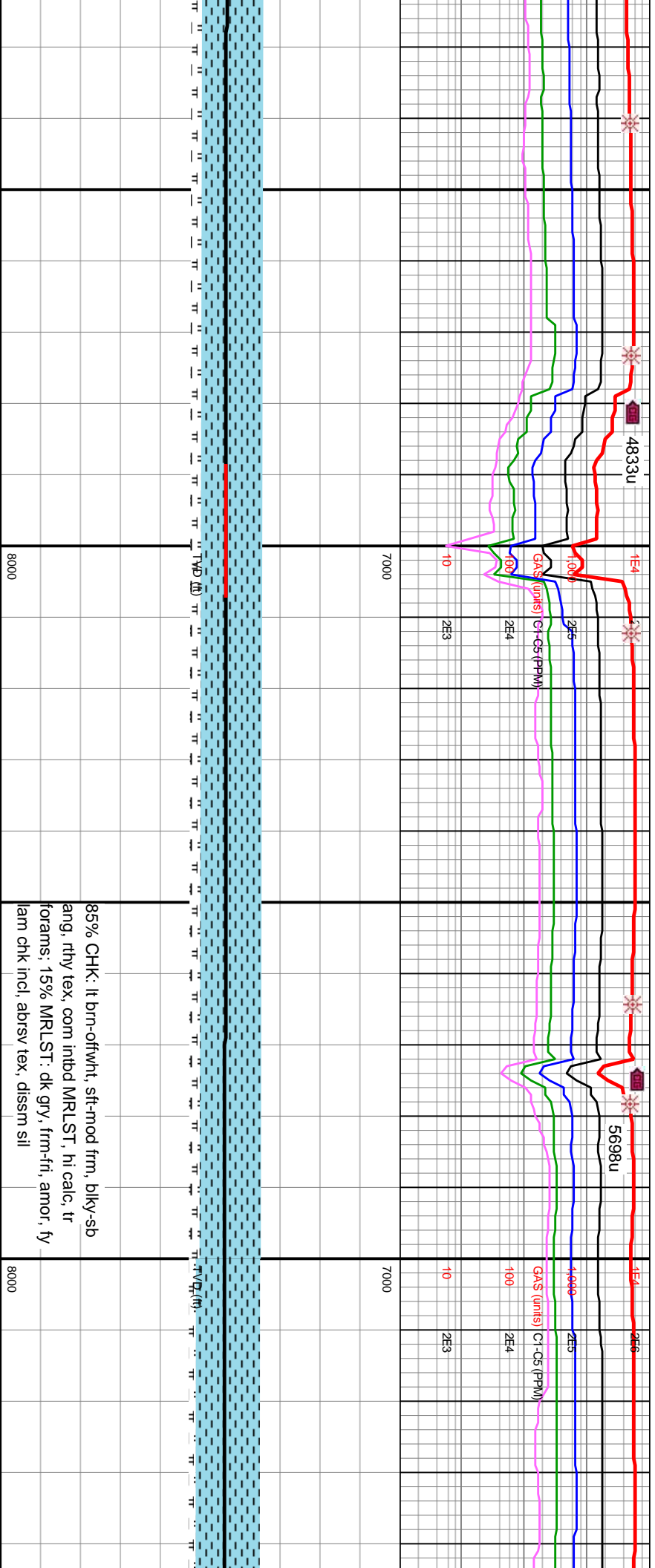
MW IN: 10.1  
VIS IN: 46  
MW OUT: 10.1  
VIS OUT: 50

MD: 10.113°  
INC: 87.7°  
AZM: 269.6°  
TVD: 7,435.57'  
VS: 2,434.27'

MW IN: 10.1  
VIS IN: 44  
MW OUT: 10  
VIS OUT: 47

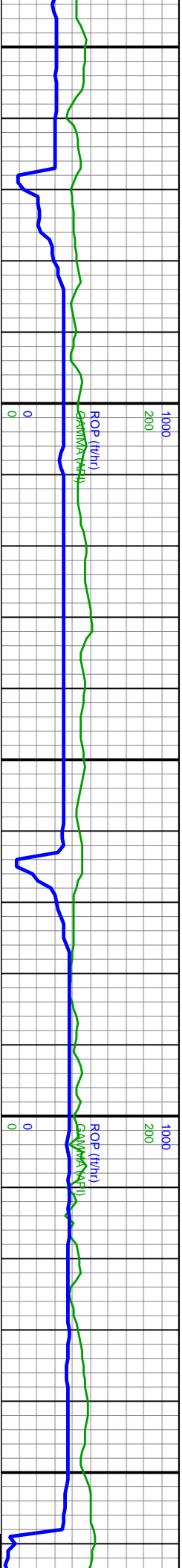
WOB: 27.4kbs  
RPM: 61  
SPM: 170  
SPP: 3,788psi

MD: 10.207°  
INC: 88.4°  
AZM: 269.6°  
TVD: 7,438.77'  
VS: 2,526.81'



85% CHK: lt brn-offwht, sft-mod frm, blk-y-sb  
ang, rthy tex, com intbd MRLST, hi calc, tr  
forams: 15% MRLST: dk gry, frm-fri, amor, fy  
lam chk incl, abrsrv tex, dissm sil



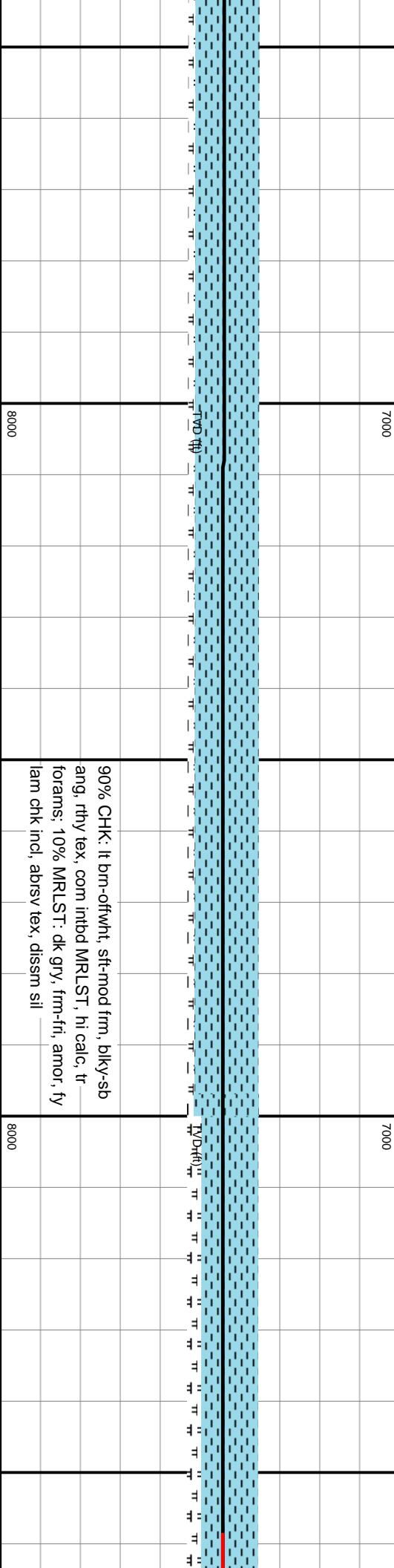
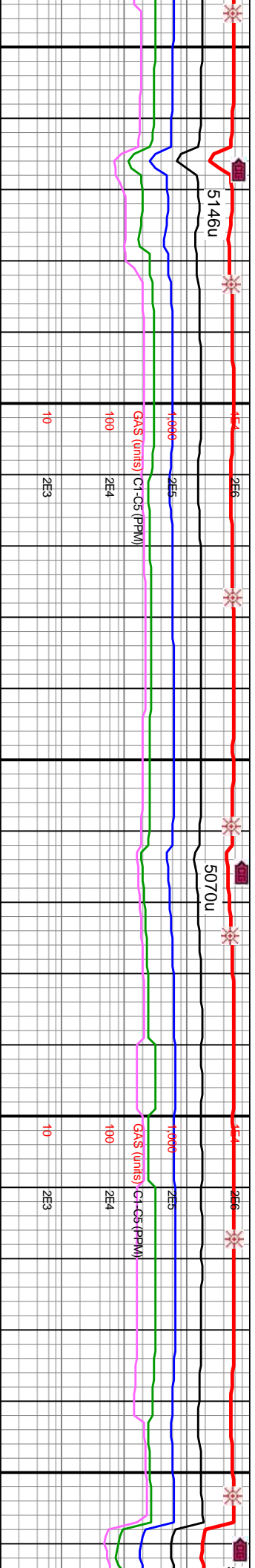


MD: 10,302'  
INC: 88.9°  
AZM: 269.5°  
TVD: 7.441'  
VS: 2.620,35'

MM IN: 10.1  
VIS IN: 44  
MM OUT: 10.1  
VIS OUT: 46

MD: 10,397'  
INC: 89.9°  
AZM: 270°  
TVD: 7.442'  
VS: 2.713,97'

WOB: 31.5kbs  
RPM: 1  
SPM: 169  
SPP: 3.971psi

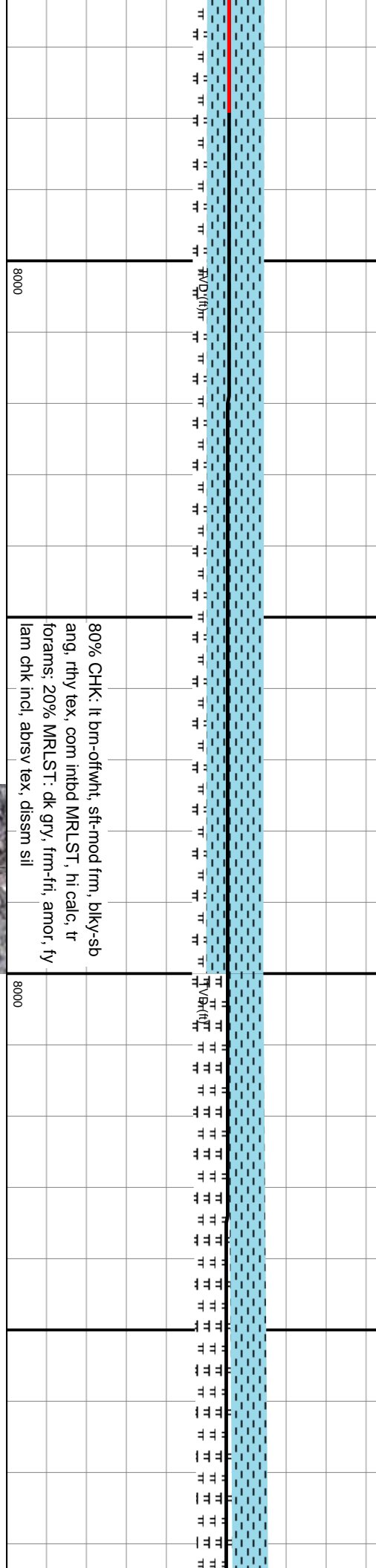
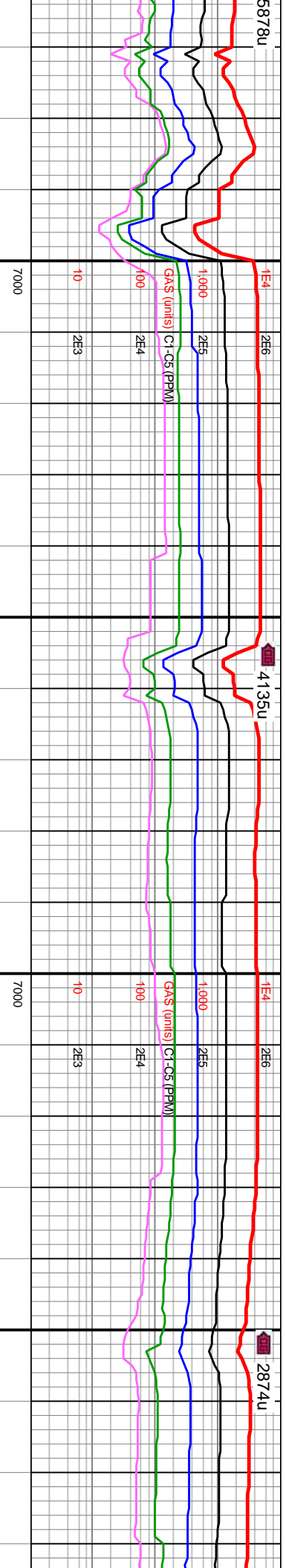


90% CHK: lt brn-ffwht, sft-mod frm, bky-sb ang, rthy tex, com intbd MRLST, hi calc, tr forams; 10% MRLST: dk gry, frm-fri, amor, fly lam chk incl, abrsv tex, dissim sil



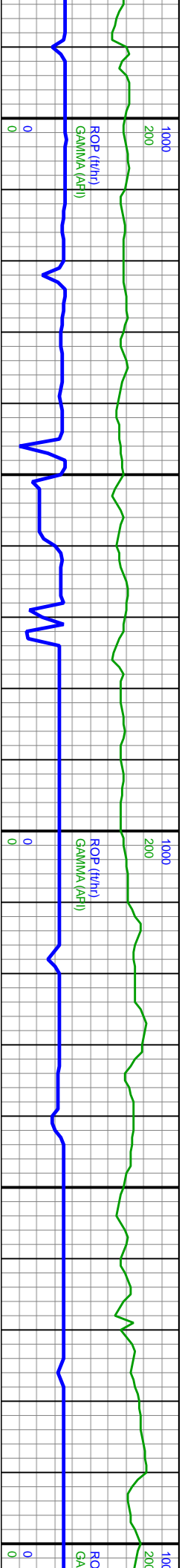


MW IN: 10.1 MD: 10.492' INC: 88° WOB: 30.1kbs RPM: 61 MD: 10.68  
VIS IN: 44 AZM: 270.2° TVD: 7.443.74' VS: 2.807.67' VS: 2.901.36' VS: 2.994.  
MW OUT: 10.1  
VIS OUT: 46



80% CHK: lt brn-offwht, sft-mod frm, blk-y-sb ang, rthy tex, com intbd MRLST, hi calc, tr forams; 20% MRLST: dk gry, frm-fri, amor, fy lam chk incl, abrsv tex, dissm sil





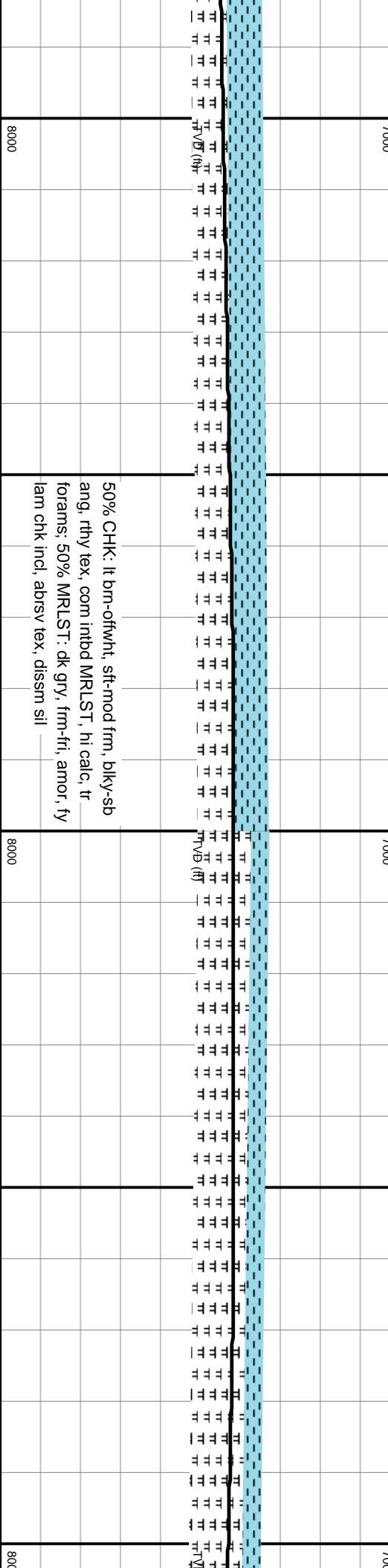
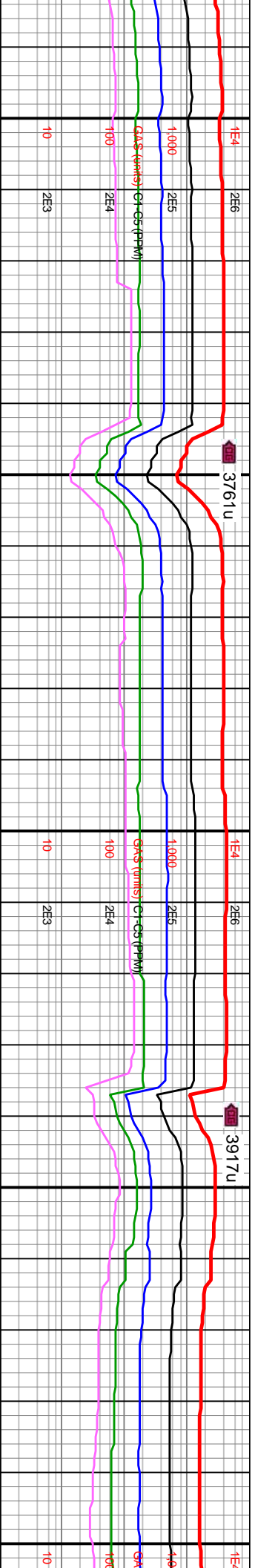
1' 1' 3' 1' 1'

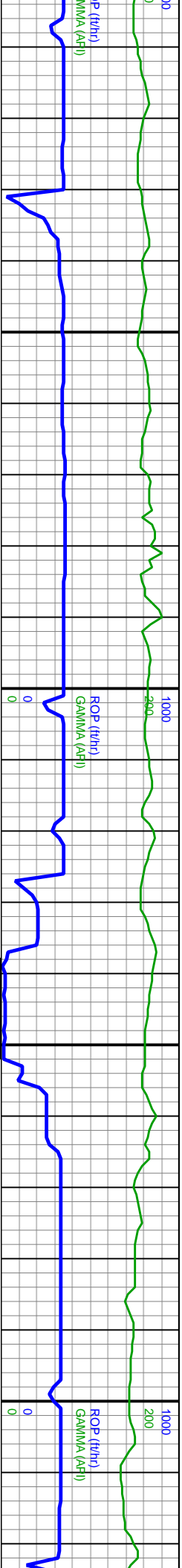
MMW IN: 10.1  
VIS IN: 44  
MW OUT: 10  
VIS OUT: 48

MD: 10.776'  
INC: 89.1°  
AZM: 270°  
TVD: 7.418'  
VS: 3.147.9'

WOB: 26.9klbs  
RPM: 60  
SPM: 169  
SPP: 3.833psi

MD: 10.871'  
INC: 89.2°  
AZM: 269.5°  
TVD: 7.419.41'  
VS: 3.241.51'





MW IN: 10  
VIS IN: 45  
MW OUT: 10  
VIS OUT: 49

MD: 10,966'  
INC: 89.2°  
AZM: 268.9°  
TVD: 7,454.16'  
VS: 3,274.88'

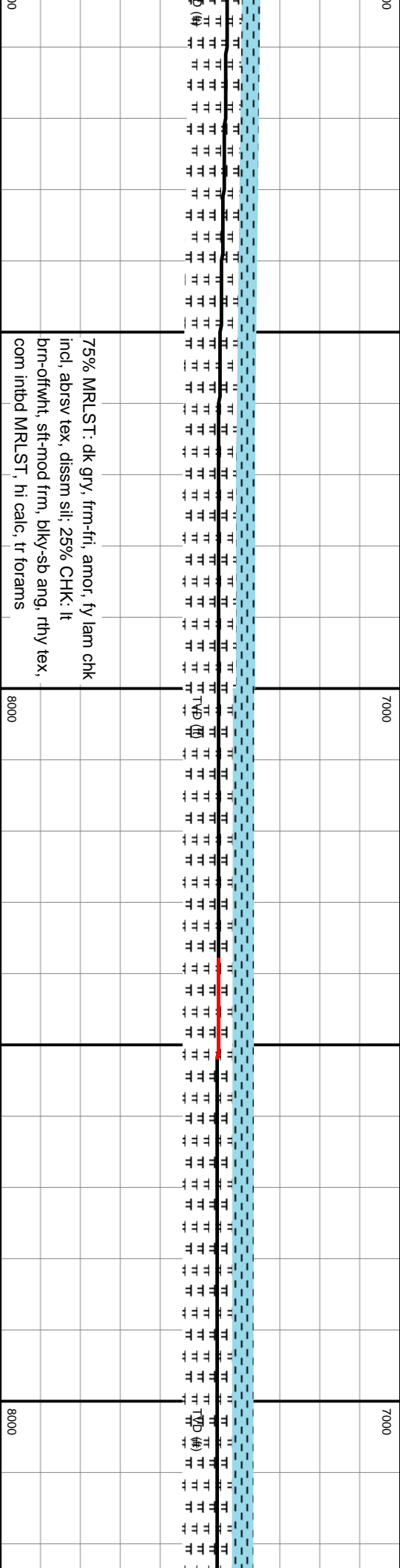
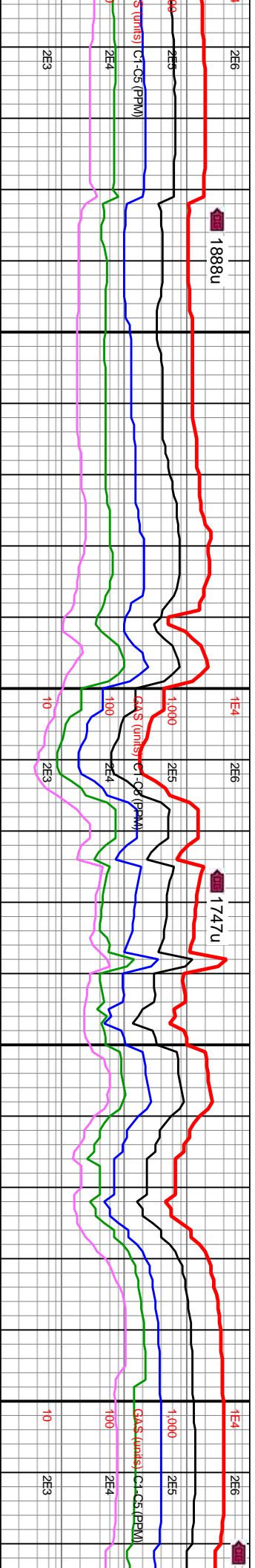
WOB: 28.8klbs  
RPM: 58  
SPM: 169  
SPP: 3.914psi

MW IN: 10  
VIS IN: 45  
MW OUT: 10  
VIS OUT: 47+

MD: 11,060'  
INC: 89.2°  
AZM: 270.2°  
TVD: 7,455.47'  
VS: 3,367.44'

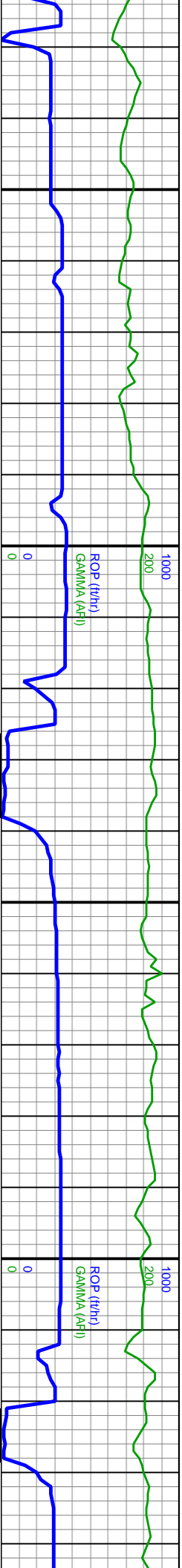
MW IN: 10  
VIS IN: 45  
MW OUT: 10  
VIS OUT: 48

BP



75% MRLST: dk gry, frm-fri, amor, fy lam chk  
incl, abrsv tex, dissim sil; 25% CHK. It  
brn-offwht, sft-mod frm, blk-y-sb ang, rthy tex,  
com intbd MRLST, hi calc, tr forams





MD: 11,155'  
INC: 90.1°  
AZM: 270.5°  
TVD: 7,456.05'  
VS: 3,461.23

MW IN: 10  
VIS IN: 45  
MW OUT: 10  
VIS OUT: 47

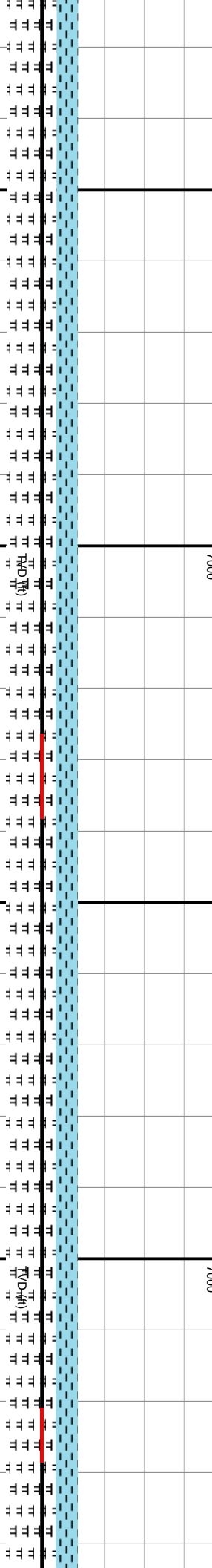
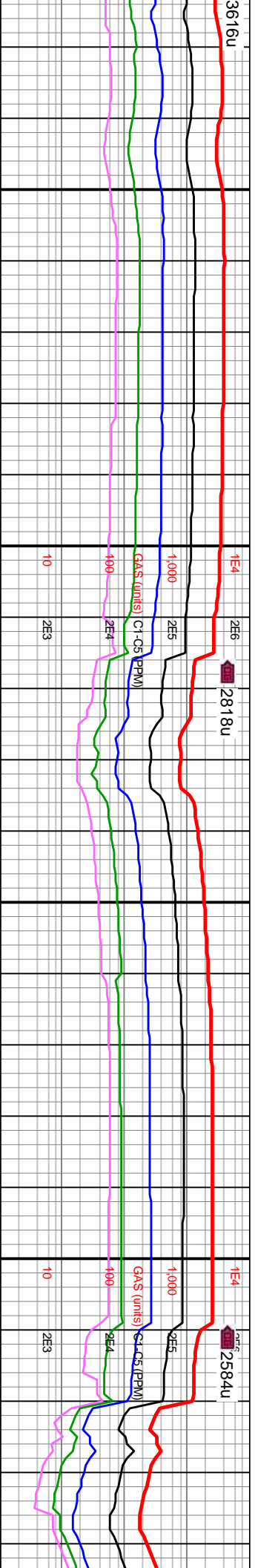
WOB: 33.5klbs  
RPM: 25  
SPM: 168  
SPP: 3,088psi

MD: 11,250'  
INC: 89.9°  
AZM: 271°  
TVD: 7,456.05'  
VS: 3,555.12

MW IN: 9.9  
VIS IN: 42  
MW OUT: 9.9  
VIS OUT: 42

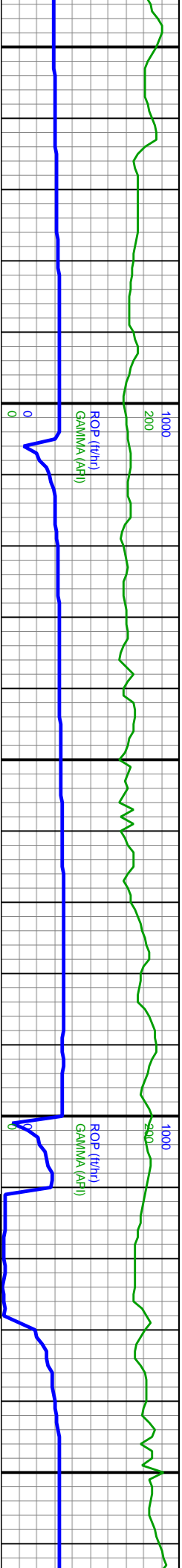
MD: 11,340'  
INC: 8°  
AZM: 271°  
TVD: 7,456.05'  
VS: 3,555.12

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



70% MRLST: dk gry, frm-fri, amor, com fy  
lam chk incl, abrsv tex, dissim sll; 30%  
CHK: lt brn-offwhit, sft-med frm, blkly-sb ang,  
rthy chky tex, occ intbd MRLST, hi calc, tr  
forams



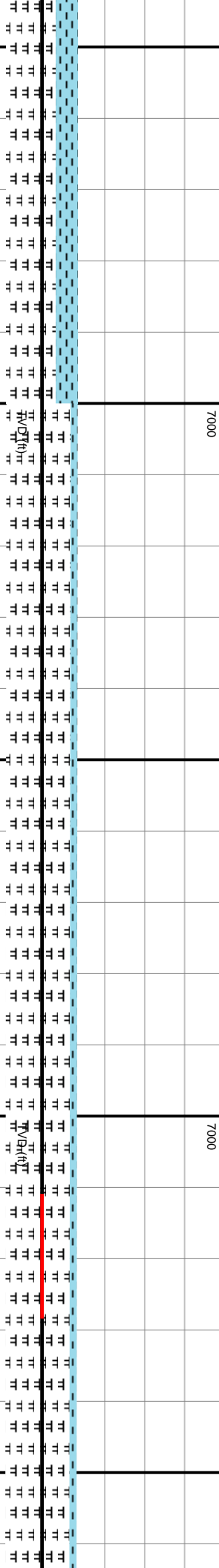
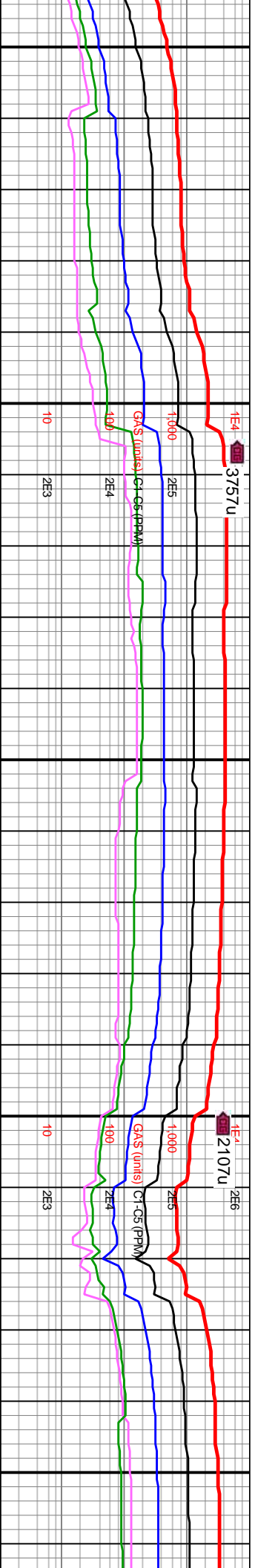


11,350 11,360 11,370 11,380 11,390 11,400 11,410 11,420 11,430 11,440 11,450 11,460 11,470 11,480 11,490 11,500 11,510 11,520 11,530 11,540 11,550 11,560

WOB: 30klbs  
RPM: 60  
SPM: 168  
SPP: 3.856psi

MD: 11,440'  
INC: 90.7°  
AZM: 271.9°  
TVD: 7,457.21'  
VS: 3,743.17'

MD: 11,534'  
INC: 89°  
AZM: 271.7°  
TVD: 7,457.46'  
VS: 3,836.31'



70% MRLST: dk gry, frm-frt, amor, com fy  
lam chk incl, abrv tex, dissn sll: 30%  
CHK: It brn-offwht, sft-med frm, blkly-sb ang,  
rthy chky tex, occ intbd MRLST, hi calc, tr  
forams

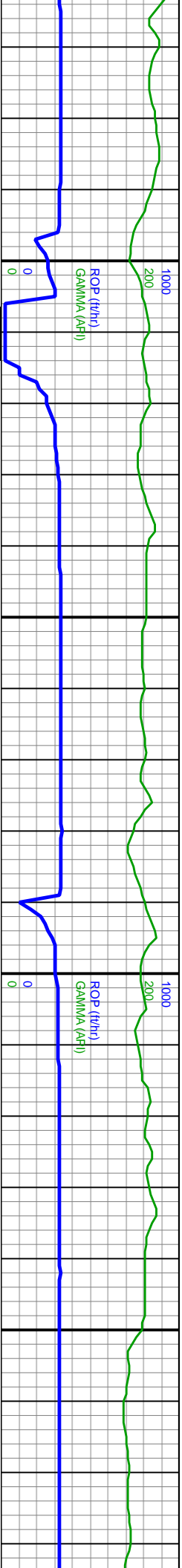
8000

8000



90% MRLST  
lam chk incl  
CHK: It brn  
rthy chky te  
calc





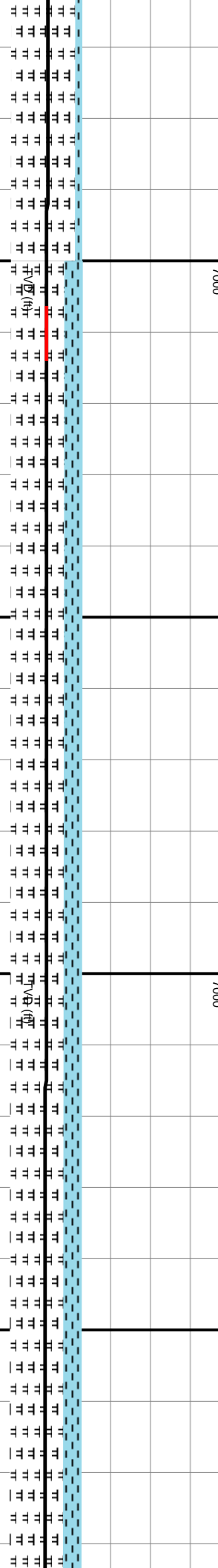
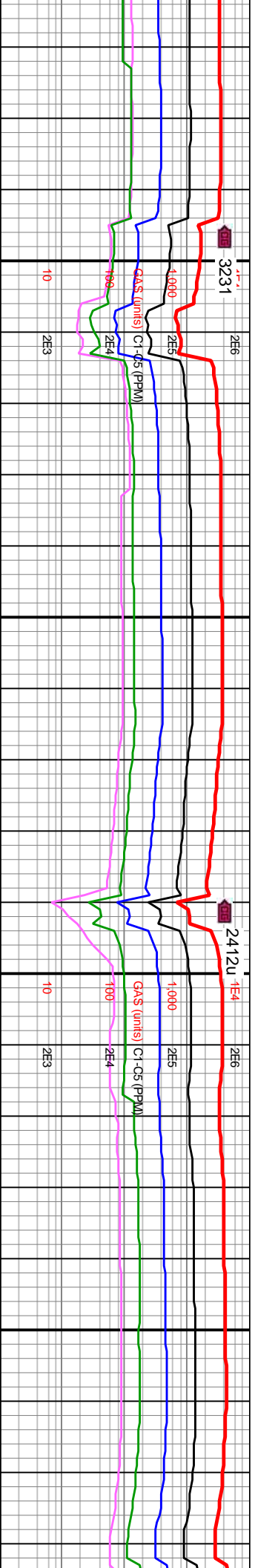
MMW IN: 9.8+  
VIS IN: 41  
MMW OUT: 9.8+  
VIS OUT: 41

WOB: 19klbs  
RPM: 60  
SPM: 171  
SPP: 3.612psi

MD: 11.629'  
INC: 88.1°  
AZM: 271.4°  
TVD: 7.459.86'  
VS: 3.930.36'

MD: 11.724'  
INC: 88.4°  
AZM: 270.7°  
TVD: 7.462.76'  
VS: 4.024.28'

MMW IN: 9.9  
VIS IN: 42  
MMW OUT: 9.8  
VIS OUT: 42

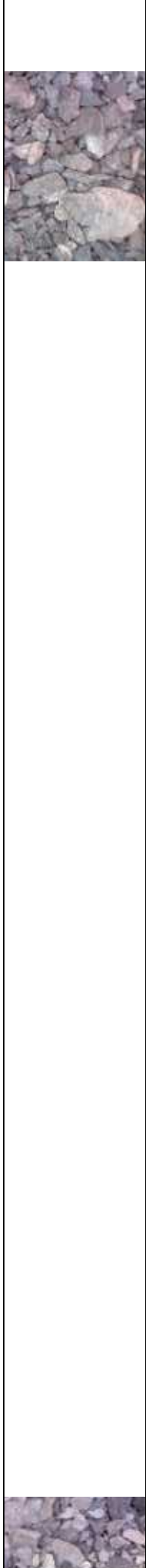


ST: dk gry, frm-fri, amor, com fy  
il, abrsv tex, dissim sli: 10%  
-offwht, sft-med frm, biky-sb ang,  
ex, occ intbd MRLST, tr forams, hi

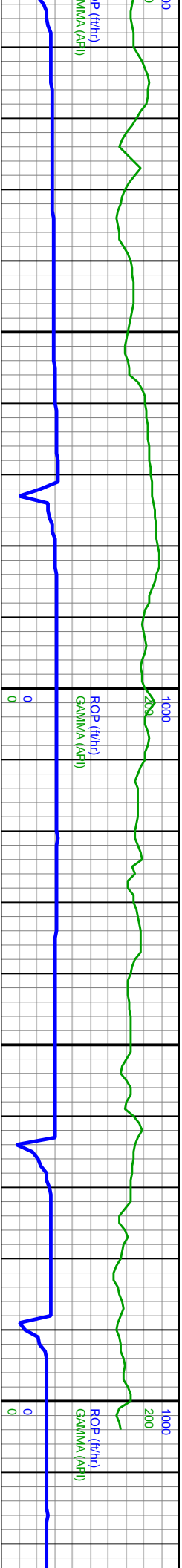
8000

8000

75% MRLST: predy dk gry, frm  
com fy lam chk incl, abrsv tex,  
25% CHK: lt brn-offwht, sft-me  
biky-sb ang, rthy chky tex, occ  
hi calc, tr forams







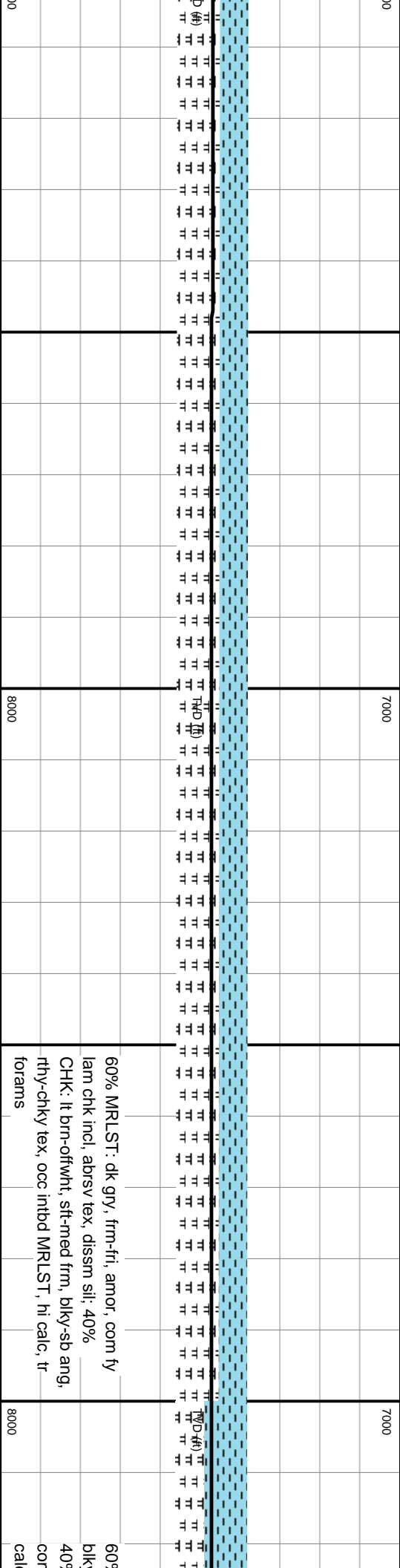
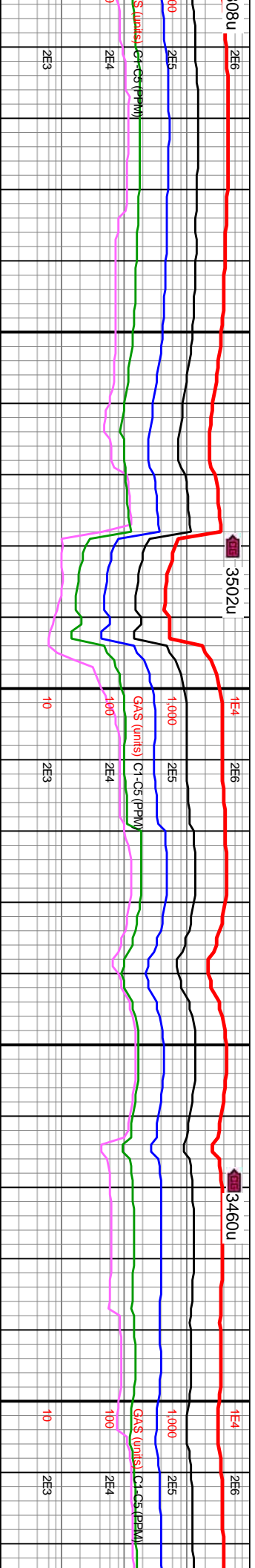
MD: 12,008' INC: 88.1° AZM: 270.9° TVD: 7,468.62' VS: 4,305.35'

MW IN: 10 VIS IN: 49 MW OUT: 10 VIS OUT: 44

MD: 12,103' INC: 88.9° AZM: 271.4° TVD: 7,471.1' VS: 4,399.31'

WOB: 30klbs RPM: 60 SPM: 170 SPP: 4,009psi

MD: 12,207' INC: 90° AZM: 271° TVD: 7,472.1' VS: 4,502.2'

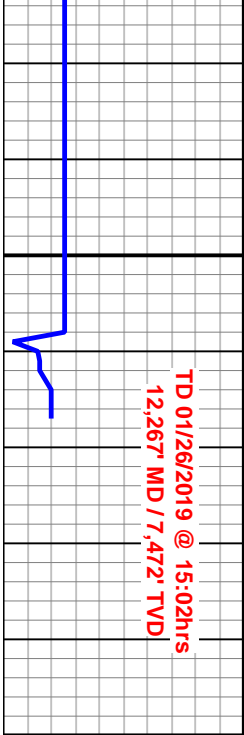


60% MRLST: dk gry, frm-fri, amor, com fy  
lam chk incl, abrsv tex, dissn sil: 40%  
CHK: It brn-offwht, sft-med frm, blk-y-sb ang,  
rthy-chky tex, ooc intbd MRLST, hi calc, tr  
forams



60°  
blk  
40°  
cor  
cal

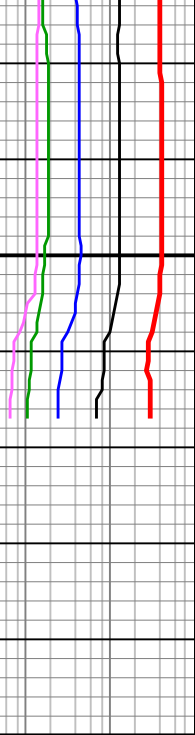
TD 01/26/2019 @ 15:02hrs  
12,267' MD / 7,472' TVD



12,230 12,240 12,250 12,260 12,270 12,280 12,290 12,300

MW IN: 10  
VIS IN: 47  
MW OUT: 10  
VIS OUT: 44

Projection to bit:  
MD: 12,267'  
INC: 90°  
AZM: 271°  
TVD: 7,472.1'  
VS: 4,561.54'



End of Horizontal Log



% CHK: lt brn-offwht, sft-med frm,  
y-sb ang, rthy-ckky tex, occ inbd MRLST;  
% MRLST: predy dk gry, frm-fri, amor,  
n fy lam chk incl, abrsv tex, diss sil, hi  
c, tr forams

