



# RESERVOIR GROUP

Scale: 5" / 100'  
Measured Depth Log

**Well Name** Sam 3K-25H-M166\_Mudlog\_COGCC

**Location** Sec. 25 T1N R66W

**State** Colorado

**County** Weld

**Country** USA

**Rig Number** Ensign 140

**API Number** 05123461210000

**AFE #** 16190876

**Geographic Region** Rockies

**Field** Wattenberg

**Spud Date** 9/8/2018

**Drilling Completed** 9/11/2018

**Surface Coordinates** Lat/Long: 40.01862/-104.733855  
SHL: Sec: 25 Twp: 1N 66W  
Footage: 1313 FSL 310 FWL

**Bottom Hole Coordinates** Proposed BHL: Sec: 25 Twp: 1N 66W  
Footages: 670 FFSLL 460 FFELL

**Ground Elevation** 5,080'

**K.B. Elevation** 5,109'

**Logged Interval** 6,700' To 11,973'

**Total Depth** 11,937

**Formation** C Chalk

**Type of Drilling Fluid** Synthetic Oil Based Mud

## Operator

**Company** Crestone Peak Resources

**Address** 1801 California Street, Suite 2500  
Denver, CO 80202



CRESTONE PEAK

# CRESTONE PEAK RESOURCES

## Geologist

**Name** John Ready

**Company** Crestone Peak Resources

**Address** 1801 California Street, Suite 2500  
Denver, CO 80202

## Zone Color Coding

Oil	Condensate	Gas
Note	Core	Pressure
Error	Water	Seal

## Other

**Loggers:** Brian Ferwerda / Nicholas Watkins / Thomas Yull

**Services Provided:** 2-Man Mudlogging / Geosteering

**Equipment:** ML-533

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

**Service Start Date:** 9/9/2018

## Rock Types

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

## Accessories

### Fossils

ALGAE
AMPHIPORA
BELEMNITE
BIOCLASTIC
BRACHIOIPOD
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

## Other Symbols

### Oil Show

- DEAD
- EVEN
- QUESTIONABLE
- SPOTTED STAINING

### Porosity

- E EARTHY
- F FENESTRAL
- F FRACTURE
- X INTERCRYSTALLINE
- INTEROOLITIC
- MOLDIC

- ORGANIC
- 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

- ANGULAR
- ROUNDED
- SUBANG
- SUBRND

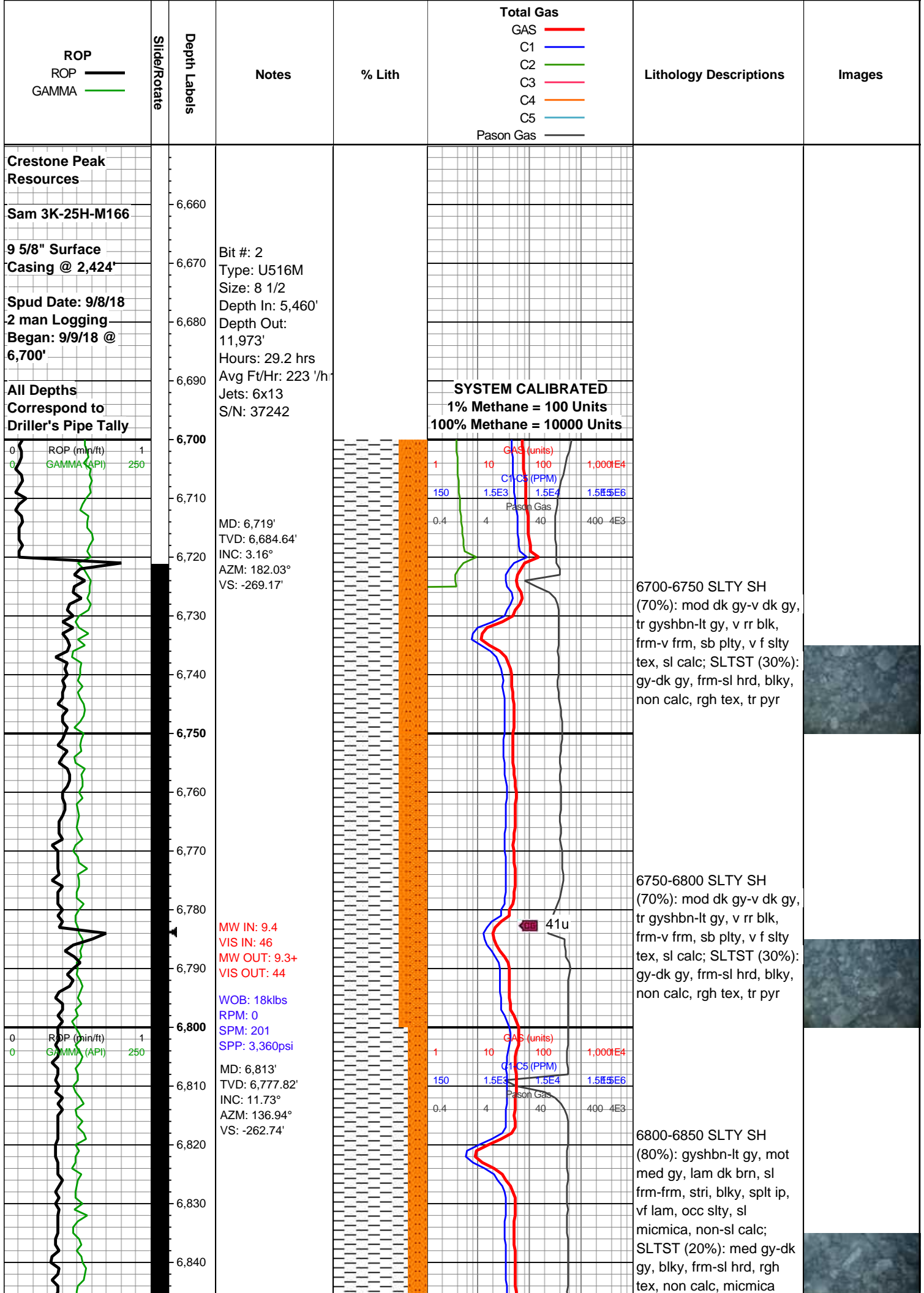
### Textures

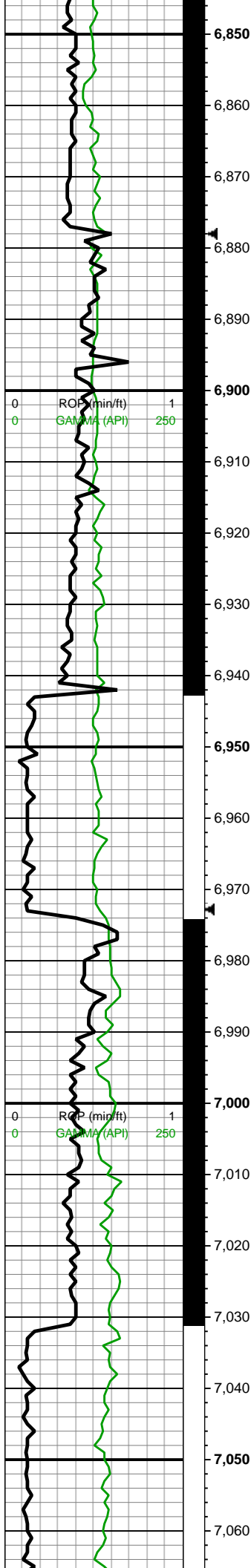
- BOUNDSTONE
- CHALKY
- CRYPTOXLN
- E EARTHY
- FINELYXLN
- GRAINSTONE

- L LITHOGRAPHIC
- MX MICROXLN
- MS MUDSTONE
- PS PACKSTONE
- WS WACKESTONE

### Sorting

- M MODERATE
- P POOR
- W WELL



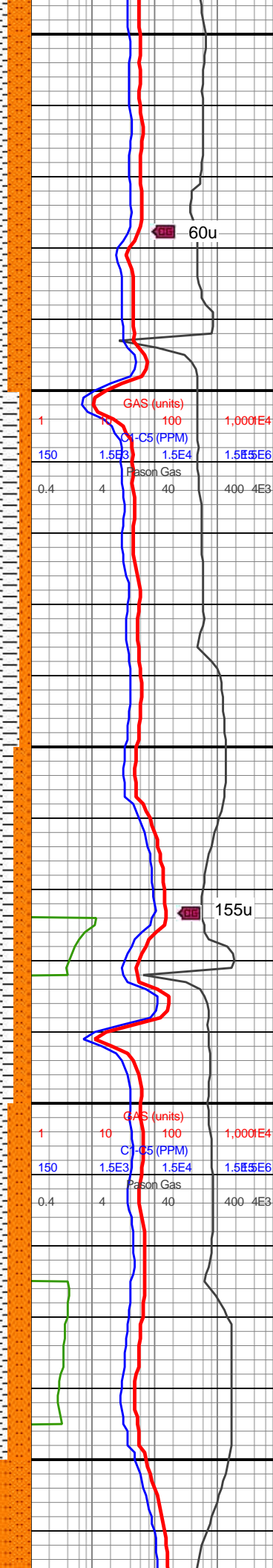


MW IN: 9.4  
VIS IN: 44  
MW OUT: 9.4  
VIS OUT: 43

MD: 6,908'  
TVD: 6,869.21'  
INC: 20°  
AZM: 112.42°  
VS: -241.09'

WOB: 18.7klbs  
RPM: 0  
SPM: 204  
SPP: 3,370psi

MD: 7,002'  
TVD: 6,956.83'  
INC: 22.54°  
AZM: 103.01°  
VS: -208.67'



6850-6900 SLTY SH  
(80%): gyshbn-lt gy, mot med gy, lam dk brn, sl frm-frm, stri, blk, spl ip, vf lam, occ slty, sl micmica, non-sl calc; SLTST (20%): med gy-dk gy, blk, frm-sl hrd, rgh tex, non calc, micmica

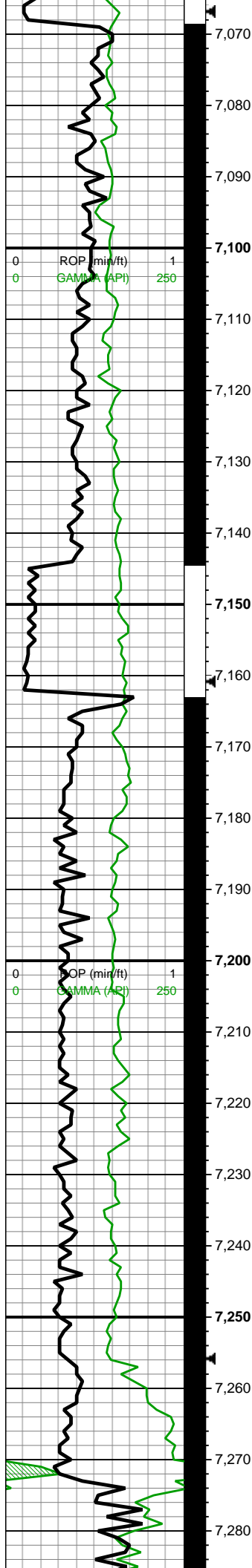
6900-6950 SLTY SH  
(90%): gyshbn-lt gy, mot med gy, lam dk brn, sl frm-frm, stri, blk, spl ip, vf lam, occ slty, sl micmica, non-sl calc; SLTST (10%): med gy-dk gy, blk, frm-sl hrd, rgh tex, non calc, micmica

6950-7000 SLTY SH  
(85%): gyshbn-lt gy, mot med gy, lam dk brn, sl frm-frm, stri, blk, spl ip, vf lam, occ slty, sl micmica, non-sl calc; SLTST (15%): med gy-dk gy, blk, frm-sl hrd, rgh tex, non calc, micmica

7000-7050 SLTY SH  
(80%): predy gy-gyshbn sb frm-frm mod fis sb blk-sb plty ctngs, occ off wh-v lt gy sft w hydrated gumbo slty sh, thn lamn, slty arg tex, non calc; SLTST (20%): gy-dk gy, frm-brit, sb plty-plty, brit, occ v dk gy wi vugy silc vn, tr vf pyr, non calc







MD: 7,096'  
TVD: 7,043.37'  
INC: 23.47°  
AZM: 95.81°  
VS: -172.5'

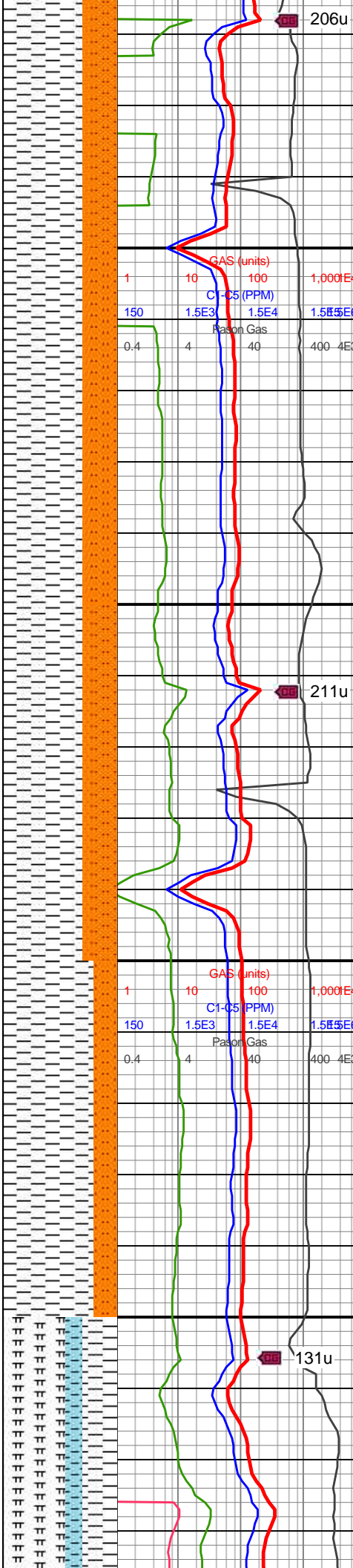
MW IN: 9.4  
VIS IN: 44  
MW OUT: 9.4  
VIS OUT: 42

MD: 7,191'  
TVD: 7,128.98'  
INC: 27.86°  
AZM: 92.82°  
VS: -131.49'

WOB: 17.6klbs  
RPM: 0  
SPM: 200  
SPP: 3,338psi

Sharon Springs  
7257MD/7186'TVD

Niobrara  
7274MD/7199'TVD



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

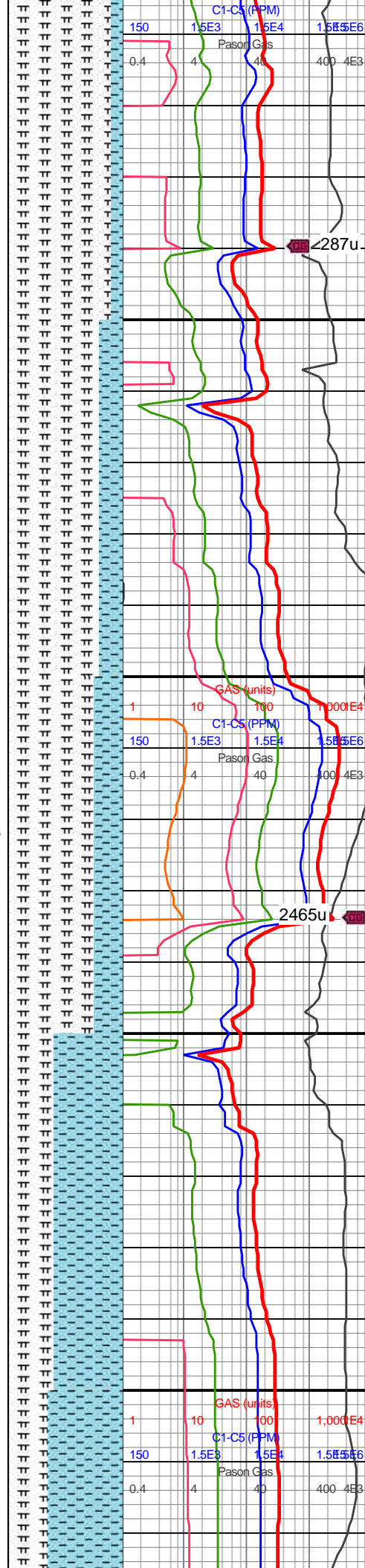
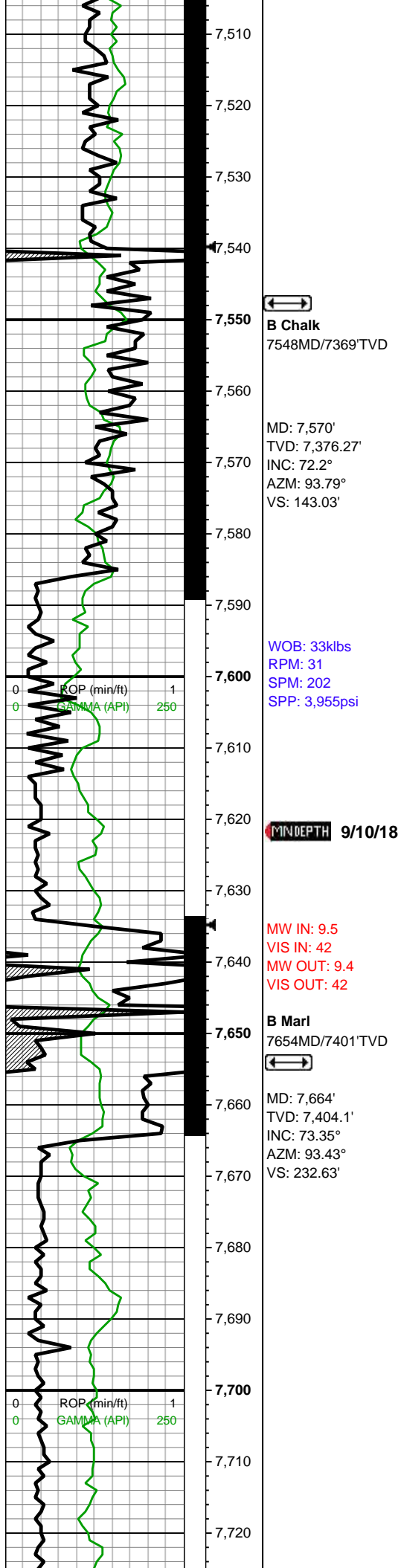
7100-7150 SLTY SH  
(70%): predy gy-gyshbn  
sb frm-frm mod fis sb  
blky-sb plty ctngs, occ off  
wh-v lt gy sft w hydrated  
gumbo slty sh, thn lamn,  
slty arg tex, non calc;  
SLTST (30%): gy-dk gy,  
frm-brit, sb plty-plty, brit,  
occ v dk gy wi vugy silc  
vn, tr vf pyr, non calc

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

7200-7250 SLTY SH  
(80%): 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 (20%): gy-dk gy,  
frm-brit, sb plty-plty, brit,  
occ v dk gy wi vugy silc  
vn, tr vf pyr, non calc

7250-7300 MRLST  
(55%): dk gy-dk gyshbn,  
sb blky-spl't ctngs, sl hd,  
brit, mn'r chk intbds, tr  
dissm mic pyr, mod-hi  
calc; SH (30%): gy-dk gy,  
frm, brit, mod fis, sb  
blky-blky, wh silc vn ip, rr  
bent, mod calc: CHK





7500-7550 MRLST  
(90%): gy-dk gy-v dk gy,  
com gyshbn, frm-brit  
mod fis sb blkyl-blky  
ctngs, sm arg-sl slty tex,  
occ brn marl incl & rr o  
stn, tr vf pyr, mod calc wi  
brn mrly resdl; CHK  
(10%): predy med gy, lt gy  
ip, frm-brit, mod fis, slty  
arg tex, sb blkyl-blky, hi  
calc

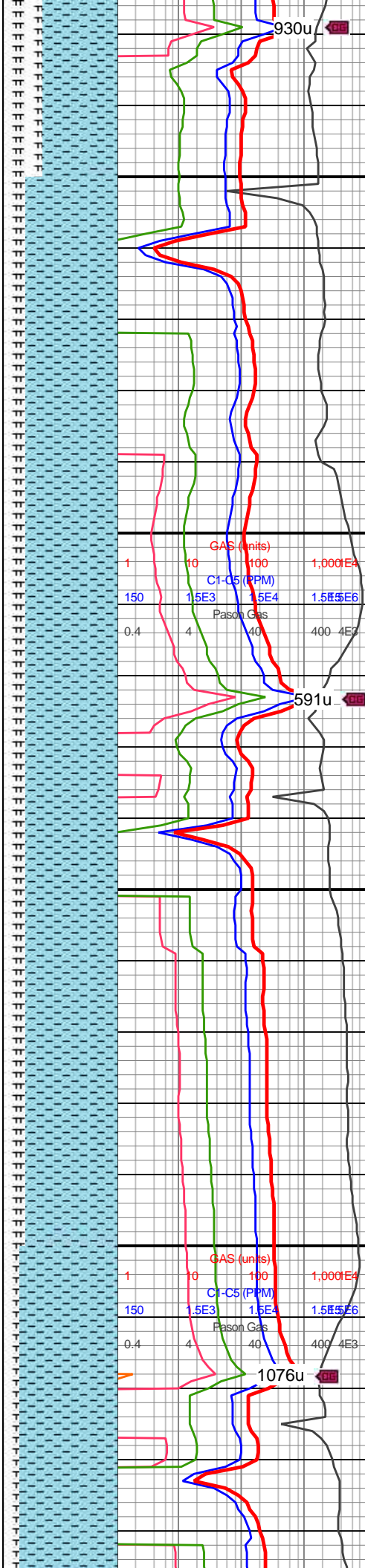
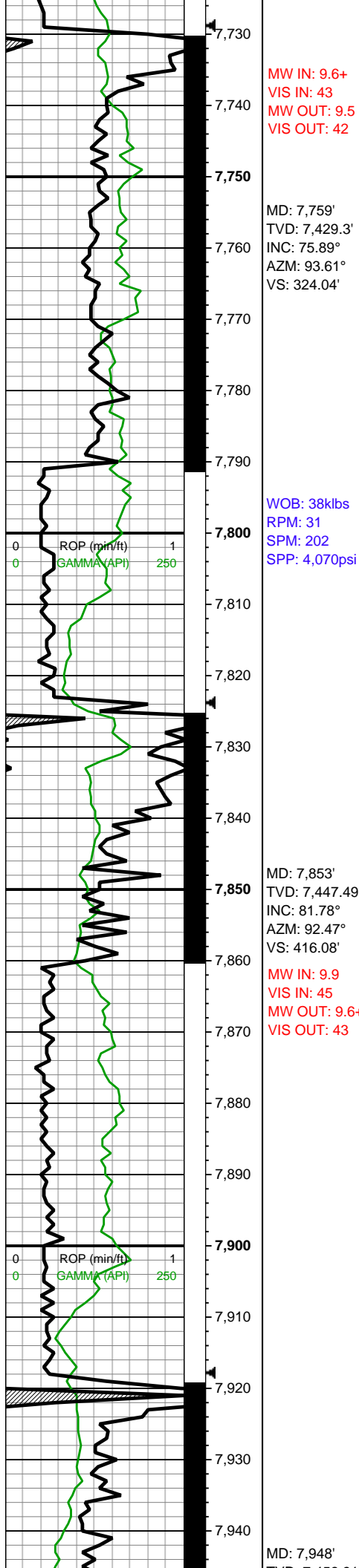
7550-7600 MRLST  
(80%): gy-gyshbn-dk gy,  
mot wi brn marl incl,  
frm-brit sb rd-sb blkyl-blky  
l-mod fis ctngs, sm  
arg-sl slty tex, tr vf pyr,  
mod calc wi brn mrly  
resdl; CHK (20%): predy  
med gy, lt gy ip, frm-brit,  
mod fis, slty arg tex, sb  
blkyl-blky, hi calc

7600-7650 MRLST  
(75%): gy-dk gy-v dk gy,  
com gyshbn, frm-brit  
mod fis sb blkyl-blky  
ctngs, sm arg-sl slty tex,  
occ brn marl incl & rr o  
stn, tr vf pyr, occ wh-tn  
bent, mod calc wi brn  
mrly resdl; CHK (25%):  
predy med gy, lt gy ip,  
frm-brit, mod fis, slty arg  
tex, sb blkyl-blky, hi calc

7650-7700 CHK (60%):  
gy-dk gy wi f wh chky incl  
& lamn, frm-brit, mod fis  
sb blkyl-hi fis blkyl ctngs,  
sm sl slty tex, tr vf pyr, hi  
calc; MRLST (40%): dk  
gy-dk gyshbn, frm-brit,  
mod fis sb blkyl-blky  
ctngs, mot wi brn marl  
incl, tr vf pyr, tr tn bent,  
mod calc wi brn mrly  
resdl

7700-7750 CHK (65%):  
gy-dk gy wi f wh chky incl  
& vf chky lamn, frm-brit,  
mod fis sb blkyl-hi fis blkyl  
ctngs, sm sl slty tex, tr  
forams, tr lt gy-tn bent, tr





930u

7750-7800 CHK (80%):  
gy-dk gy wi f wh chky incl  
& lamn, frm-brit, mod fis  
sb blk-y-hi fis blk-y ctngs,  
sm sl slty tex, tr vf pyr, hi  
calc; MRLST (20%): dk  
gy-dk gyshbn, frm-brit,  
mod fis sb blk-y-blky  
ctngs, mot wi brn marl  
incl, tr vf pyr, tr tn bent,  
mod calc wi brn mrly  
resdl

591u

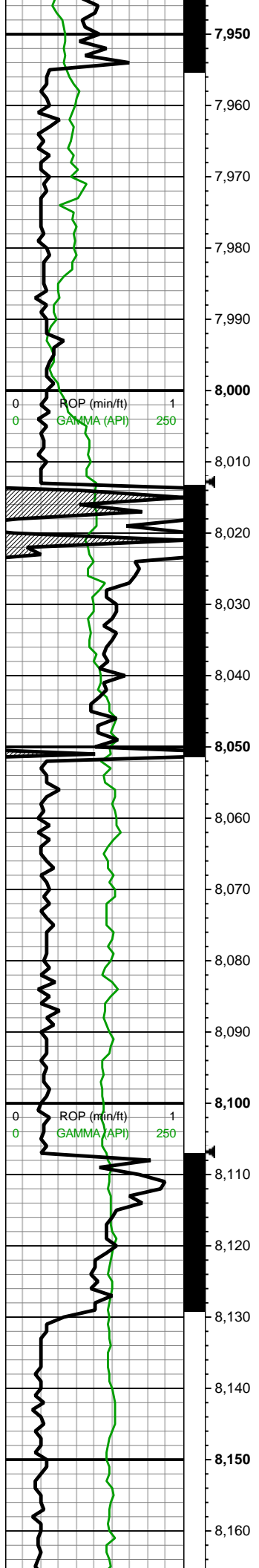
7800-7850 CHK (80%):  
gy-dk gy wi f wh chky incl  
& lamn, frm-brit, mod fis  
sb blk-y-hi fis blk-y ctngs,  
sm sl slty tex, tr vf pyr, hi  
calc; MRLST (20%): dk  
gy-dk gyshbn, frm-brit,  
mod fis sb blk-y-blky  
ctngs, mot wi brn marl  
incl, tr vf pyr, tr tn bent,  
mod calc wi brn mrly  
resdl

7850-7900 CHK (80%):  
gy-dk gy wi f wh chky incl  
& lamn, frm-brit, mod fis  
sb blk-y-hi fis blk-y ctngs,  
sm sl slty tex, tr vf pyr, hi  
calc; MRLST (20%): dk  
gy-dk gyshbn, frm-brit,  
mod fis sb blk-y-blky  
ctngs, mot wi brn marl  
incl, tr vf pyr, tr tn bent,  
mod calc wi brn mrly  
resdl

1076u

7900-7950 CHK (85%):  
gy-dk gy wi f wh chky incl  
& vf chky lamn, frm-brit,  
mod fis sb blk-y-hi fis blk-y  
ctngs, sm sl slty tex, tr  
forams, tr lt gy-tn bent, tr  
vf pyr, hi calc; MRLST  
(15%): dk gy-dk gyshbn,  
frm-brit, mod fis sb  
blk-y-blky ctngs, mot wi  
brn marl incl, tr vf pyr, tr tn  
bent, mod calc wi brn





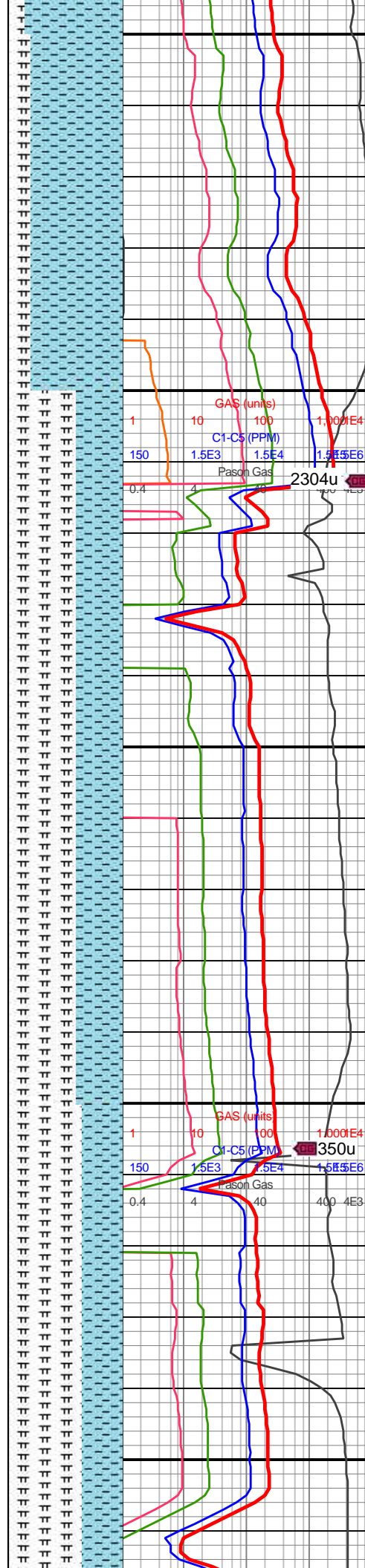
VDD: 7,458.91'  
INC: 84.42°  
AZM: 90.53°  
VS: 510.34'

WOB: 39klbs  
RPM: 33  
SPM: 202  
SPP: 4,041psi

MD: 8,043'  
TVD: 7,465.49'  
INC: 87.63°  
AZM: 90.89°  
VS: 605.09'

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

MD: 8,137'  
TVD: 7,467.36'  
INC: 90.09°  
AZM: 91.59°  
VS: 699.04'

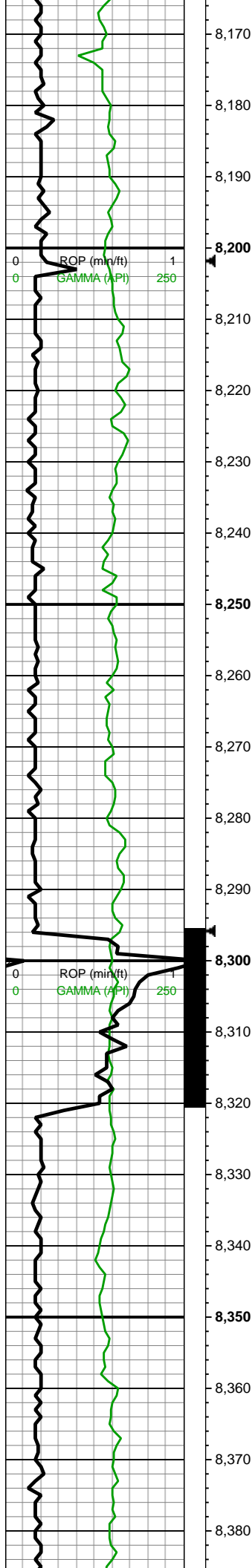


mrly resdl

7950-8000 CHK (80%):  
gy-dk gy wi f wh chky incl  
& vf chky lamn, frm-brit,  
mod fis sb blk-y-hi fis blk-y  
ctngs, sm sl slty tex, tr  
forams, tr lt gy-tn bent, tr  
vf pyr, hi calc; MRLST  
(20%): dk gy-dk gyshbn,  
frm-brit, mod fis sb  
blk-y-blk-y ctngs, mot wi  
brn marl incl, tr vf pyr, tr tn  
bent, mod calc wi brn  
mrly resdl

8000-8100 CHK (70%): lt  
gy-lt gyshbn wi yel brn o  
stn, sb frm-frm, brit ip,  
l-mod fis sb rd-sb blk-y  
ctngs, sl slty tex, thn chky  
lamn, tr vf pyr, hi calc;  
MRLST (30%): dk gy,  
frm-brit mod fis sb  
blk-y-blk-y ctngs, sl slty tex,  
tr vf pyr, mod calc wi brn  
resdl

8100-8200 CHK (80%): lt

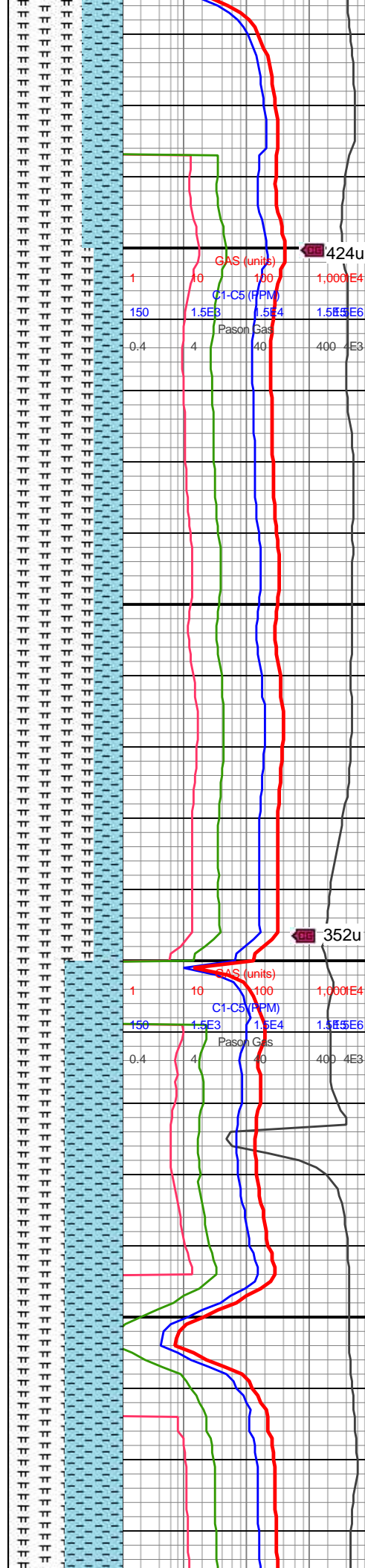


WOB: 38.9klbs  
RPM: 51  
SPM: 202  
SPP: 4,056psi

MD: 8,231'  
TVD: 7,467.75'  
INC: 89.43°  
AZM: 92.73°  
VS: 792.96'

MW IN: 9.8+  
VIS IN: 46  
MW OUT: 9.8+  
VIS OUT: 45

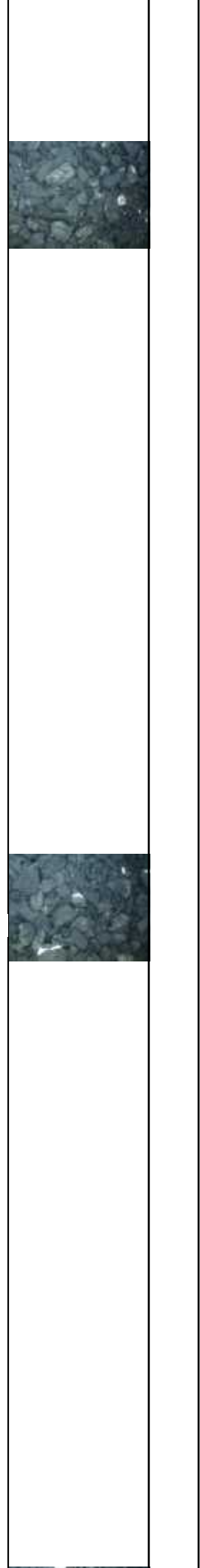
MD: 8,326'  
TVD: 7,466.08'  
INC: 92.59°  
AZM: 92.2°  
VS: 887.84'



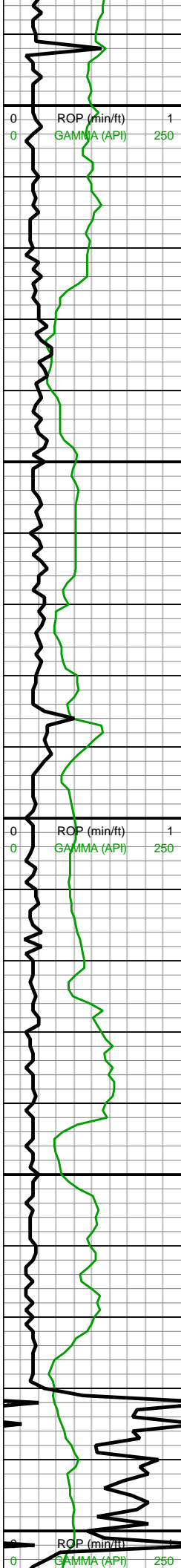
8100-8200 CHK (80%): lt gy-lt gyshbn, sb frm-frm-brit, l fis sb rd ctngs, sl slty tex, thn wh chky lamn, occ yel o strn, tr vf pyr, hi calc; MRLST (20%): dk gy, frm-brit mod fis sb blkly-blky ctngs, sl slty tex, tr vf pyr, mod calc wi brn resdl

8200-8300 MRLST (75%): med gy-dk gy-occ blk, frm-hd-brit, med fis sb blkly-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, blkly-sb plty-plty, sm tex, hi calc

8300-8400 MRLST (50%): dk gy-dk gyshbn, sl hd, sb blkly-splt ctngs, mntr Chk intbds, tr diss







WOB: 37.6klbs  
RPM: 66  
SPM: 200  
SPP: 4,179psi

MD: 8,421'  
TVD: 7,461.31'  
INC: 93.16°  
AZM: 90.97°  
VS: 982.68'

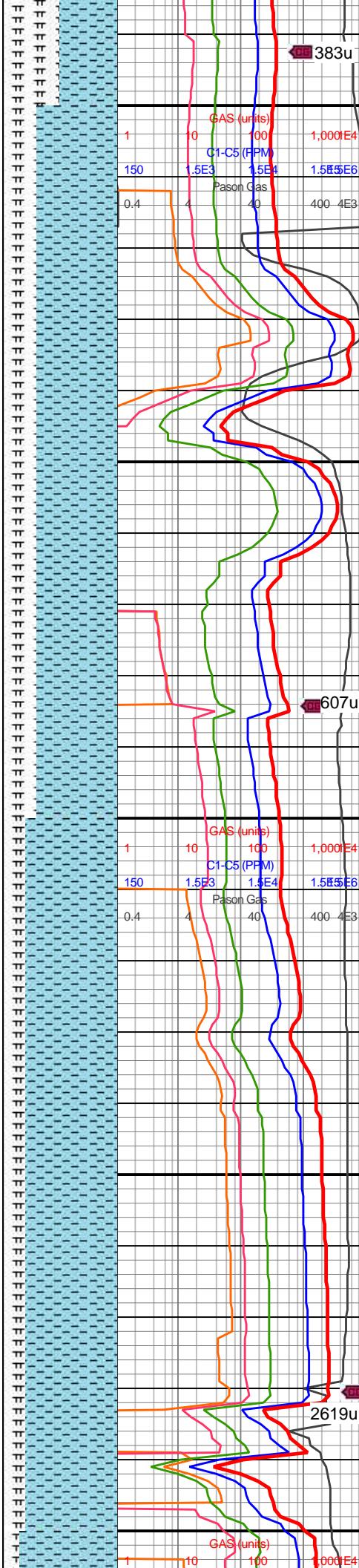
On Buster

MD: 8,515'  
TVD: 7,455.05'  
INC: 94.48°  
AZM: 90.62°  
VS: 1,076.46'

MW IN: 9.8  
VIS IN: 46  
MW OUT: 9.8  
VIS OUT: 45

WOB: 50.7klbs  
RPM: 0  
SPM: 202  
SPP: 3,764psi

MD: 8,609'

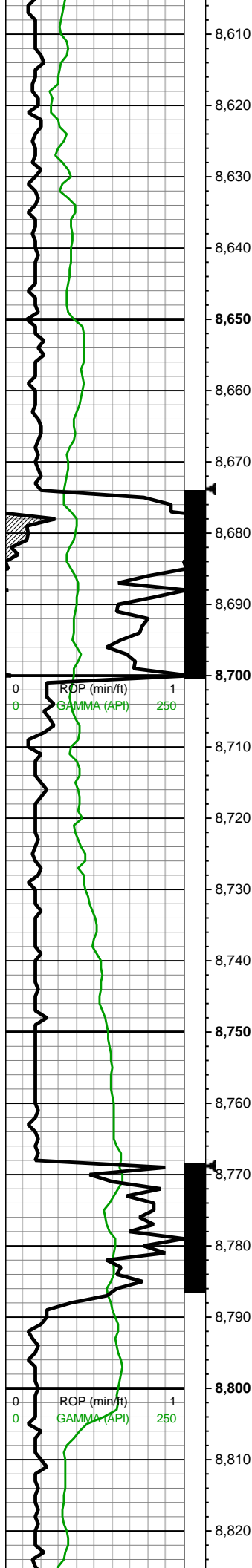


mic pyr, mod calc; CHK  
(50%): lt gy-gyshbn, sb  
blky-sb tab ctngs, sl  
frm-brit, tr vf lam, hi calc

8400-8500 CHK(70%):  
med gy-sl gyshbn, sub  
blky-sub plty med fis  
ctngs, frm, occ-com fos  
frags, rr forams, tr vf-uf  
pyr, hi calc; MRLST  
(30%): dk gyshbn-dk gy,  
frm-sl hd-brit, mod calc, tr  
CHK incl

8500-8600 CHK (80%): lt  
gy-med gy wi sme wh  
chky incl thru, sb frm-frm,  
l-mod fis sb rd-sb blky  
ctngs, chky 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





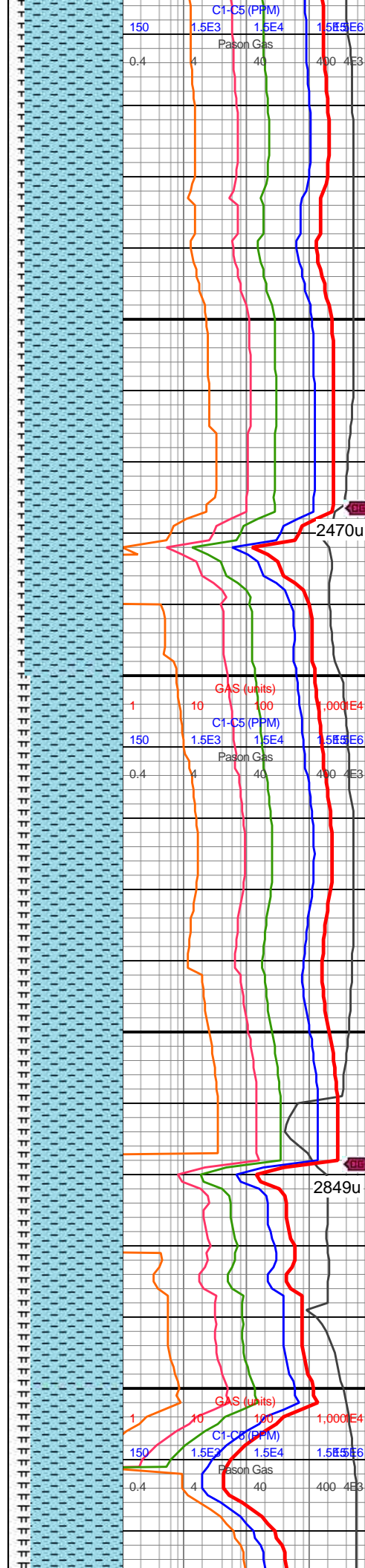
TVD: 7,448.85'  
INC: 93.08°  
AZM: 88.69°  
VS: 1,170.25'

MD: 8,704'  
TVD: 7,445.17'  
INC: 91.36°  
AZM: 90.09°  
VS: 1,265.17'

MW IN: 9.8  
VIS IN: 45  
MW OUT: 9.7+  
VIS OUT: 44

MD: 8,798'  
TVD: 7,444.6'  
INC: 89.34°  
AZM: 90.27°  
VS: 1,359.16'

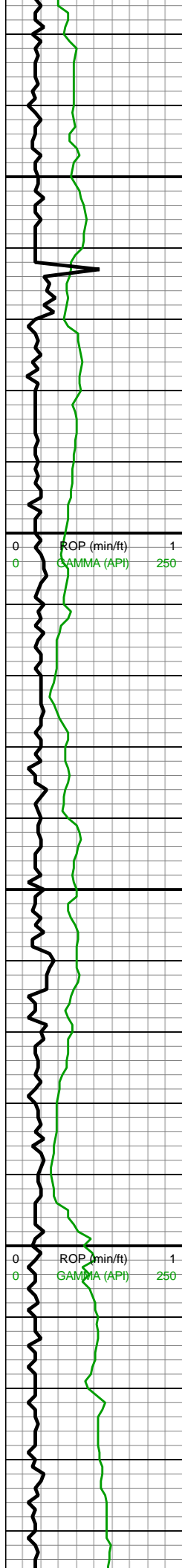
WOB: 35.6klbs  
RPM: 65  
SPM: 202  
SPP: 4,294psi



8600-8700 CHK (85%):  
med gy-sl gyshbn, mot lt  
gy-brn, sub blk-sub plty  
med fis ctngs, frm,  
occ-com fos frags, rr  
forams, tr vf-uf pyr, hi calc;  
MRLST (15%): dk  
gyshbn-dk gy, frm-sl  
hd-brit, mod calc, tr CHK  
incl

8700-8800 CHK (80%):  
predy gyshbn-lt gy, mot,  
scat offwht, sb blk-sub  
ang ctngs, fri-frm, sm  
chky tex, scat inoc fos  
frags, calc; MRLST  
(20%): dk gyshbn-dk gy,  
frm-sl hd, sb blk-sub  
ang ctngs, sl sm-rgh tex, com  
intbd CHK, scat pyrc nod,  
rr frac fl cal, hi calc





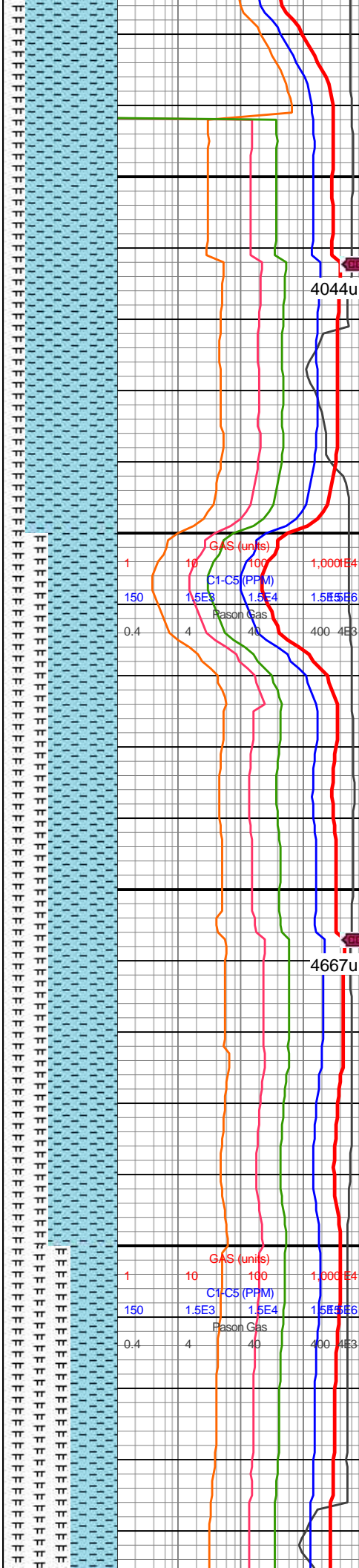
8,830  
8,840  
8,850  
8,860  
8,870  
8,880  
8,890  
8,900  
8,910  
8,920  
8,930  
8,940  
8,950  
8,960  
8,970  
8,980  
8,990  
9,000  
9,010  
9,020  
9,030  
9,040

MD: 8,893'  
TVD: 7,446.46'  
INC: 88.42°  
AZM: 90.45°  
VS: 1,454.14'

MD: 8,988'  
TVD: 7,449.99'  
INC: 87.32°  
AZM: 89.48°  
VS: 1,549.07'

WOB: 38.8klbs  
RPM: 65  
SPM: 200  
SPP: 4,371psi

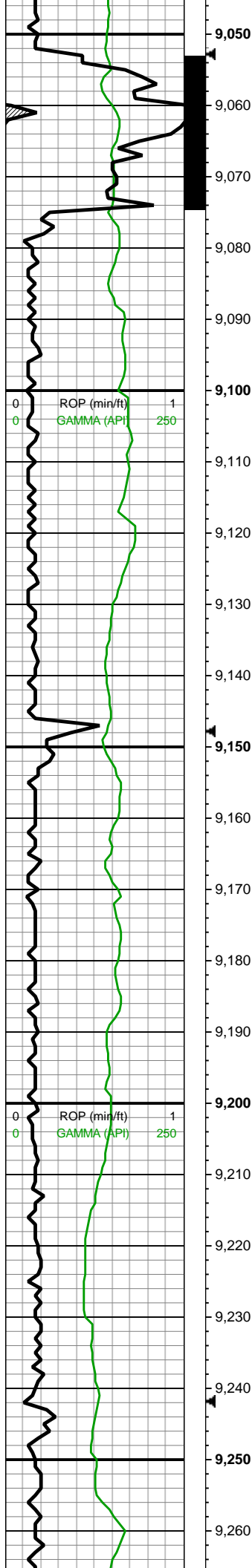
MW IN: 9.8  
VIS IN: 45  
MW OUT: 9.8  
VIS OUT: 44



8800-8900 CHK (80%):  
pred lt gry wi lt brn, sme  
sl med gy-brn, frm-sl brit,  
sb blkyl-sl plty, sl sft ip, v  
calc, tr pyr, scat lse cal;  
MRLST (20%): v dk  
gy-blk, occ gyshbn, frm-v  
frm, blkyl, calc, sl rgh tex  
wi com micmica

8900-9000 CHK (60%):  
lt-med gy wi occ f wh chky  
incl, frm-brit, sb blkyl-blky  
ctngs, tr foram, v tr fos  
frag, tr vf pyr, hi calc;  
MRLST (40%): dk gy, rr  
blk, frm-brit, blkyl-sb blkyl  
ctngs, predy sm arg tex,  
sl slty ip, tr vf pyr, mod  
calc

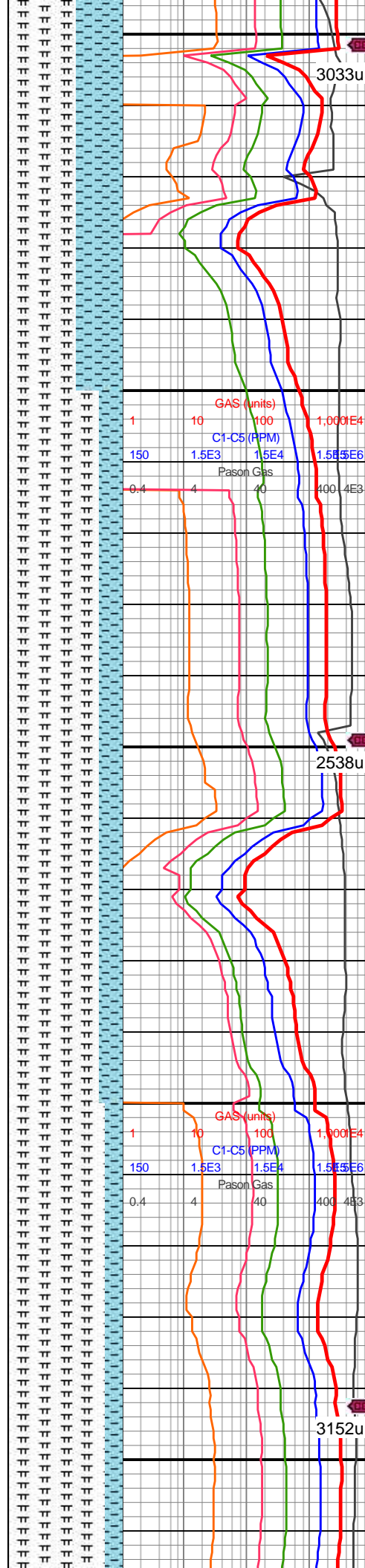




MD: 9,083'  
TVD: 7,453.34'  
INC: 88.64°  
AZM: 88.86°  
VS: 1,644'

MD: 9,177'  
TVD: 7,455.61'  
INC: 88.59°  
AZM: 88.86°  
VS: 1,737.96'

WOB: 35.3klbs  
RPM: 65  
SPM: 202  
SPP: 4,397psi

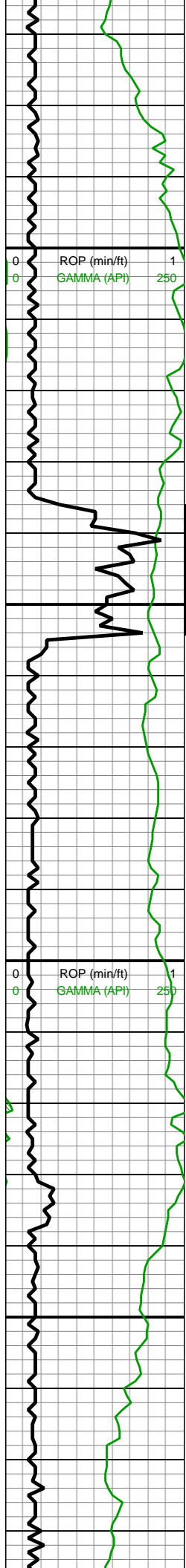


9000-9100 MRLST  
(60%): v dk gy-blk,  
frm-brit-hd, mod fis sb  
blky-blky ctngs, rr-occ vf  
pyr, rr sp brn marl incl,  
occ pyr strg, hi calc; CHK  
(40%): dk gy-med gy,  
sme offwht, sb frm-frm,  
brit, tr vf pyr, hi calc

9100-9200 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







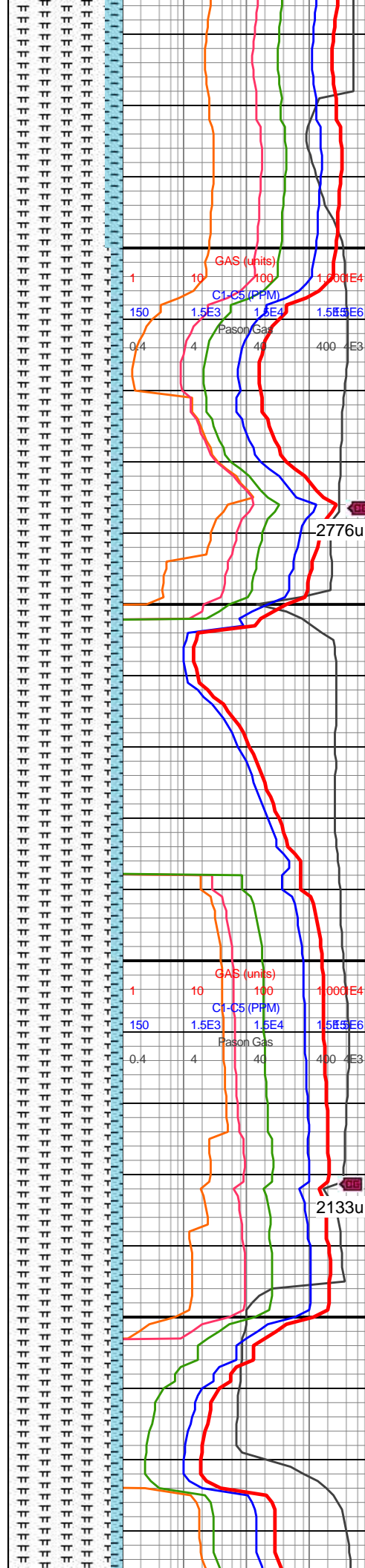
MD: 9,272'  
TVD: 7,458.13'  
INC: 88.37°  
AZM: 88.78°  
VS: 1,832.9'

MW IN: 9.8  
VIS IN: 44  
MW OUT: 9.7+  
VIS OUT: 44

MD: 9,367'  
TVD: 7,459.7'  
INC: 89.74°  
AZM: 88.6°  
VS: 1,927.87'

WOB: 28.9klbs  
RPM: 65  
SPM: 202  
SPP: 4,253psi

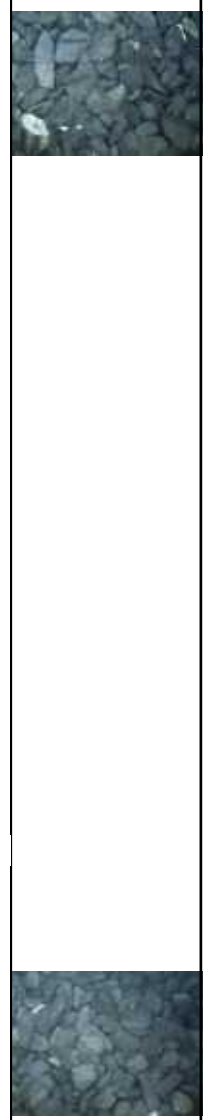
MD: 9,462'  
TVD: 7,459.73'  
INC: 90.22°  
AZM: 88.42°  
VS: 2,022.84'



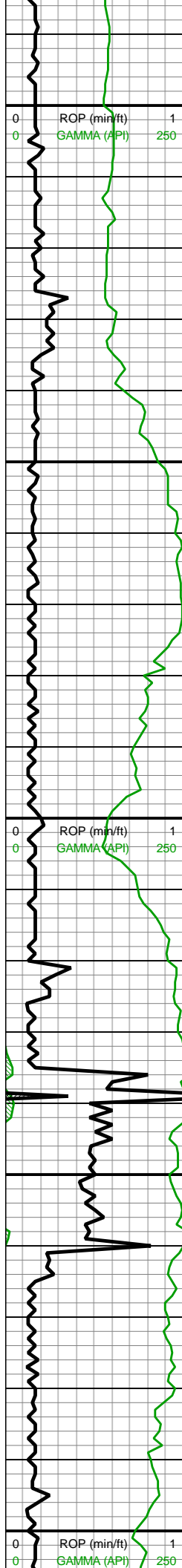
9200-9300 MRLST  
(85%): dk gy-dk gyshbn, sb blky-splt ctngs, brit, sl hd-frm, mntr CHK intbds, tr pp mic pyr, mod calc; CHK (15%): med brn-gyshbn, mot, sl frm-frm, sb blky-sb tab ctngs, brit, tr CHK incl, mntr vf lam, v calc

9300-9400 MRLST  
(90%): dk gyshbn, frm, sb blky-sb ang, l-mod fis ctngs, slty-sl rgh mot tex, arg, com CHK intbd lam, mod calc; CHK (10%): lt gy-med gy, wh chky incl, sb frm-frm-brit, mod fis, sb blky-blky ctngs, sl slty tex, hi calc

9400-9500 MRLST  
(90%): dk gy-dk gyshbn, sb blky-splt ctngs, brit, sl hd-frm, mntr CHK intbds, tr pp mic pyr, mod calc; CHK (10%): med







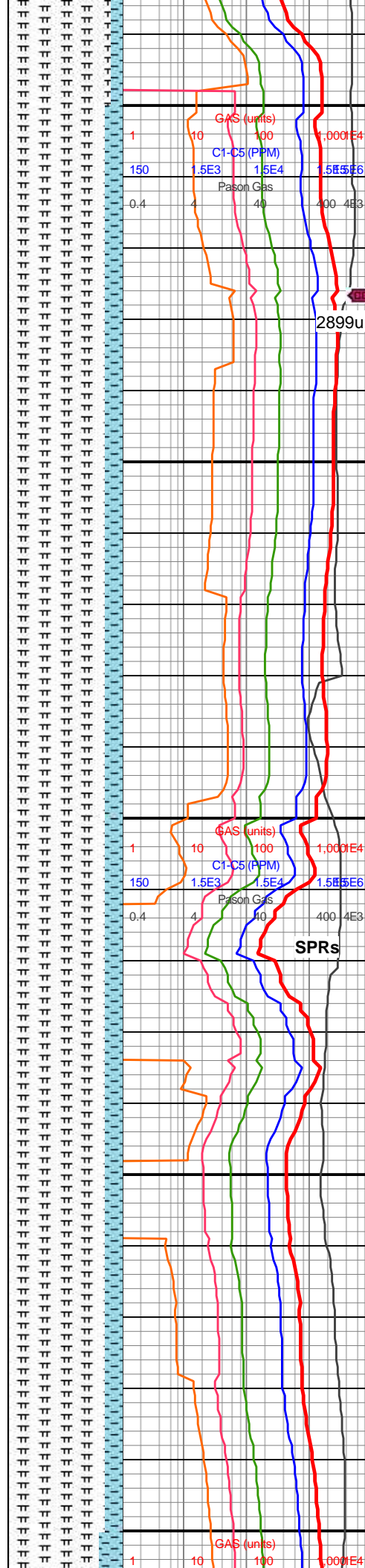
9,490  
9,500  
9,510  
9,520  
9,530  
9,540  
9,550  
9,560  
9,570  
9,580  
9,590  
9,600  
9,610  
9,620  
9,630  
9,640  
9,650  
9,660  
9,670  
9,680  
9,690  
9,700

MD: 9,556'  
TVD: 7,460.99'  
INC: 88.24°  
AZM: 84.82°  
VS: 2,116.65'

WOB: 41.4klbs  
RPM: 65  
SPM: 200  
SPP: 4,462psi

MD: 9,650'  
TVD: 7,462.98'  
INC: 89.34°  
AZM: 85.7°  
VS: 2,210.32'

MW IN: 9.7  
VIS IN: 44  
MW OUT: 9.8  
VIS OUT: 43

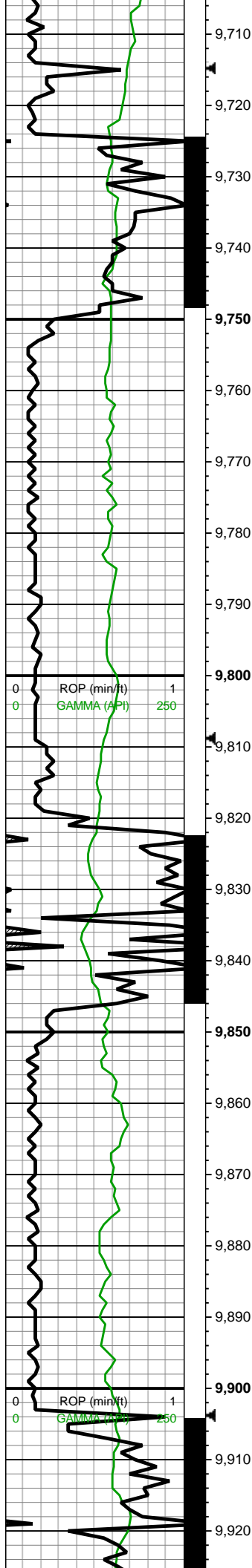


CHK (15%): med  
brn-gyshbn, mot, sl  
frm-frm, sb blk-  
ctngs, brit, tr CHK incl,  
mnr vf lam, v calc

9500-9600 MRLST  
(85%): gyshbn-dk gy,  
frm-hd, mod fis, sb blk,  
dul rthy lstr, mod calc wi  
brn mrly resd; CHK  
(15%): med gy, frm-brit,  
mod fis sb ang-sb blk  
ctngs, sm sl slty tex, tr  
forams, hi calc;

9600-9700 MRLST  
(85%): dk gy-gyshbn ip,  
sb frm-frm, brit ip, blk,  
sm-sl slty arg tex, mot, v  
calc; CHK (15%): med  
gy-lt gy, sme offwht, dk gy  
ip, tr lt gyshbn, frm-brit,  
sb blk-blky ctngs, tr-rr  
mic fos frags, tr vf pyr, hi  
calc



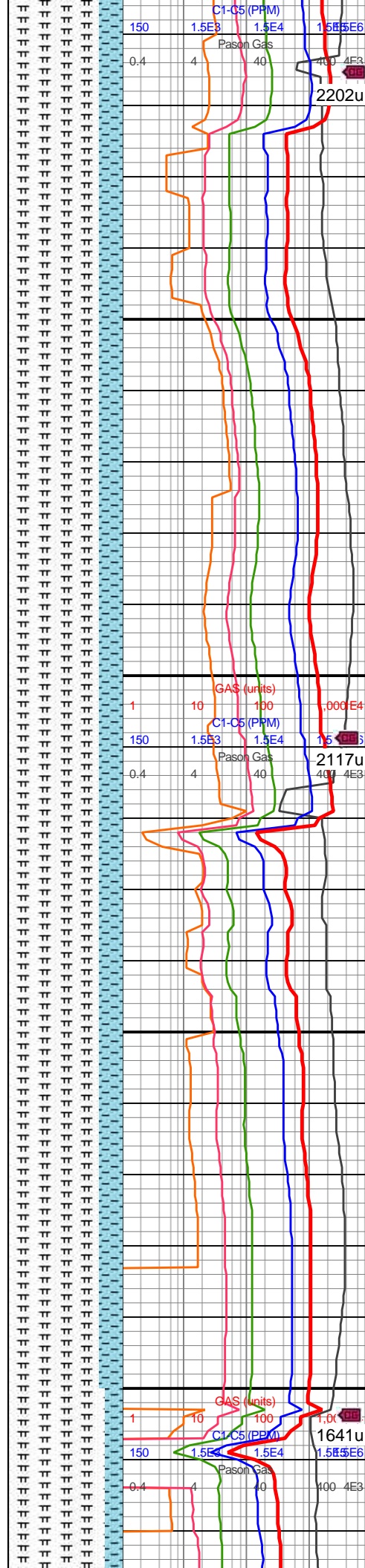


MD: 9,744'  
TVD: 7,464.53'  
INC: 88.77°  
AZM: 86.67°  
VS: 2,304.11'

WOB: 39.3klbs  
RPM: 65  
SPM: 202  
SPP: 4,468psi

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

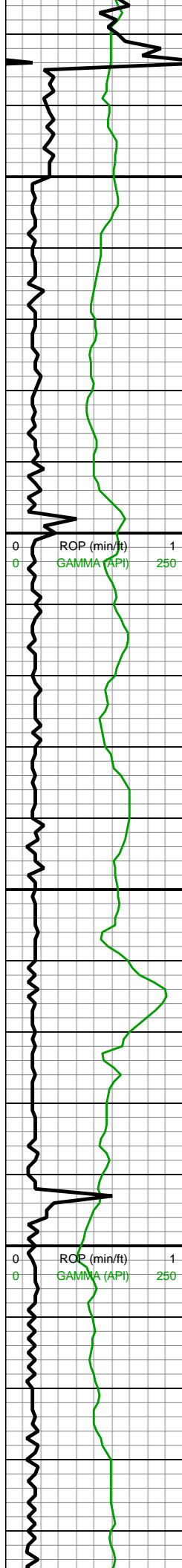
MD: 9,839'  
TVD: 7,465.66'  
INC: 89.87°  
AZM: 86.75°  
VS: 2,398.95'



9700-9800 MRLST  
(80%): 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  
(20%): dk gy-med gy,  
sme offwht, sb frm-frm,  
brit, tr vf pyr, hi calc

9800-9900 MRLST  
(80%): dk gy-dk gyshbn,  
sb blky-splt ctngs, brit, sl  
hd-frm, mnr CHK intbds,  
tr pp mic pyr, mod calc;  
CHK (20%): med  
brn-gyshbn, mot  
lt-gy-brn-offwht, sl  
frm-frm, sb blky-sb tab  
ctngs, brit, tr CHK incl,  
mnv vf lam, v calc





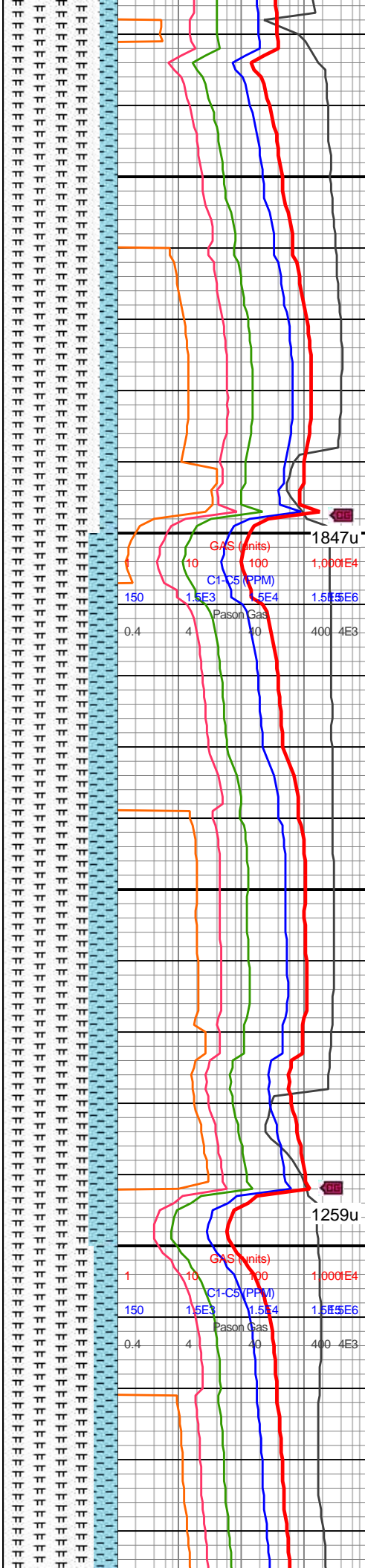
MD: 9,933'  
TVD: 7,464.47'  
INC: 91.58°  
AZM: 90.8°  
VS: 2,492.9'

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

WOB: 39klbs  
RPM: 65  
SPM: 200  
SPP: 4,465psi

MD: 10,028'  
TVD: 7,461.62'  
INC: 91.85°  
AZM: 91.5°  
VS: 2,587.83'

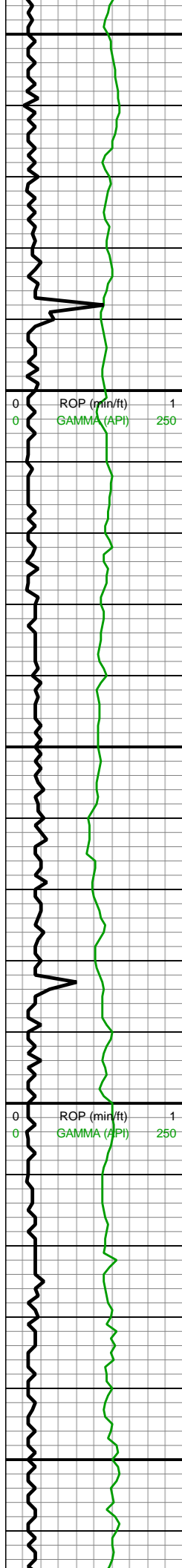
MD: 10,123'  
TVD: 7,459.47'  
INC: 90.75°  
AZM: 92.64°  
VS: 2,682.74'



9900-10000 MRLST  
(85%): dk gy-gyshbn ip,  
sb frm-frm, brit ip, blk,  
sm-sl slty arg tex, occ  
mot brn mrly incl ip, occ  
calc frac fill; CHK (15%):  
med gy, dk gy ip, tr lt gy,  
frm-brit, sb blk-bkly  
ctngs, chky tex, tr vf pyr, hi  
calc

10000-10100 MRLST  
(75%): dk gy-dk gyshbn,  
sb blk-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 blk-sb tab  
ctngs, brit, tr CHK incl,  
mnv vf lam, v calc





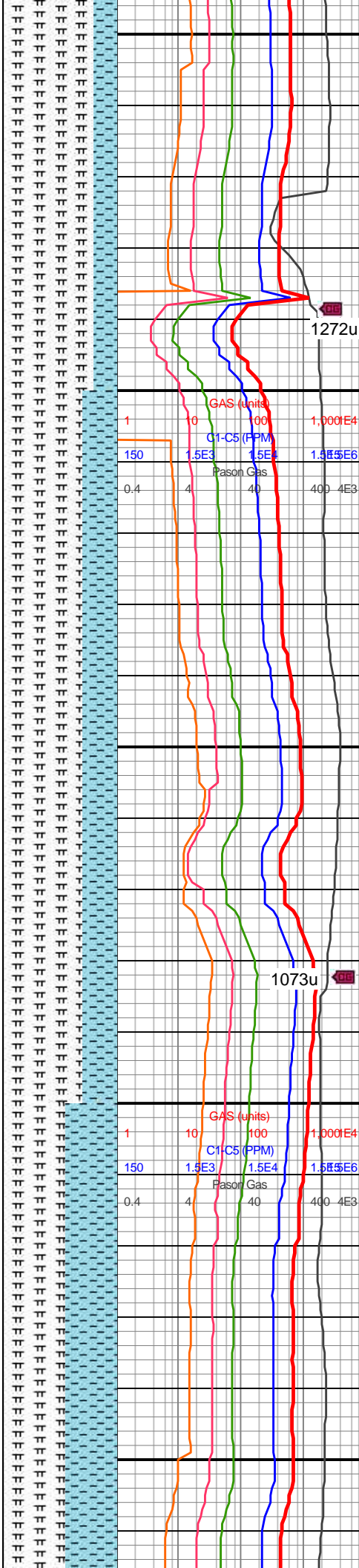
10,150  
10,160  
10,170  
10,180  
10,190  
10,200  
10,210  
10,220  
10,230  
10,240  
10,250  
10,260  
10,270  
10,280  
10,290  
10,300  
10,310  
10,320  
10,330  
10,340  
10,350  
10,360

WOB: 37.9klbs  
RPM: 65  
SPM: 200  
SPP: 4,499psi

MD: 10,218'  
TVD: 7,458.45'  
INC: 90.48°  
AZM: 91.5°  
VS: 2,777.67'

MW IN: 9.7+  
VIS IN: 43  
MW OUT: 9.7+  
VIS OUT: 44

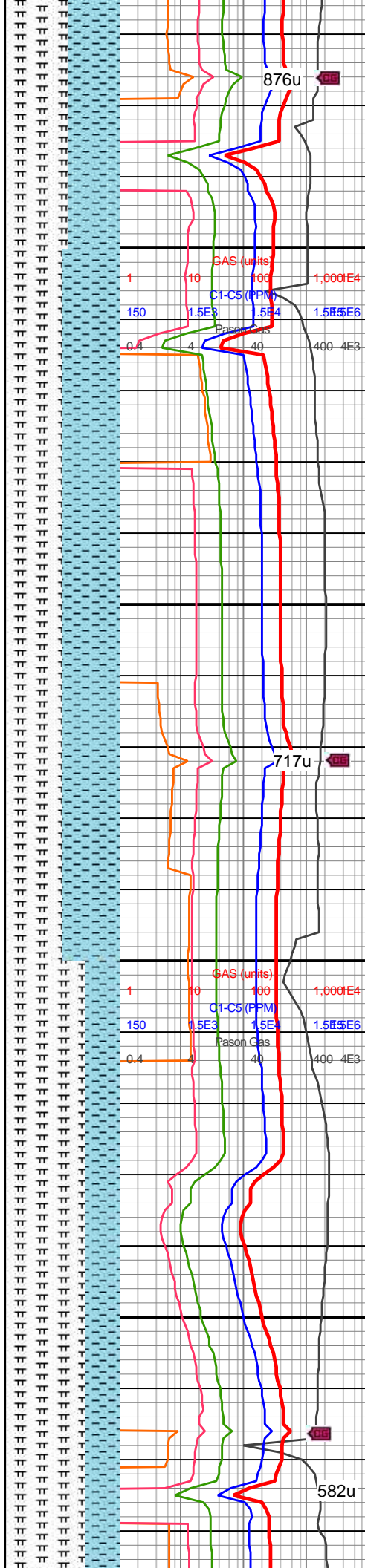
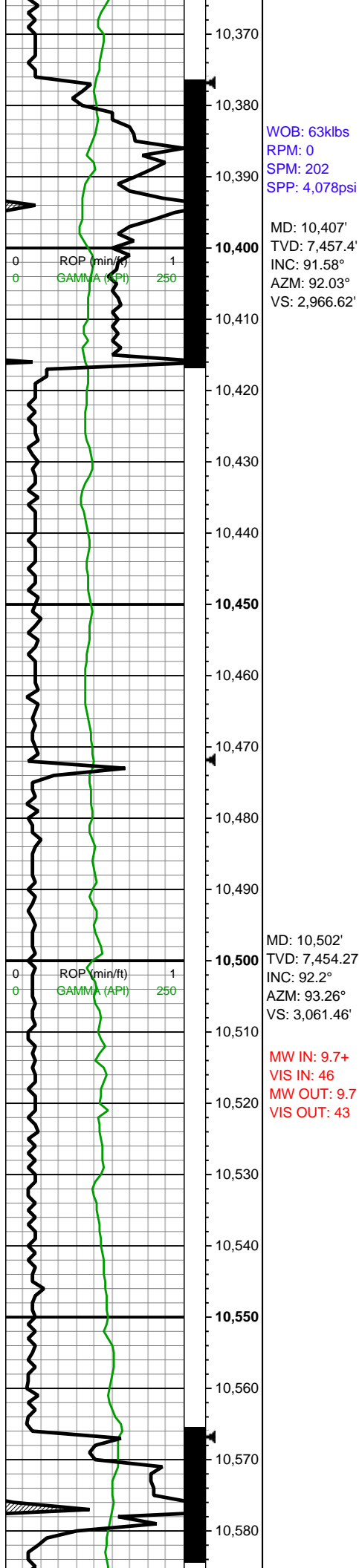
MD: 10,312'  
TVD: 7,458.38'  
INC: 89.6°  
AZM: 88.16°  
VS: 2,871.65'



10100-10200 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, scat  
cal vns

10200-10300 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

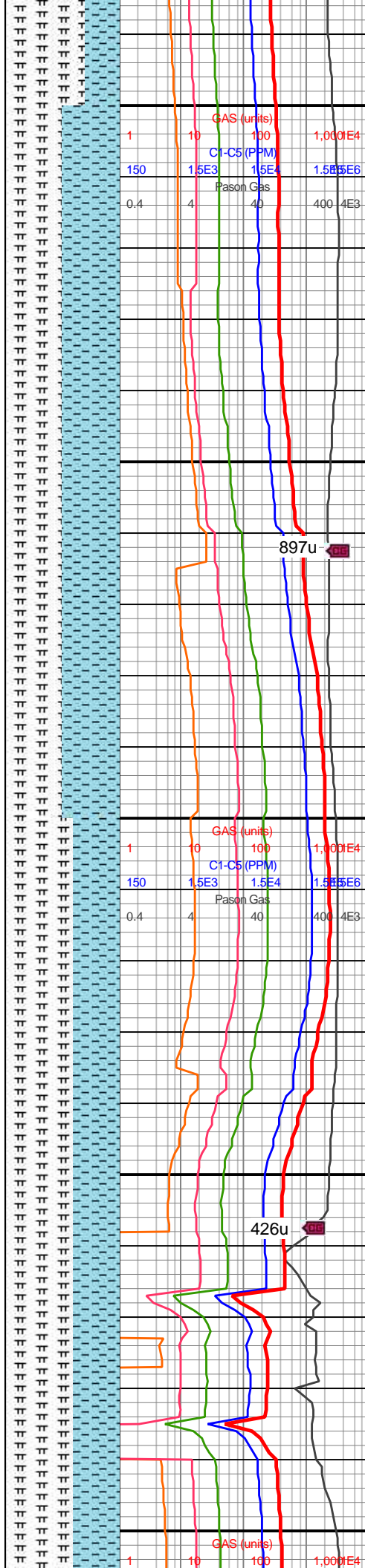
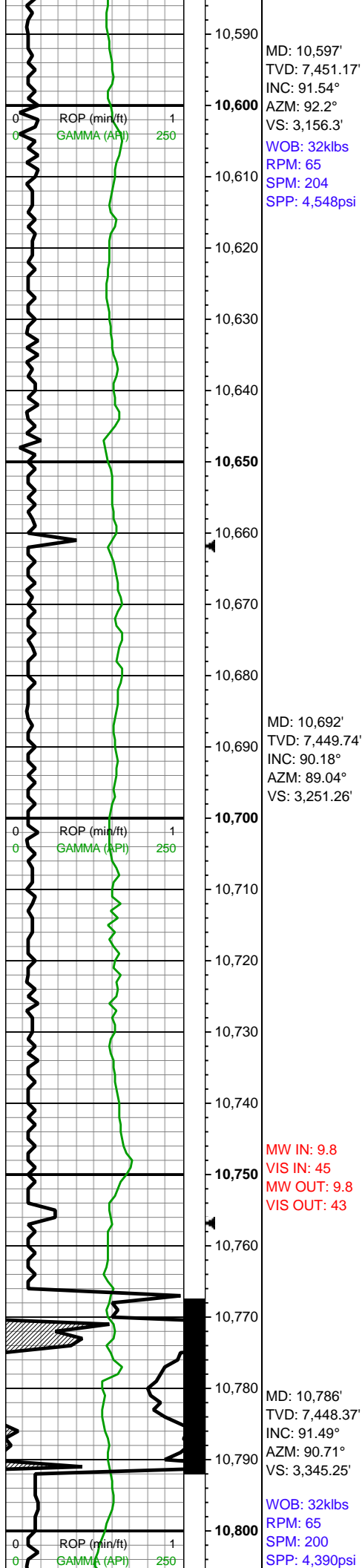




10300-10400 MRLST  
(45%): v dk gy-blk, occ  
gyshbn, frm-v frm, blk,  
calc, sl rgh tex wi com  
micmica; CHK (55%):  
pred lt gry wi lt brn, sme  
sl med gy-brn, frm-sl brit,  
sb blkly-sl plty, sl sft ip, v  
calc, tr pyr, scat-com mic  
fos frags, scat lse cal

10400-10500 MRLST  
(50%): v dk gy-blk, occ  
gyshbn, frm-v frm, blk,  
calc, sl rgh tex wi com  
micmica; CHK (50%):  
pred lt gry wi lt brn, sme  
sl med gy-brn, frm-sl brit,  
sb blkly-sl plty, sl sft ip, v  
calc, tr pyr, scat-com mic  
fos frags, scat lse cal

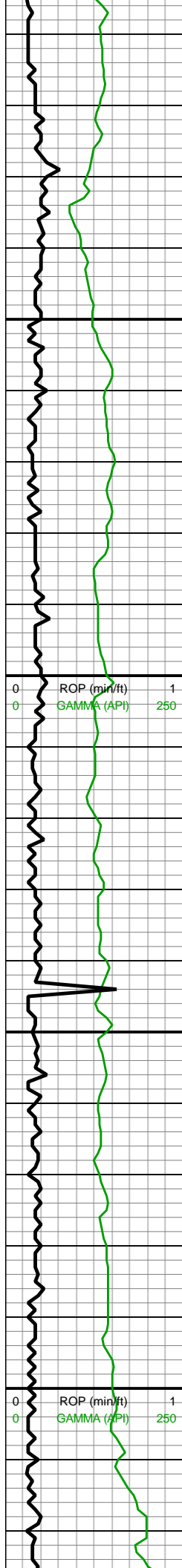
10500-10600 MRLST  
(70%): v dk gy-blk, occ  
gyshbn, frm-v frm, blk,  
calc, sl rgh tex wi com  
micmica; CHK (30%):  
pred lt gry wi lt brn, sme  
sl med gy-brn, frm-sl brit



sl med gy-brn, frm-sl brit,  
sb blkyl-sl plty, sl sft ip, v  
calc, tr pyr, scat-com mic  
fos frags, scat lse cal

10600-10700 MRLST  
(50%): v dk gy-blk, occ  
gyshbn, frm-v frm, blkyl,  
calc, sl rgh tex wi com  
micmica; CHK (50%):  
pred lt gry wi lt brn, sme  
sl med gy-brn, frm-sl brit,  
sb blkyl-sl plty, sl sft ip, v  
calc, tr pyr, scat-com mic  
fos frags, scat lse cal

10700-10800 MRLST  
(60%): v dk gy-blk, occ  
gyshbn, frm-v frm, blkyl,  
calc, sl rgh tex wi com  
micmica; CHK (40%):  
pred lt gry wi lt brn, sme  
sl med gy-brn, frm-sl brit,  
sb blkyl-sl plty, sl sft ip, v  
calc, tr pyr, scat-com mic  
fos frags, scat lse cal



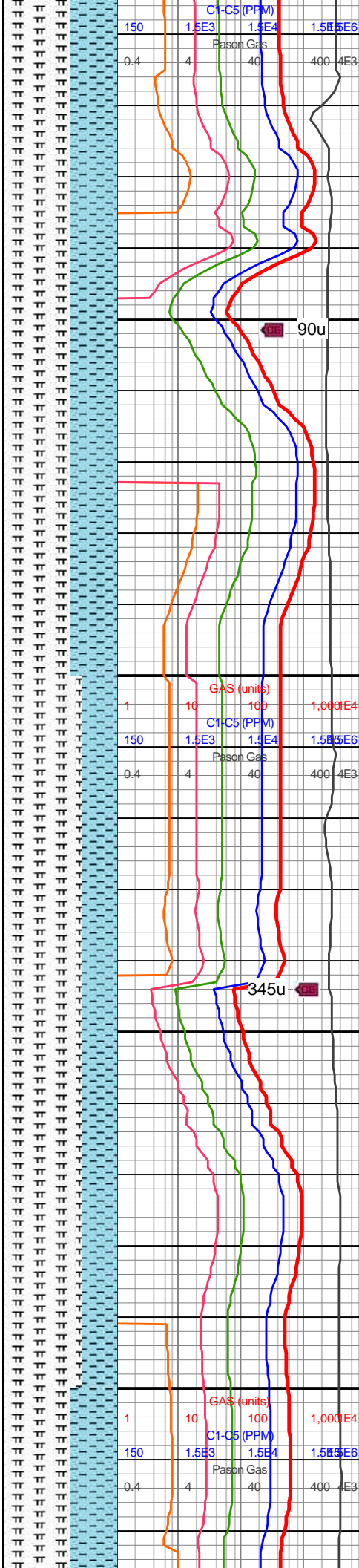
10,810  
10,820  
10,830  
10,840  
10,850  
10,860  
10,870  
10,880  
10,890  
10,900  
10,910  
10,920  
10,930  
10,940  
10,950  
10,960  
10,970  
10,980  
10,990  
11,000  
11,010  
11,020

MD: 10,881'  
TVD: 7,445.65'  
INC: 91.8°  
AZM: 91.15°  
VS: 3,440.19'

MW IN: 9.8  
VIS IN: 45  
MW OUT: 9.7+  
VIS OUT: 44

MD: 10,975'  
TVD: 7,443.37'  
INC: 90.97°  
AZM: 90.01°  
VS: 3,534.16'

WOB: 36klbs  
RPM: 65  
SPM: 204  
SPP: 4,648psi



10800-10900 MRLST  
(60%): v dk gy-blk, occ  
gyshbn, frm-v frm, blkly,  
calc, sl rgh tex wi com  
micmica; CHK (40%):  
pred lt gry wi lt brn, sme  
sl med gy-brn, frm-sl brit,  
sb blkly-sl plty, sl sft ip, v  
calc, tr pyr, scat-com mic  
fos frags, scat lse cal

10900-11000 MRLST  
(70%): v dk gy-blk, occ  
gyshbn, frm-v frm, blkly,  
calc, sl rgh tex wi com  
micmica; CHK (30%):  
pred lt gry wi lt brn, sme  
sl med gy-brn, frm-sl brit,  
sb blkly-sl plty, sl sft ip, v  
calc, tr pyr, scat-com mic  
fos frags, scat lse cal







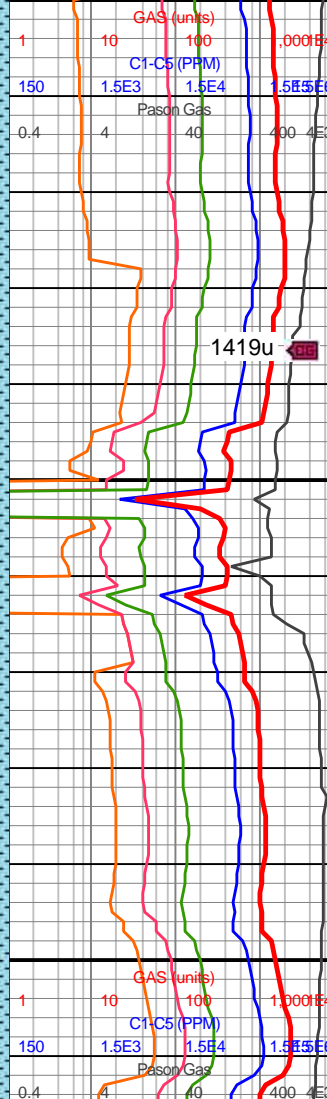
11,030  
11,040  
11,050  
11,060  
11,070  
11,080  
11,090  
11,100  
11,110  
11,120  
11,130  
11,140  
11,150  
11,160  
11,170  
11,180  
11,190  
11,200  
11,210  
11,220  
11,230  
11,240

MD: 11,070'  
TVD: 7,441.55'  
INC: 91.23°  
AZM: 89.92°  
VS: 3,629.14'

MW IN: 9.8  
VIS IN: 44  
MW OUT: 9.8  
VIS OUT: 43

MD: 11,164'  
TVD: 7,441.16'  
INC: 89.25°  
AZM: 90.97°  
VS: 3,723.13'

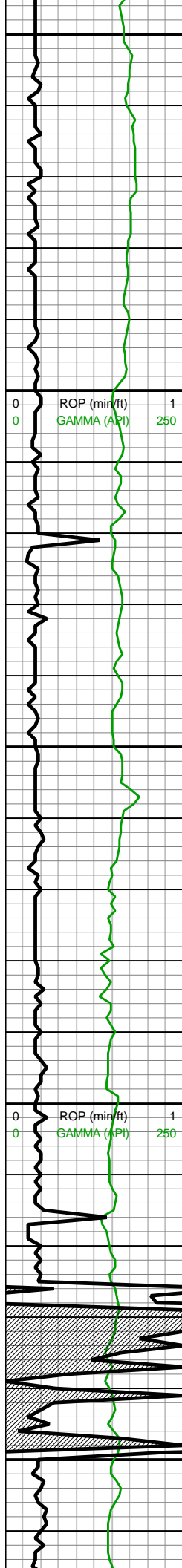
WOB: 37.7klbs  
RPM: 66  
SPM: 200  
SPP: 4,520psi



11000-11100 MRLST  
(60%): v dk gy-blk, occ  
gyshbn, frm-v frm, blkly,  
calc, sl rgh tex wi com  
micmica; CHK (40%):  
pred lt gry wi lt brn, sme  
sl med gy-brn, frm-sl brit,  
sb blkly-sl plty, sl sft ip, v  
calc, tr pyr, scat-com mic  
fos frags, scat lse cal

11100-11200 MRLST  
(60%): v dk gy-blk, occ  
gyshbn, frm-v frm, blkly,  
calc, sl rgh tex wi com  
micmica; CHK (40%):  
pred lt gry wi lt brn, sme  
sl med gy-brn, frm-sl brit,  
sb blkly-sl plty, sl sft ip, v  
calc, tr pyr, scat-com mic  
fos frags, scat lse cal





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

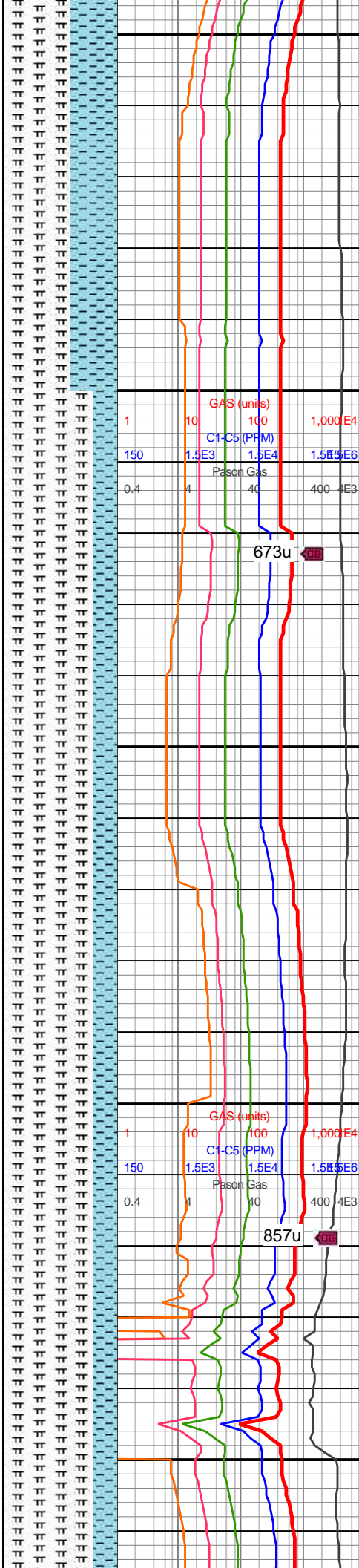
MD: 11,259'  
TVD: 7,442.07'  
INC: 89.65°  
AZM: 91.33°  
VS: 3,818.1'

MD: 11,354'  
TVD: 7,442.39'  
INC: 89.96°  
AZM: 90.36°  
VS: 3,913.09'

WOB: 39klbs  
RPM: 65  
SPM: 202  
SPP: 4,622psi

MW IN: 9.8  
VIS IN: 44  
MW OUT: 9.7+  
VIS OUT: 42

MD: 11,448'  
TVD: 7,444.41'  
INC: 87.58°  
AZM: 92.38°  
VS: 4,007.02'

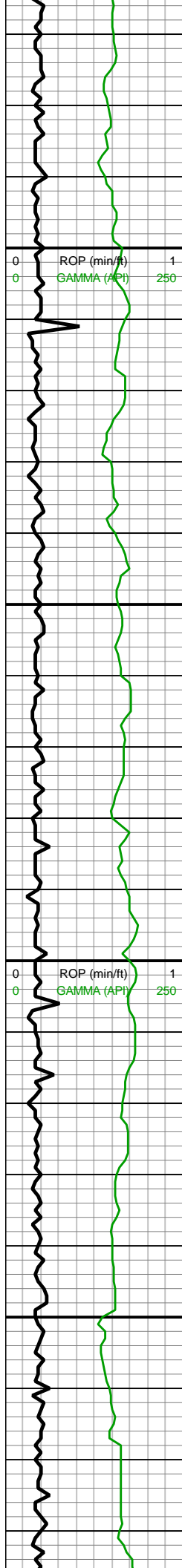


11200-11300 MRLST  
(60%): v dk gy-blk, occ  
gyshbn, frm-v frm, blk,  
calc, sl rgh tex wi com  
micmica; CHK (40%):  
pred lt gry wi lt brn, sme  
sl med gy-brn, frm-sl brit,  
sb blkyl-sl plty, sl sft ip, v  
calc, tr pyr, scat-com mic  
fos frags, scat lse cal

11300-11400 MRLST  
(80%): v dk gy-blk, occ  
gyshbn, frm-v frm, blk,  
calc, sl rgh tex wi com  
micmica; CHK (20%):  
pred lt gry wi lt brn, sme  
sl med gy-brn, frm-sl brit,  
sb blkyl-sl plty, sl sft ip, v  
calc, tr pyr, scat-com mic  
fos frags, scat lse cal



11400-11500 MRLST



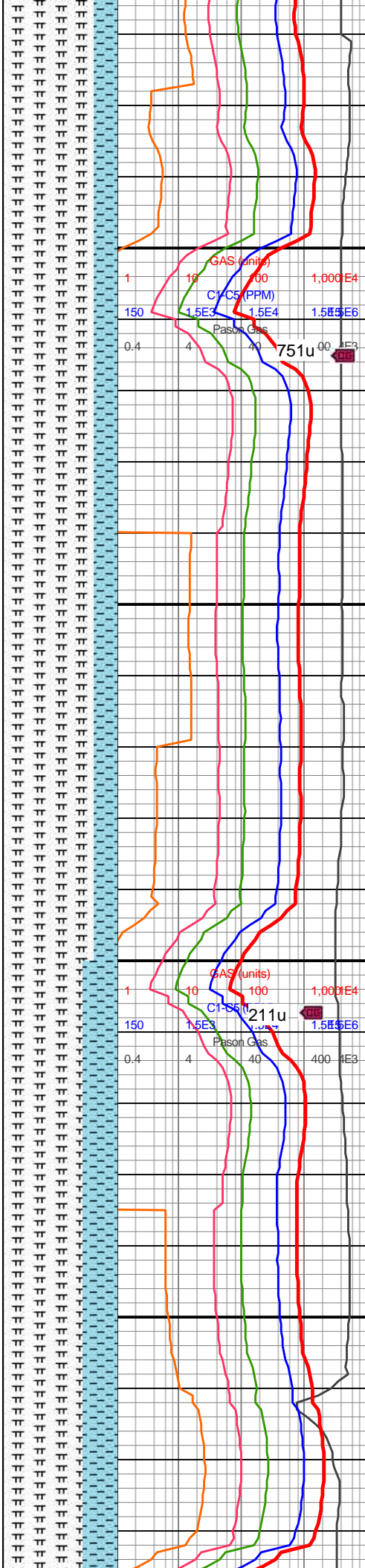
11,470  
11,480  
11,490  
11,500  
11,510  
11,520  
11,530  
11,540  
11,550  
11,560  
11,570  
11,580  
11,590  
11,600  
11,610  
11,620  
11,630  
11,640  
11,650  
11,660  
11,670  
11,680

MD: 11,544'  
TVD: 7,448.68'  
INC: 87.32°  
AZM: 91.68°  
VS: 4,102.86'

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

WOB: 39klbs  
RPM: 65  
SPM: 200  
SPP: 4,610psi

MD: 11,638'  
TVD: 7,453.22'  
INC: 87.14°  
AZM: 91.5°  
VS: 4,196.71'



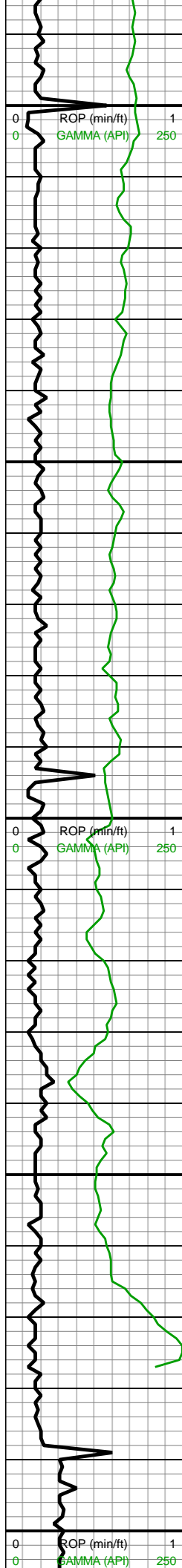
11400-11500 MRLST  
(80%): v dk gy-blk, occ gyshbn, frm-v frm, blk, calc, sl rgh tex wi com micmica; CHK (20%): pred lt gry wi lt brn, sme sl med gy-brn, frm-sl brit, sb blk-slt ply, sl sft ip, v calc, tr pyr, scat-com mic fos frags, scat lse cal

11500-11600 MRLST  
(80%): v dk gy-blk, occ gyshbn, frm-v frm, blk, calc, sl rgh tex wi com micmica; CHK (20%): pred lt gry wi lt brn, sme sl med gy-brn, frm-sl brit, sb blk-slt ply, sl sft ip, v calc, tr pyr, scat-com mic fos frags, scat lse cal

11600-11700 MRLST  
(70%): v dk gy-blk, occ gyshbn, frm-v frm, blk, calc, sl rgh tex wi com micmica; CHK (30%): pred lt gry wi lt brn, sme sl med gy-brn, frm-sl brit







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

MINDEPTH 9/11/2018

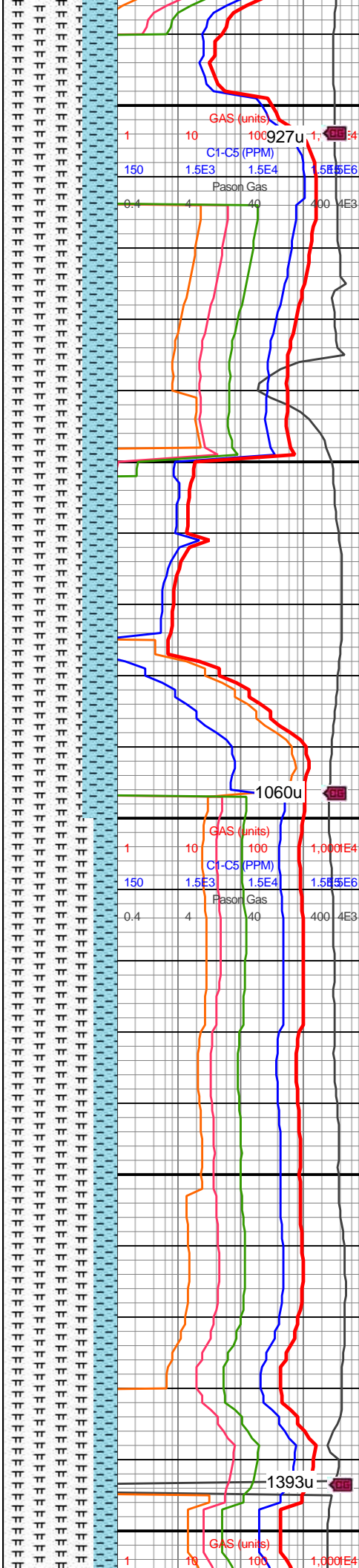
MD: 11,732'  
TVD: 7,457.77'  
INC: 87.32°  
AZM: 90.97°  
VS: 4,290.58'

WOB: 40klbs  
RPM: 65  
SPM: 204  
SPP: 4,660psi

MD: 11,827'  
TVD: 7,461.77'  
INC: 87.85°  
AZM: 91.68°  
VS: 4,385.47'

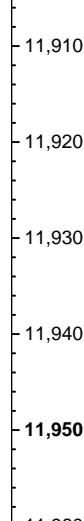
MW IN: 9.7+  
VIS IN: 47  
MW OUT: 9.8  
VIS OUT: 45

MD: 11,872'  
TVD: 7,463.36'  
INC: 88.11°  
AZM: 91.15°  
VS: 4,430.42'

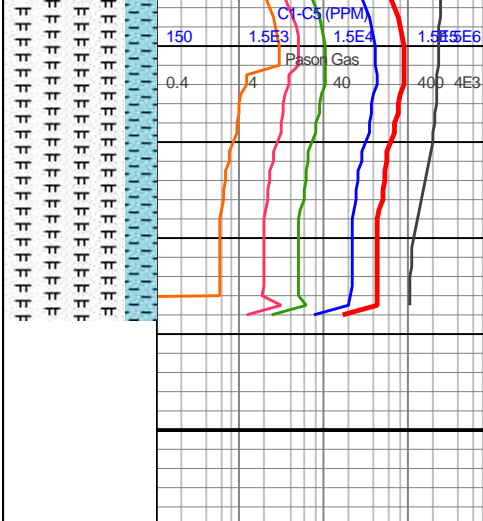


sb blk-y-sl plty, sl sft ip, v calc, tr pyr, scat-com mic fos frags, scat lse cal

11700-11800 MRLST (70%): v dk gy-blk, occ gyshbn, frm-v frm, blk-y, calc, sl rgh tex wi com micmica; CHK (30%): pred lt gry wi lt brn, sme sl med gy-brn, frm-sl brit, sb blk-y-sl plty, sl sft ip, v calc, tr pyr, scat-com mic fos frags, scat lse cal



**\*Bit Projection\***  
MD: 11,937'  
TVD: 7,465.5'  
INC: 88.11°  
AZM: 91.15°  
VS: 4,495.37'  
**TD Well @**  
**0054hrs 9/11/18**



11800-11937 MRLST  
(80%): v dk gy-blk, occ  
gyshbn, frm-v frm, blk,  
calc, sl rgh tex wi com  
micmica; CHK (20%):  
pred lt gry wi lt brn, sme  
sl med gy-brn, frm-sl brit,  
sb blk-sl plty, sl sft ip, v  
calc, tr pyr, scat-com mic  
fos frags, scat lse cal

