



Scale: 5" / 100'  
Measured Depth Log

**Well Name** Rugge 3L-4H-N165

**Location** Sec. 4 T1N R65W

**State** CO

**County** Weld

**Country** USA

**Rig Number** Ensign 140

**API Number** 05-123-46561-00000

**AFE #** 16190988

**Geographic Region** DJ Basin

**Field** Wattenberg

**Spud Date** 7/4/2018

**Drilling Completed** 7/5/2018

**Surface Coordinates** Lat/Long: 40.075261/-104.670738  
SHL: Sec. 4 Twp: 1N Range: 65W  
Footage: 708 FSL 2146 FWL

**Bottom Hole Coordinates** Proposed BHL: Sec: 4 Twp: 1N 65W  
Footages: 460 FNL 2195 FEL

**Ground Elevation** 4,915'

**K.B. Elevation** 4,938'

**Logged Interval** 6,500' **To** 11,892'

**Total Depth** 11,892'

**Formation** Niobrara C

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

## Operator

**Company** Crestone Peak Resources

**Address** 370 17th Street #2170  
Denver, CO 80202



**CRESTONE PEAK**  
RESOURCES

**Geologist**

**Zone Color Coding**

**Name** John Ready

**Company** Crestone Peak Resources

**Address** 370 17th Street #2170  
Denver, CO 80202



Oil

Condensate

Gas

Note

Core

Pressure

Error

Water

Seal

## Other

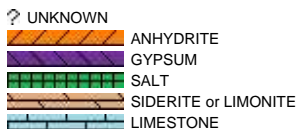
**Loggers:** Matthew Cox / Nick Watkins

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

**Equipment:** ML-522

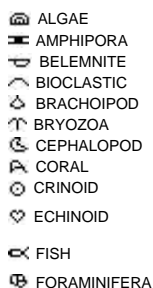
**Contractor:** Empirica, Reservoir Group  
6360 West Sam Houston Pkwy N  
Houston, Texas, 77041

## Rock Types



## Accessories

### Fossils



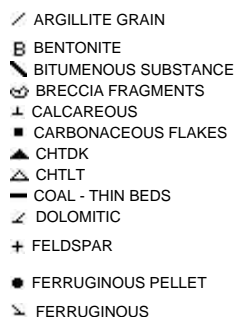
FOSSIL



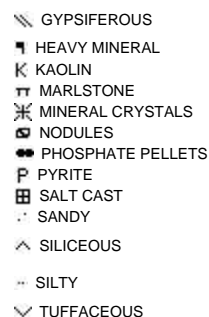
### Minerals



ARGILLACEOUS



GLAUCONITE



### Stringer



## Other Symbols

# Other Symbols

## Oil Show

- DEAD
- EVEN
- QUESTIONABLE
- SPOTTED STAINING

## Porosity

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

- ORGANIC
- P PINPOINT
- V 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

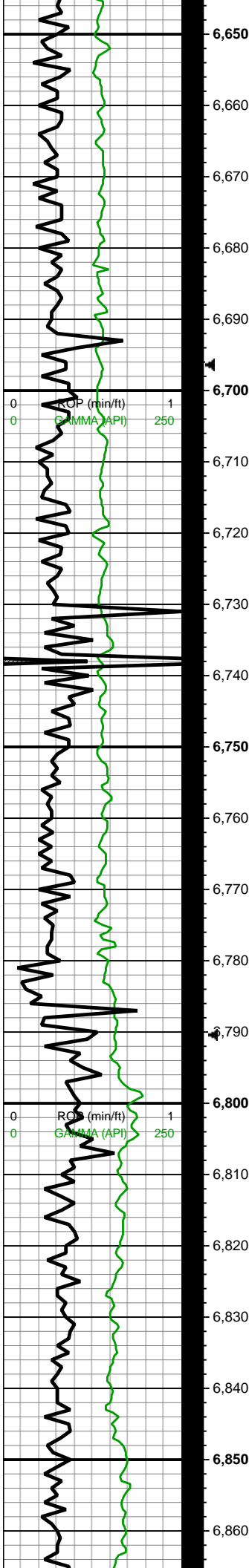
- BOUNDSTONE
- CHALKY
- CRYPTOXLN
- E EARTHY
- FINELYXLN
- GRAINSTONE

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

## Sorting

- M MODERATE
- P POOR
- W WELL

<div> <div>ROP</div> <div>ROP</div> <div>GAMMA</div> </div>		Slide/Rotate	Depth Labels	Notes	% Lith	<div> <div>Total Gas</div> <div>GAS</div> <div>C1</div> <div>C2</div> <div>C3</div> <div>C4</div> <div>C5</div> <div>Pason Gas</div> </div>	Lithology Descriptions	Images
<div> <div>Crestone Peak Resources</div> <div>Ruegge 3L-4H-N165</div> <div>9 5/8" Surface Casing @ 2,451'</div> <div>Spud Date: 7/4/18</div> <div>2-man logging began: 7/4/18 @ 6,400'</div> <div>All Depths Correspond to Driller's Pipe Tally</div> </div>			<div> <div>6,460</div> <div>6,470</div> <div>6,480</div> <div>6,490</div> <div>6,500</div> <div>6,510</div> <div>6,520</div> <div>6,530</div> <div>6,540</div> <div>6,550</div> <div>6,560</div> <div>6,570</div> <div>6,580</div> <div>6,590</div> <div>6,600</div> <div>6,610</div> <div>6,620</div> <div>6,630</div> <div>6,640</div> </div>	<div> <div>Bit #: 1</div> <div>Type: U516M</div> <div>Size: 8 1/2</div> <div>Depth In: 2,475"</div> <div>Depth Out: 11,892'</div> <div>Hours: 29 hrs</div> <div>Avg Ft/Hr: 324 '/hr</div> <div>Jets: 6x13</div> <div>S/N: 41638</div> </div>		<div> <div>0.065</div> <div>0.65</div> <div>6.5</div> <div>65</div> <div>650</div> </div>	<div> <div>6500-6550 SHY SLTST (40%): gy-dk gy, rr v dk gy-blk, frm, brit, cons wi silc &amp; sme arg cmt ip, wi rr-occ bent strg, non calc;</div> <div>SLTST (40%): gy-dk gy, frm, brit, hi fis, plty, cons wi silc cmt, non calc;</div> <div>SLTY SH (20%): lt gy, sft-sb frm, l fis rd-sb rd gumbo ctngs, slty tex occ sdy, non calc</div> </div>	
				<div> <div>MD: 6,540'</div> <div>INC: 17.36°</div> <div>AZM: 43.14°</div> <div>TVD: 6,405.2'</div> <div>VS: -896.08'</div> </div>		<div> <div>SYSTEM CALIBRATED</div> <div>1% Methane = 100 units</div> <div>100% Methane = 10000 units</div> </div>	<div> <div>6550-6600 SLTY SH (50%): lt gy, sft-sb frm, l fis rd-sb rd gumbo ctngs, slty tex occ sdy, non calc;</div> <div>SLTST (30%): gy-dk gy, frm, brit, hi fis, plty, cons wi silc cmt, non calc;</div> <div>SHY SLTST (20%): gy-dk gy, rr v dk gy-blk, frm, brit, cons wi silc &amp; sme arg cmt ip, wi rr-occ bent strg, non calc</div> </div>	
				<div> <div>WOB: 13.3klbs</div> <div>RPM: 0</div> <div>SPM: 204</div> <div>SPP: 3,600psi</div> </div>		<div> <div>0.8</div> <div>80</div> <div>800</div> <div>8000</div> <div>80000</div> </div>	<div> <div>6600-6650 SHY SLTST/SST (40%): gy-dk gy wi com lt gy arg cmt &amp; intbds thru, rr v dk gy-blk, sft-sb frm-frm, brit, slty-sdy, non calc;</div> <div>SLTY SH (30%): lt gy, sft-sb frm-gumbo, l fis rd-sb rd gumbo ctngs, v water solu, thn bdg lamn, slty tex occ sdy, non calc;</div> <div>SLTST (30%): gy-dk gy-v dk gy, frm-brit, hd ip,</div> </div>	
				<div> <div>MD: 6,635'</div> <div>INC: 21.45°</div> <div>AZM: 29.08°</div> <div>TVD: 6,494.83'</div> <div>VS: -870.35'</div> </div>		<div> <div>0.065</div> <div>0.65</div> <div>6.5</div> <div>65</div> <div>650</div> </div>		

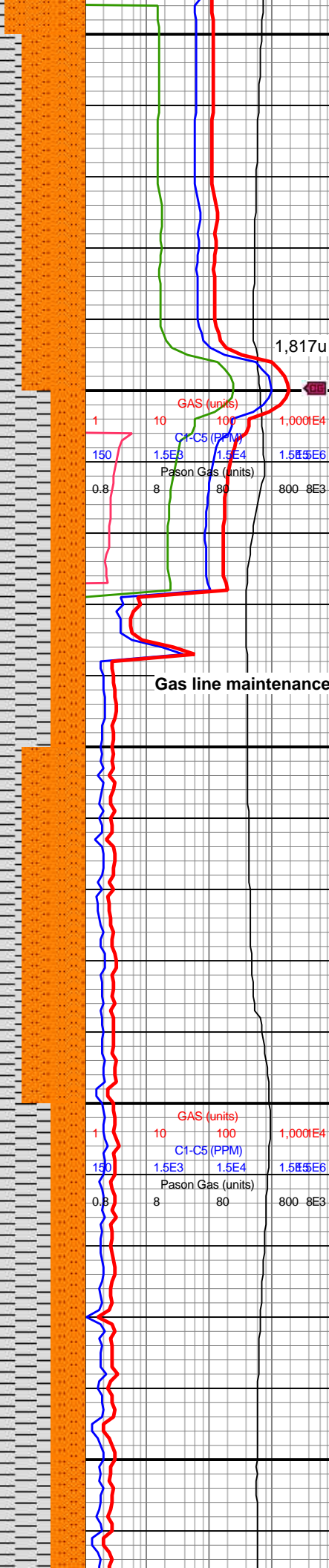


MD: 6,730'  
INC: 26.81°  
AZM: 18.09°  
TVD: 6,581.55'  
VS: -834.6'

MW IN: 9.6  
VIS IN: 47  
MW OUT: 9.6  
VIS OUT: 45

WOB: 8.8klbs  
RPM: 0  
SPM: 204  
SPP: 3,490psi

MD: 6,825'  
INC: 30.67°  
AZM: 13.79°  
TVD: 6,664.84'  
VS: -790.56'



6650-6700 SHY SLTST  
(45%): lt gy-gy-dk gy, dk  
gy ip, frm, brit, cons wi hd  
silc cmt wi arg intbds,  
non calc; SLTY SH  
(45%): lt gy, sft-sb frm, l  
fis rd-sb rd ctngs, v  
hydrated & water solu,  
sly tex, non calc; SLTST  
(10%): v dk gy-blk, hd,  
silc vn ip, non-l calc

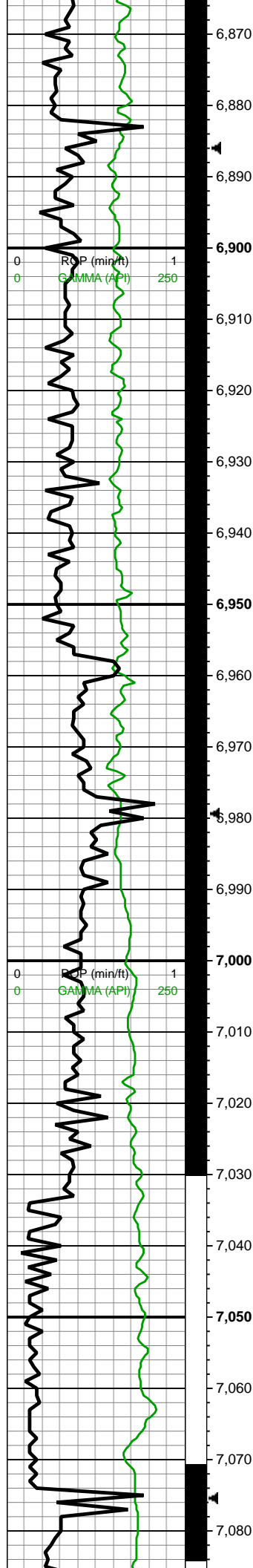
6700-6750 SLTY SH  
(70%): lt gy, predy sft,  
sme sb frm, mod fis sb  
blk cyctngs wi f lamn, w  
hydrated & swelling, sm  
arg-sl sly tex, non calc;  
SLTST (20%): gy-dk gy,  
occ v dk gy-blk, frm, brit,  
occ wvy vugy lt gy silc vn  
ip, non-l calc; SHY SLTST  
(10%): gy-dk gy, rr v dk gy,  
frm, brit, cons wi hd silc  
cmt, sl arg, non calc;

6750-6800 SHY SLTST  
(45%): lt gy-gy-dk gy, dk  
gy ip, frm, brit, cons wi hd  
silc cmt wi arg intbds,  
non calc; SLTY SH  
(45%): lt gy, sft-sb frm, l  
fis rd-sb rd ctngs, v  
hydrated & water solu,  
sly tex, non calc; 10%  
SLTST: v dk gy-blk, hd,  
silc vn ip, non-l calc

6800-6850 SLTY SH  
(70%): lt gy, predy sft,  
sme sb frm, mod fis sb  
blk cyctngs wi f lamn, w  
hydrated & swelling, sm  
arg-sl sly 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;

6850-6900 SLTY SH  
(70%): lt gy, predy sft,  
sme sb frm, mod fis w  
hydrated sb blk cy swelling





MINDEPTH 7/5/18

MW IN: 9.6+  
VIS IN: 48  
MW OUT: 9.6+  
VIS OUT: 44

MD: 6,919'  
INC: 40.83°  
AZM: 12.99°  
TVD: 6,741.02'  
VS: -737.07'

WOB: 9.7klbs  
RPM: 0  
SPM: 206  
SPP: 3,600psi

MD: 7,014'  
INC: 51.46°  
AZM: 12.91°  
TVD: 6,806.75'  
VS: -670.24'

MW IN: 9.6+  
VIS IN: 67  
MW OUT: 9.7  
VIS OUT: 43

GAS (units)			
1	10	100	1,000E4
C1-C5 (PPM)			
150	1.5E3	1.5E4	1.5E5E6
Pason Gas (units)			
0.8	8	80	800 8E3

GAS (units)			
1	10	100	1,000E4
C1-C5 (PPM)			
150	1.5E3	1.5E4	1.5E5E6
Pason Gas (units)			
0.8	8	80	800 8E3

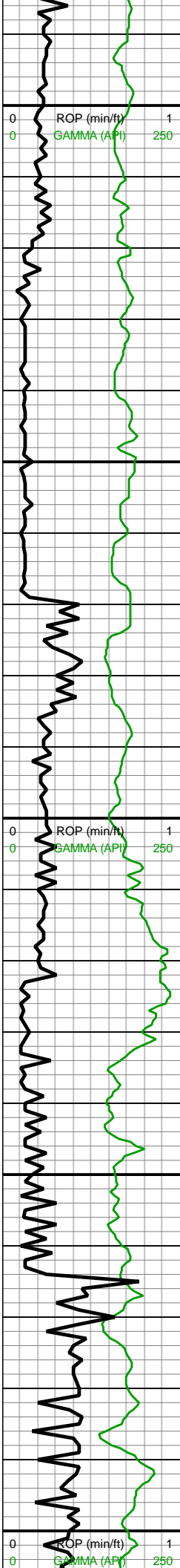
ctngs, sm arg-sl slty tex,  
non calc, wi decr cly grdg  
to shy sltst; SHY SLTST  
(20%): gy-dk gy, rr v dk gy,  
frm, brit, cons wi hd silc  
cmt, sl arg, non calc;  
SLTST (10%): v dk gy-blk,  
hd, lt gy silc vn ip, non-l  
calc

6900-6950 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;

6950-7000 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

7000-7050 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

7000-7100 SLTY SH  
(100%): gy-gyshbn wi sp  
blk lith incl, frm, brit, sb  
frm ip, med-hi fis blk-tab  
ctngs wi wxy lstr, slty arg  
tex, tr tn bent, mod calc



7,090  
7,100  
7,110  
7,120  
7,130  
7,140  
7,150  
7,160  
7,170  
7,180  
7,190  
7,200  
7,210  
7,220  
7,230  
7,240  
7,250  
7,260  
7,270  
7,280  
7,290  
7,300

MD: 7,109'  
INC: 54.98°  
AZM: 10.53°  
TVD: 6,863.63'  
VS: -595.6'

WOB: 16klbs  
RPM: 0  
SPM: 203  
SPP: 3,765psi

MD: 7,203'  
INC: 56.82°  
AZM: 7.37°  
TVD: 6,916.33'  
VS: -518.61'

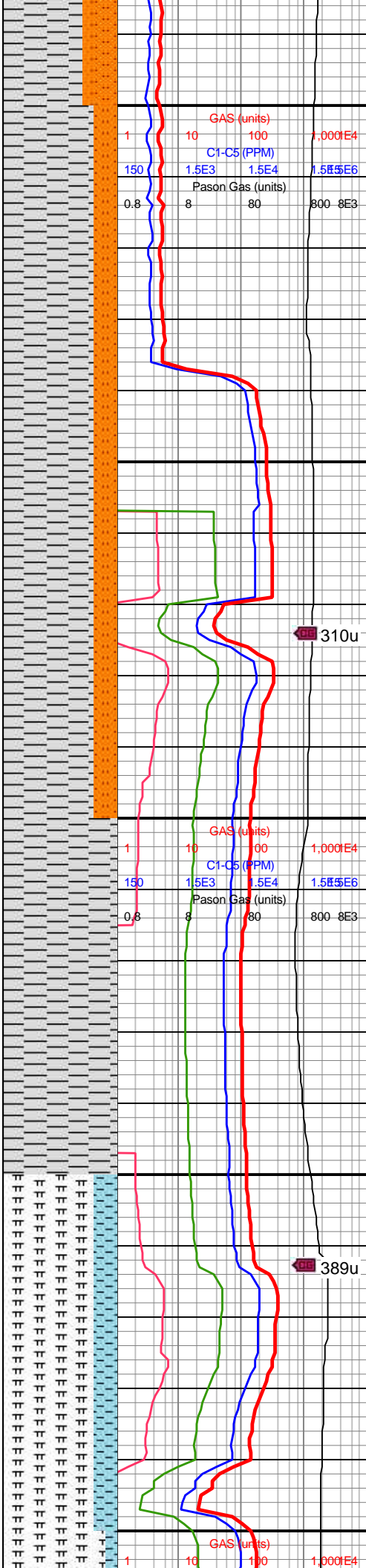
Sharon Springs  
7,206' MD / 6,918'  
TVD

Niobrara A  
7,238' MD / 6,935'  
TVD

A Marl  
7,241' MD / 6,937'  
TVD

MW IN: 9.6+  
VIS IN: 47  
MW OUT: 9.6  
VIS OUT: 43

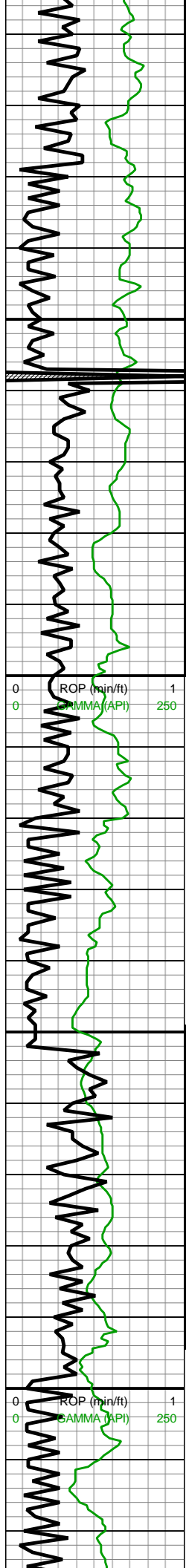
MD: 7,298'



7100-7200 MRLST  
(85%): 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; CHK (15%): gy-dk  
gy wi f wh chky incl & thn  
wh chky lamn, frm, brit,  
l-mod fis sb rd-sb blky  
ctngs, sl slty tex, hi calc

7200-7250 MRLST  
(90%): gyshbn-dk gy-dk  
gyshbn, sb frm-frm,  
l-mod fis sb rd-sb  
blky-blky ctngs, occ brn  
sp marl incl & thn chky  
lamn ip, tr bent, mod calc  
wi brn mrly resdl; CHK  
(10%): dk gy wi f-elong  
wh chky incl, sb frm-frm,  
brit, tr vf pyr, hi calc

7250-7300 MRLST  
(80%): gyshbn-dk gy-dk  
gyshbn, sb frm-frm,  
l-mod fis sb rd-sb  
blky-blky ctngs, occ brn  
sp marl incl & thn chky  
lamn ip, tr bent, mod calc  
wi brn mrly resdl; CHK  
(20%): dk gy wi f-elong  
wh chky incl, sb frm-frm,  
brit, tr vf pyr, hi calc



MD: 7,298'  
INC: 59.94°  
AZM: 2.62°  
TVD: 6,966.16'  
VS: -448.05'

MD: 7,393'  
INC: 66.84°  
AZM: 1.13°  
TVD: 7,008.68'  
VS: -363.21'

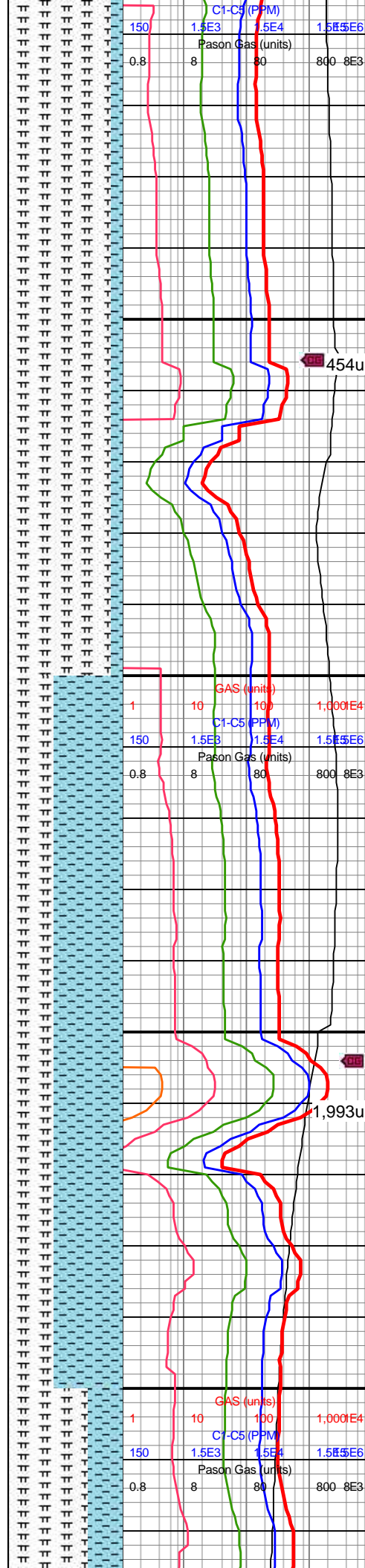
WOB: 22.2klbs  
RPM: 0  
SPM: 202  
SPP: 3,870psi

**B Chalk**  
7,420' MD / 7,019' TVD

MW IN: 9.6+  
VIS IN: 46  
MW OUT: 9.6+  
VIS OUT: 43

MD: 7,487'  
INC: 73.17°  
AZM: 359.46°  
TVD: 7,040.81'  
VS: -274.93'

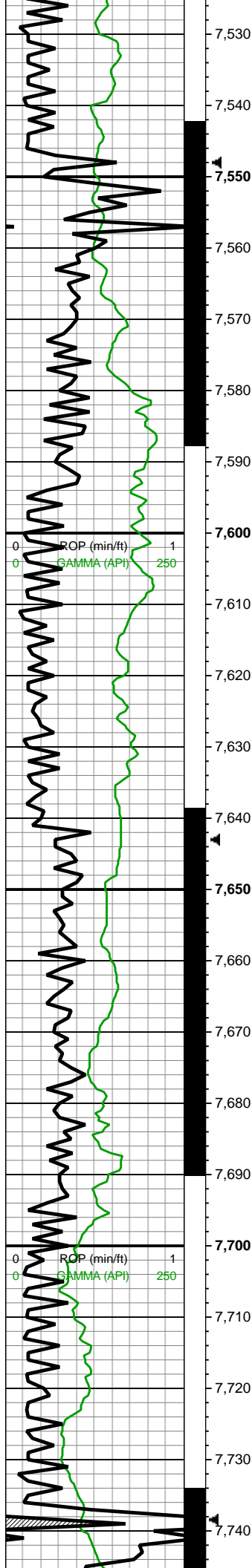
**B Marl**  
7,515' MD / 7,049' TVD



7300-7400 MRLST  
(90%): gyshbn-dk gy-dk  
gyshbn, sb frm-frm,  
l-mod fis sb rd-sb  
blky-blky ctngs, occ brn  
sp marl incl & thn chky  
lamn ip, tr bent, mod calc  
wi brn mrly resdl; CHK  
(10%): dk gy wi f-elong  
wh chky incl, sb frm-frm,  
brit, tr vf pyr, hi calc

7400-7500 CHK (60%): lt  
gy-med gy-dk gy wi f wh  
chky incl, frm- mod fis, sb  
blky-blky ctngs, occ-com  
wh-tn bent, sl slty tex,  
mod calc wi brn mrly  
resdl; MRLST (40%): dk  
gy wi, sb frm-fri, com pyr,  
hi calc






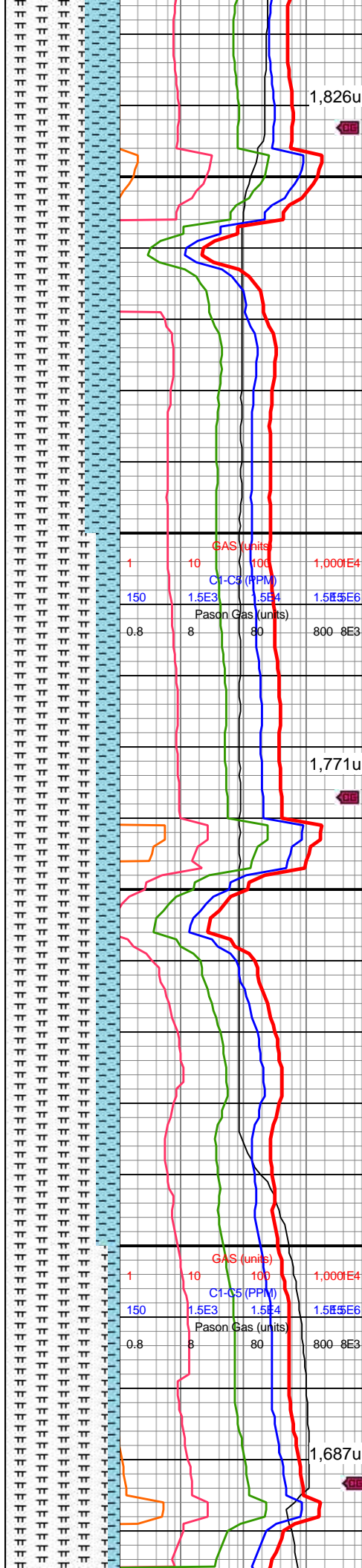
MD: 7,582'  
INC: 76.03°  
AZM: 359.11°  
TVD: 7,066.04'  
VS: -183.36'

WOB: 16.3klbs  
RPM: 31  
SPM: 203  
SPP: 4,190psi

MW IN: 9.6+  
VIS IN: 46  
MW OUT: 9.6+  
VIS OUT: 43

MD: 7,677'  
INC: 81.43°  
AZM: 359.46°  
TVD: 7,084.6'  
VS: -90.23'

 **C Chalk**  
**7,704' MD / 7,088'**  
**TVD**

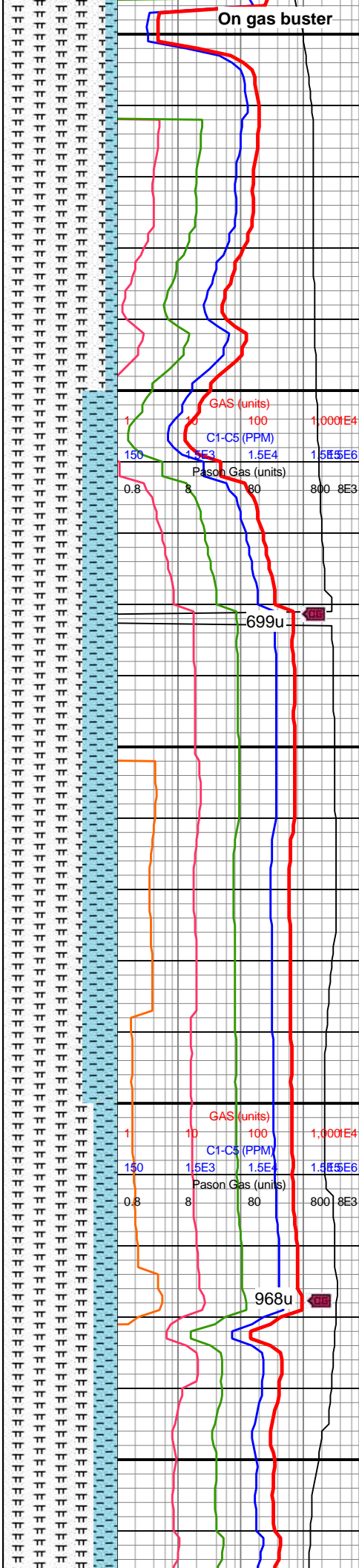
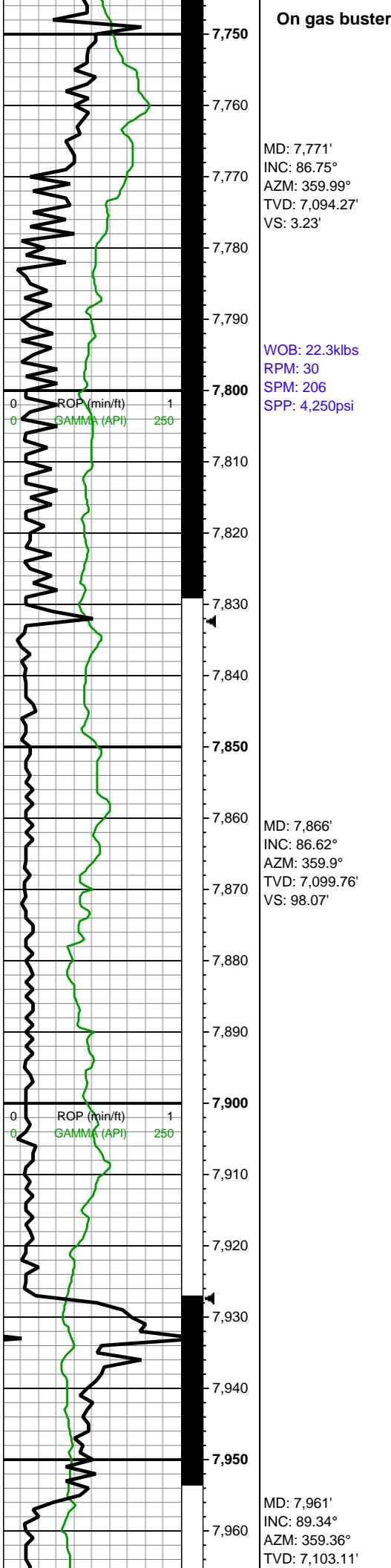


7500-7600 MRLST  
(70%): predy dk gy wi occ  
gyshbn intbds, mod fis  
frm-crunchy-brit sb  
blky-blky-tab ctngs, rr-occ  
wh-tn bent, sl slty tex,  
mod calc wi brn mrlly  
resdl; CHK (30%): dk gy  
wi f-elong wh chky incl,  
frm-brit mod fis sb  
blky-blky ctngs, sl slty tex,  
tr vf pyr, hi calc



7600-7700 MRLST  
(80%): gyshbn-dk gy-dk  
gyshbn wi occ c brn marl  
incl, sb frm-frm, l-mod fis  
sb rd-sb blky-blky ctngs,  
thn lamn, tr bent, mod  
calc wi brn mrlly resdl;  
CHK (20%): dk gy wi  
f-elong wh chky incl, sb  
frm-frm, brit, tr vf pyr, hi  
calc

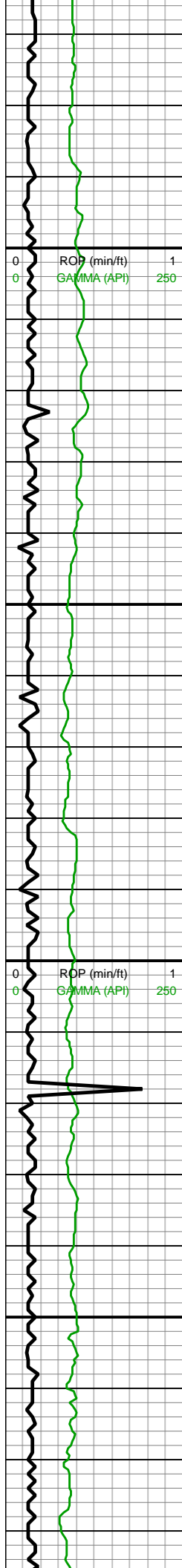




7700-7800 MRLST  
(100%): dk gy, frm-mod  
fis, sb blkly-blky ctngs,  
occ-com wh-tn bent, sl  
silty tex, mod calc wi brn  
mrly resdl; CHK (tr): dk gy  
wi, fri, pyr, hi calc

7800-7900 MRLST  
(70%): dk gy, v frm, sb  
blkly-blky ctngs, occ-com  
wh-tn bent, sl silty tex,  
mod calc wi brn mrly  
resdl; CHK (30%): dk gy  
wi, fri, pyr ip, hi calc





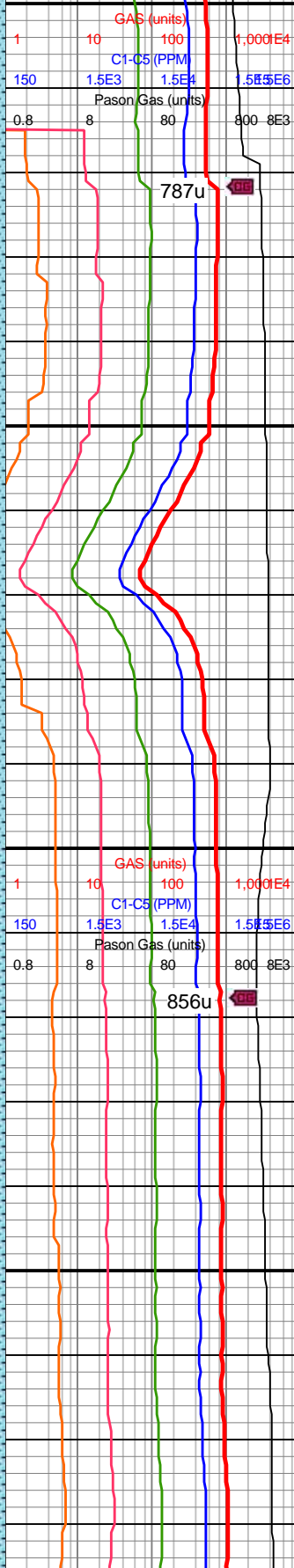
7,970  
7,980  
7,990  
8,000  
8,010  
8,020  
8,030  
8,040  
8,050  
8,060  
8,070  
8,080  
8,090  
8,100  
8,110  
8,120  
8,130  
8,140  
8,150  
8,160  
8,170  
8,180

VS: 193'  
WOB: 31klbs  
RPM: 70  
SPM: 203  
SPP: 4,200psi

MW IN: 9.7  
VIS IN: 47  
MW OUT: 9.75  
VIS OUT: 44

MD: 8,055'  
INC: 90.62°  
AZM: 0.78°  
TVD: 7,103.15'  
VS: 287'

MD: 8,150'  
INC: 89.78°  
AZM: 358.84°  
TVD: 7,102.81'  
VS: 381.99'



7900-8000 MRLST  
(70%): dk gy, v frm, sb  
blky-blky ctngs, occ-com  
wh-tn bent, sl slty tex,  
mod calc wi brn mrly  
resdl; CHK (30%): dk gy  
wi, fri, pyr ip, hi calc

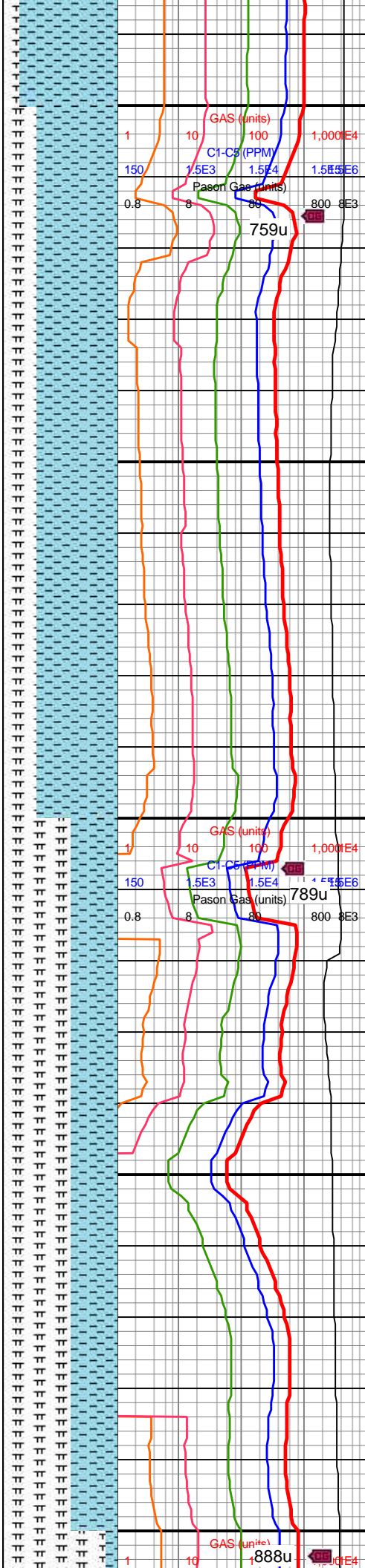
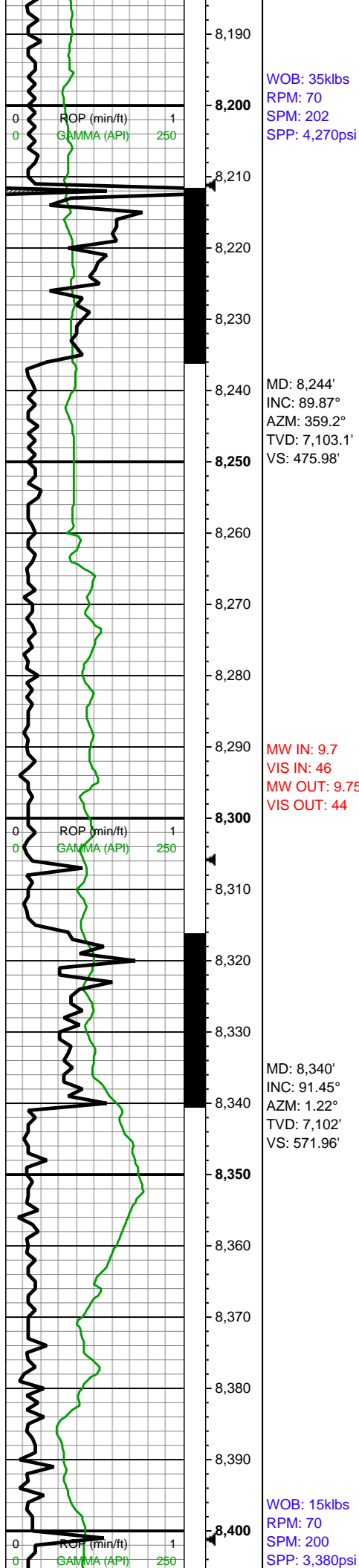


8000-8100 CHK (80%): lt  
gy-med gy, occ med-dk  
gy wi f wh chky incl & thn  
chky lamn, frm, brit, mod  
fis sb rd-sb blky-blky  
ctngs, sm sl slty tex, tr  
bent, tr forams, hi calc;  
MRLST (20%): dk gy,  
frm-hd, brit, sb blky mod  
fis ctngs, sm-sl slty tex,  
sp brn marl incl ip, mod  
calc wi brn mrly resdl



8100-8200 CHK (85%): lt  
gy-med gy, occ med-dk  
gy wi f wh chky incl & thn  
chky lamn, frm, brit, mod  
fis sb rd-sb blky-blky  
ctngs, sm sl slty tex, tr  
bent, tr forams, hi calc;  
MRLST (15%): dk gy.

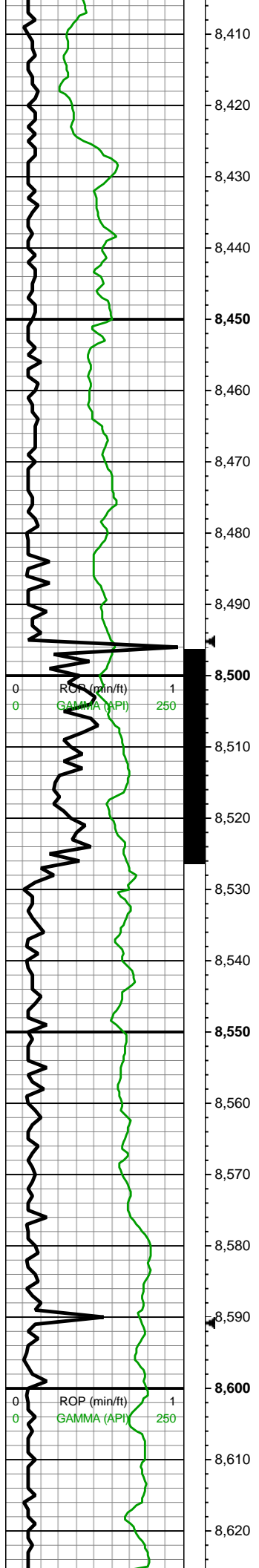




frm-hd, brit, sb blkly mod  
fis ctngs, sm-sl slty tex,  
sp brn marl incl ip, mod  
calc wi brn mrly resdl

8200-8300 CHK (70%): lt  
gy-lt gyshbn-brn ip,  
frm-brit, mod-hi fis sb  
blkly-blky-sb plty ctngs,  
sm tex, sl slty ip, hi calc;  
MRLST (30%): dk gy-v dk  
gy-blk, frm-hd, brit, sb  
blkly mod fis ctngs, sm-sl  
slty tex, sp brn marl incl  
ip, mod calc wi brn mrly  
resdl

8300-8400 MRLST  
(60%): dk gy-v dk gy-blk,  
frm-hd, brit, sb blkly mod  
fis ctngs, sm-sl slty tex,  
mod calc wi brn mrly  
resdl; CHK (40%): lt gy-lt  
gyshbn-brn ip, frm-brit,  
mod-hi fis sb blkly-blky-sb  
plty ctngs, sm tex, sl slty  
ip, hi calc



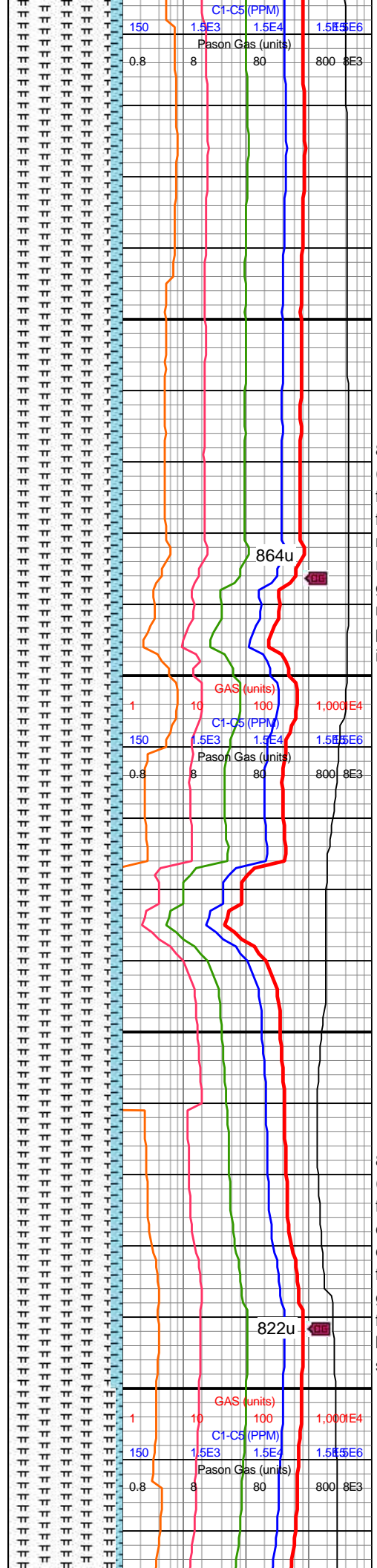
MD: 8,434'  
INC: 92.11°  
AZM: 1.22°  
TVD: 7,099.08'  
VS: 665.9'

MD: 8,529'  
INC: 90.7°  
AZM: 0.43°  
TVD: 7,096.75'  
VS: 760.86'

MW IN: 9.7+  
VIS IN: 46  
MW OUT: 9.7  
VIS OUT: 44

WOB: 33.6klbs  
RPM: 70  
SPM: 200  
SPP: 4,394psi

MD: 8,624'  
INC: 91.06°  
AZM: 0.07°

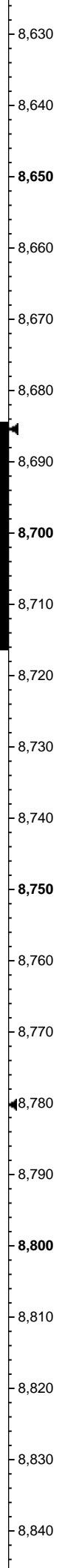
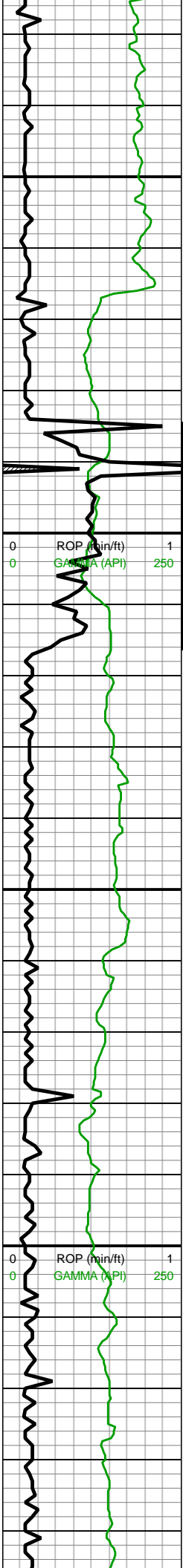


8400-8500 MRLST  
(90%): dk gy-v dk gy-blk,  
frm-hd, brit, sb blkly mod  
fis ctngs, sm-sl slty tex,  
mod calc wi brn mrlly  
resdl; CHK (10%): lt gy-lt  
gyshbn-brn ip, frm-brit,  
mod-hi fis sb blkly-blky-sb  
plty ctngs, sm tex, sl slty  
ip, hi calc

8500-8600 MRLST  
(90%): dk gy-v dk gy-blk,  
frm-hd, brit, blkly mod fis  
ctngs, sm-sl slty tex, mod  
calc wi brn mrlly resdl,  
forams ip; CHK (10%): lt  
gy-lt gyshbn-brn ip,  
frm-brit, mod-hi fis sb  
blkly-blky-sb plty ctngs,  
sm tex, sl slty ip, hi calc







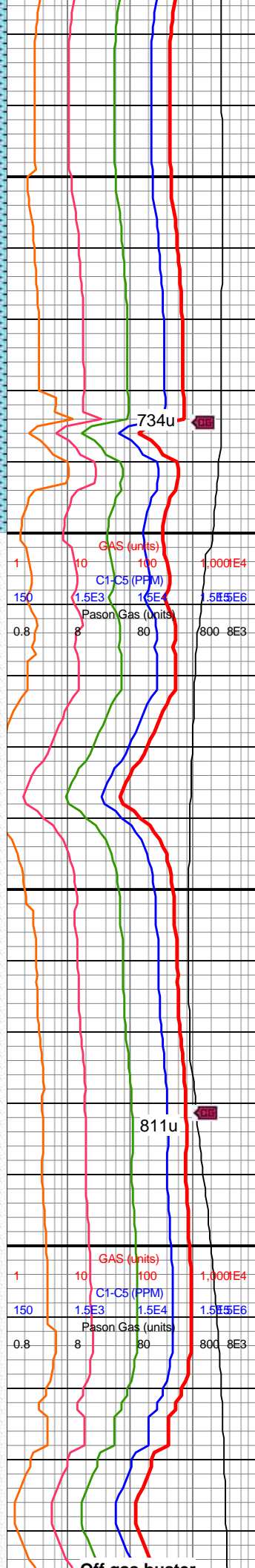
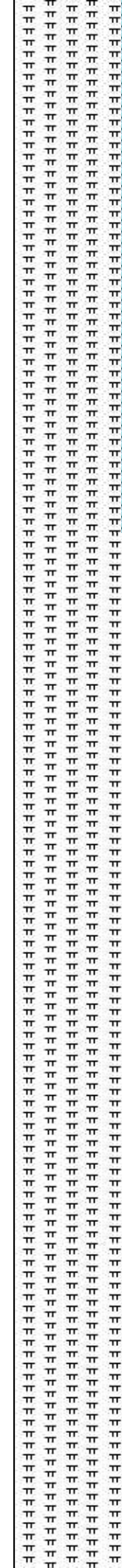
TVD: 7,095.29'  
VS: 855.84'

MW IN: 9.75  
VIS IN: 46  
MW OUT: 9.75  
VIS OUT: 44

MD: 8,719'  
INC: 89.25°  
AZM: 2.45°  
TVD: 7,095.03'  
VS: 950.81'

WOB: 37.8klbs  
RPM: 647  
SPM: 86.4  
SPP: 159.5psi

MD: 8,813'  
INC: 87.8°  
AZM: 2.1°  
TVD: 7,097.45'  
VS: 1,044.7'



8600-8700 MRLST  
(95%): dk gy-v dk gy-blk,  
frm-hd, brit, blkly mod fis  
ctngs, sm-sl slty tex, mod  
calc wi brn mrly resdl,  
forams ip; CHK (5%): lt  
gy-lt gyshbn-brn ip,  
frm-brit, mod-hi fis sb  
blkly-blky-sb plty ctngs,  
sm tex, sl slty ip, hi calc

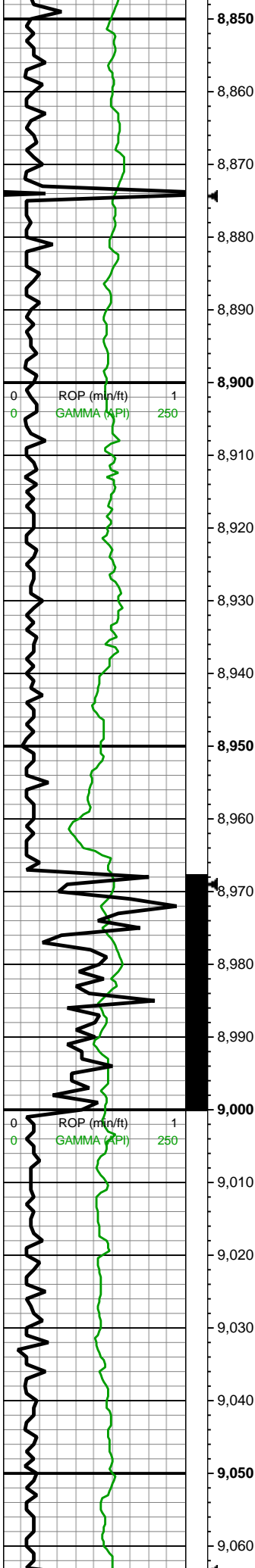
8700-8800 MRLST  
(100%): dk gy-v dk gy-blk,  
frm-hd, brit, blkly mod fis  
ctngs, sm-sl slty tex, mod  
calc wi brn mrly resdl,tr  
pyr tr forams mict cal



Off gas burner

Off gas buster

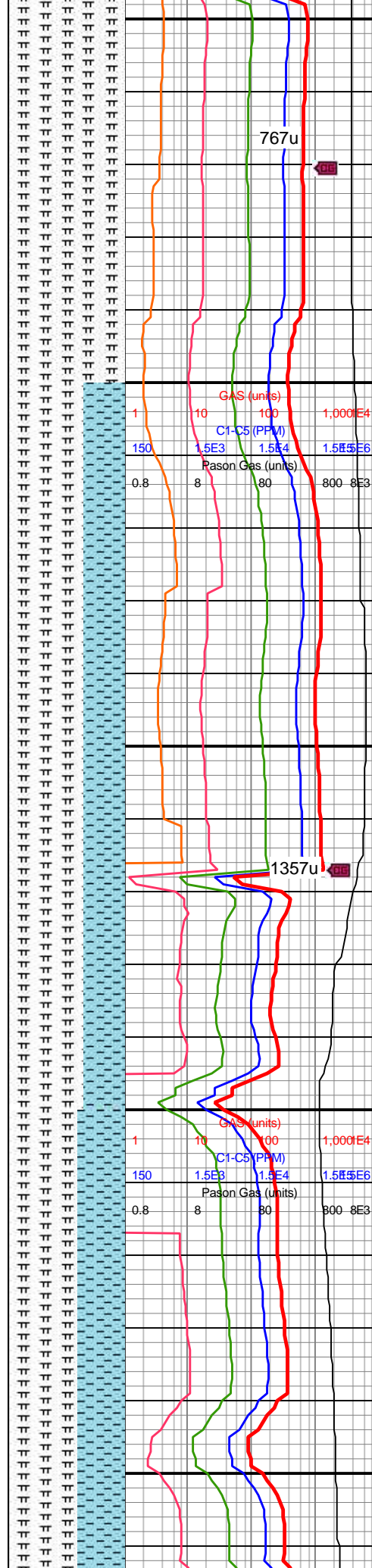
On gas buster



MD: 8,907'  
INC: 86.35°  
AZM: 1.92°  
TVD: 7,102.25'  
VS: 1,138.52'

MD: 9,002'  
INC: 88.68°  
AZM: 1.04°  
TVD: 7,106.37'  
VS: 1,233.39'

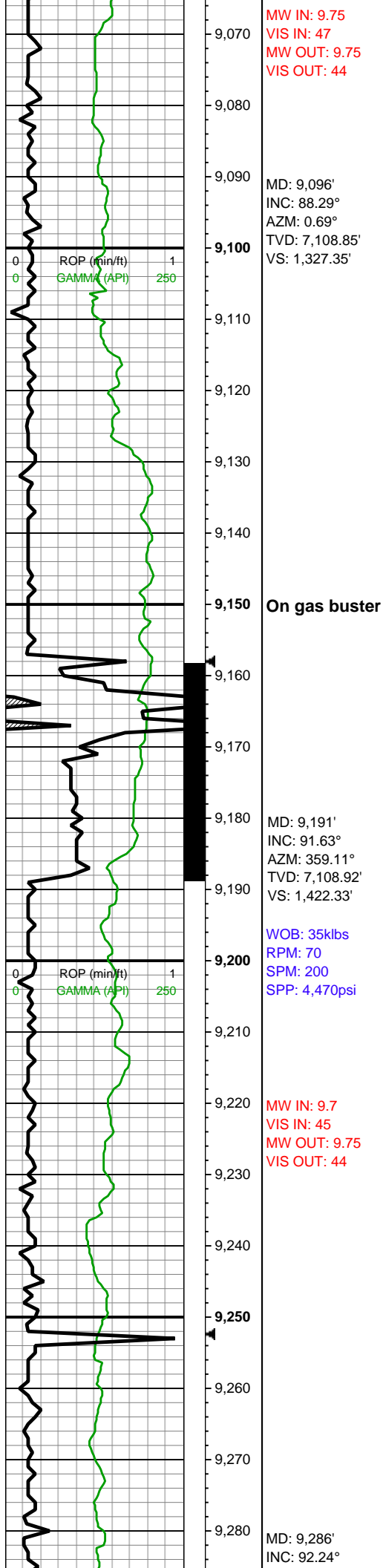
WOB: 27klbs  
RPM: 70  
SPM: 201  
SPP: 4,300psi



8800-8900 MRLST  
(100%): dk gy-v dk gy-blk,  
frm-hd, brit, blkly mod fis  
ctngs, sm-sl slty tex, mod  
calc wi brn mrly resdl,tr  
pyr tr forams mict cal

8900-9000 MRLST  
(65%): dk gy, v dk gy ip,  
frm-hd med fis sb blkly-sb  
plty ctngs wi brit sl slty  
tex, rr vf-ptch pyr strg ip,  
occ sp brn marl incl, mod  
calc wi brn mrly resdl;  
CHK (35%): lt gy-med gy,  
occ dk gy wi f wh chky  
lamn & incl, frm, brit,  
l-mod fis sb rd-sb blkly  
ctngs, tr wh forams & tr tn  
bent, hi calc

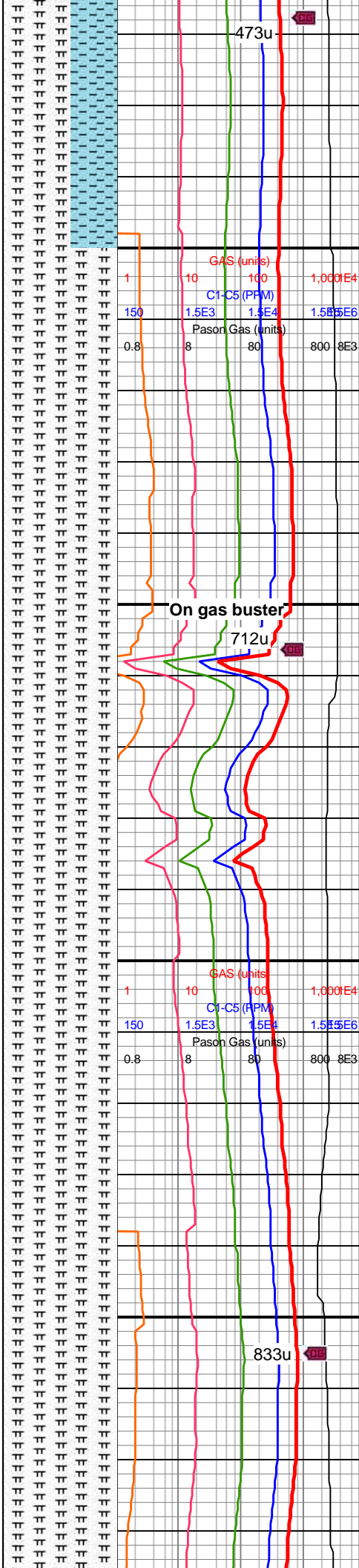
9000-9100 MRLST  
(60%): dk gy, v dk gy ip,  
frm-brit, hd ip, med fis sb  
blkly sb plty ctngs wi brit



MW IN: 9.75  
VIS IN: 47  
MW OUT: 9.75  
VIS OUT: 44

On gas buster

MW IN: 9.7  
VIS IN: 45  
MW OUT: 9.75  
VIS OUT: 44



473u

712u

833u

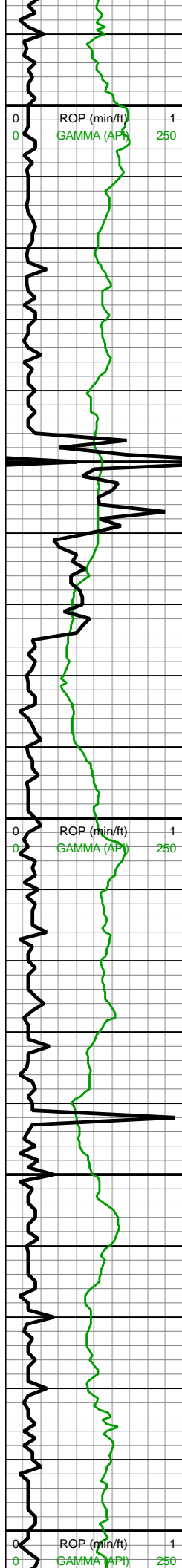
blky-sb plty ctngs wi brit  
sl slty tex, rr vf-ptch pyr  
strg ip, occ sp brn marl  
incl, mod calc wi brn mrly  
resdl; CHK (40%): lt  
gy-med gy, occ dk gy wi f  
wh chky lamn & incl, frm,  
brit, l-mod fis sb rd-sb  
blky ctngs, tr wh forams &  
tr tn bent, hi calc

9100-9200 MRLST  
(100%): v dk gy, frm-brit,  
hd ip, sb blky-sb plty  
ctngs wi brit sl slty tex, rr  
vf-ptch pyr strg ip, occ sp  
brn marl incl, mod calc wi  
brn mrly resdl

9200-9300 MRLST  
(100%): v dk gy, frm-brit,  
hd ip, med fis sb blky-sb  
plty ctngs wi brit sl slty







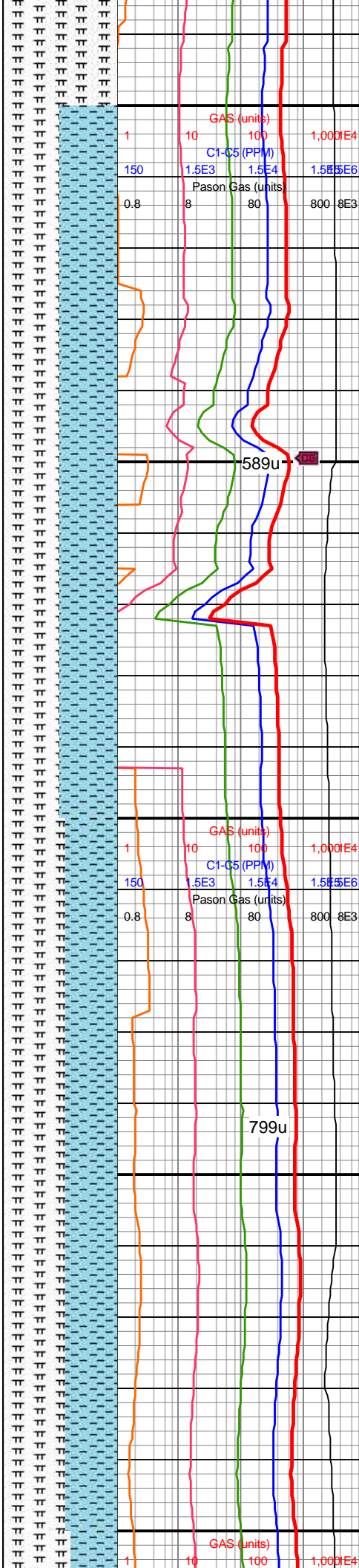
AZM: 358.93°  
TVD: 7,105.71'  
VS: 1,517.26'

MD: 9,380'  
INC: 90.26°  
AZM: 359.99°  
TVD: 7,103.66'  
VS: 1,611.23'

WOB: 33klbs  
RPM: 70  
SPM: 201  
SPP: 4,540psi

MW IN: 9.75  
VIS IN: 46  
MW OUT: 9.7  
VIS OUT: 43

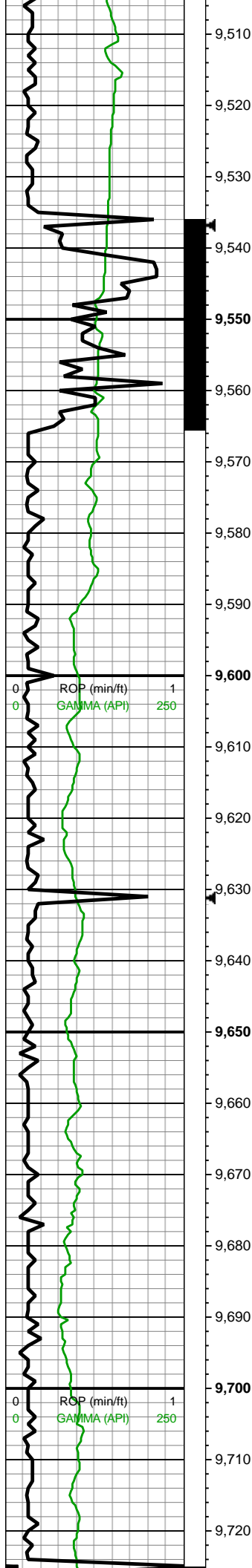
MD: 9,475'  
INC: 91.01°  
AZM: 359.46°  
TVD: 7,102.61'  
VS: 1,706.22'



ply ctngs wi brit slsly  
tex, rr vf-ptch pyr strg ip,  
occ sp brn marl incl, mod  
calc wi brn mrly resdl

9300-9400 MRLST  
(50%): dk gy, v dk gy ip,  
frm-brit, hd ip, med fis sb  
blky-sb plty ctngs wi brit  
sl slty tex, rr vf-ptch pyr  
strg ip, occ sp brn marl  
incl, mod calc wi brn mrly  
resdl; CHK (50%): lt  
gy-med gy, occ dk gy wi f  
wh chky lamn & incl, frm,  
brit, l-mod fis sb rd-sb  
blky ctngs, tr wh forams &  
tr tn bent, hi calc

9400-9500 MRLST  
(60%): dk gy, v dk gy ip,  
frm-brit, hd ip, med fis sb  
blky-sb plty ctngs wi brit  
sl slty tex, rr vf-ptch pyr  
strg ip, occ sp brn marl  
incl, mod calc wi brn mrly  
resdl; CHK (40%):  
gy-med gy, occ dk gy wi f  
wh chky lamn & incl, frm,  
brit, l-mod fis sb rd-sb  
blky ctngs, hi calc

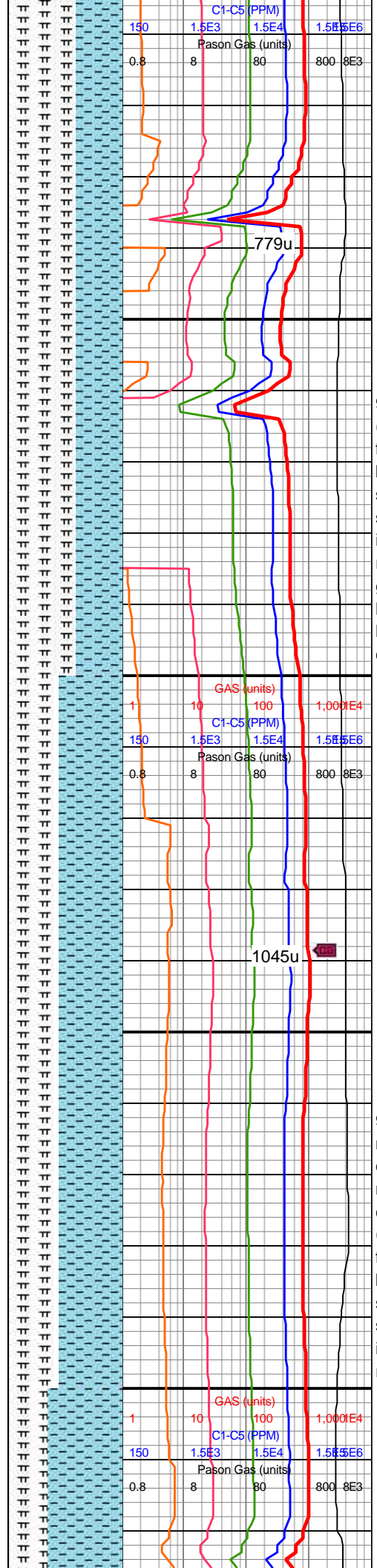


MD: 9,570'  
INC: 89.65°  
AZM: 0.6°  
TVD: 7,102.06'  
VS: 1,801.21'

WOB: 33klbs  
RPM: 70  
SPM: 200  
SPP: 4,560psi

MD: 9,665'  
INC: 89.69°  
AZM: 358.76°  
TVD: 7,102.61'  
VS: 1,896.21'

MW IN: 9.75  
VIS IN: 45  
MW OUT: 9.8  
VIS OUT: 43



779u

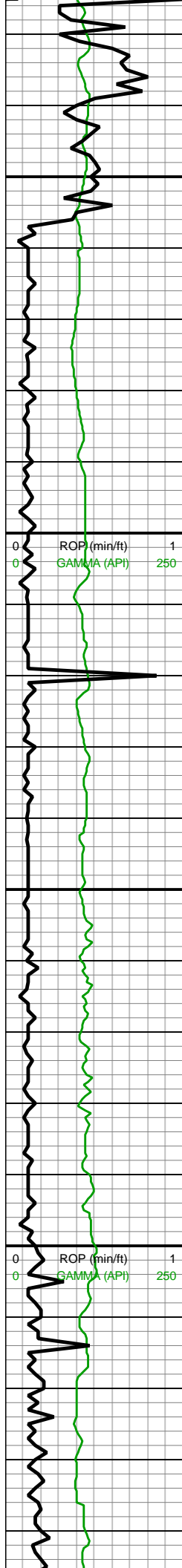
1045u

9500-9600 MRLST  
(60%): dk gy, v dk gy ip,  
frm-brit, hd ip, med fis sb  
blky-sb plty ctngs wi brit  
sl slty tex, rr vf-ptch pyr  
strg ip, occ sp brn marl  
incl, mod calc wi brn mrly  
resdl; CHK (40%): med  
gy, occ dk gy wi f wh chky  
lamn & incl, frm, brit,  
l-mod fis sb rd-sb blky  
ctngs, hi calc

9600-9700 CHK (55%):  
med gy, occ dk gy wi f wh  
chky lamn & incl, brit-frm,  
mod fis sb rd-sb blky  
ctngs, hi calc; MRLST  
(45%): dk gy, v dk gy ip,  
frm-brit, hd ip, med fis sb  
blky-sb plty ctngs wi brit  
sl slty tex, rr vf-ptch pyr  
strg ip, occ sp brn marl  
incl, mod calc wi brn mrly  
resdl







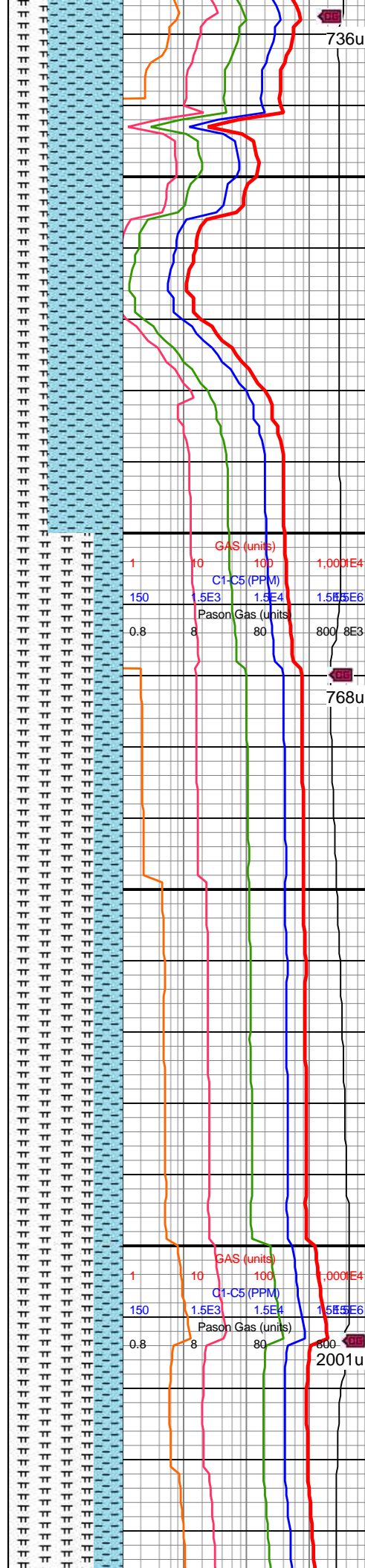
MD: 9,759'  
INC: 90.92°  
AZM: 0.25°  
TVD: 7,102.11'  
VS: 1,990.2'

WOB: 37klbs  
RPM: 70  
SPM: 200  
SPP: 4,610psi

MD: 9,854'  
INC: 90.18°  
AZM: 359.99°  
TVD: 7,101.19'  
VS: 2,085.19'

MW IN: 9.75  
VIS IN: 45  
MW OUT: 9.75  
VIS OUT: 43

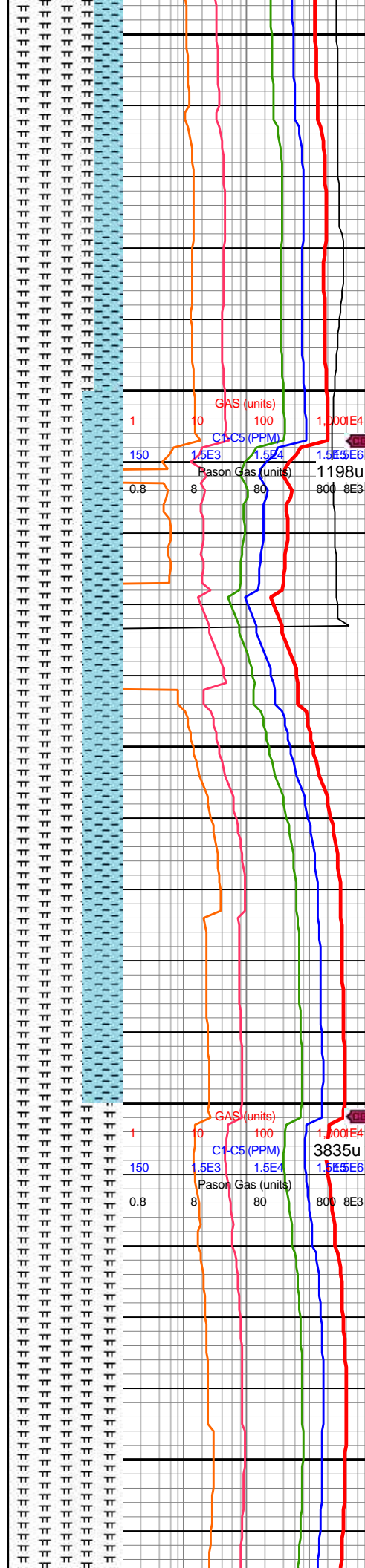
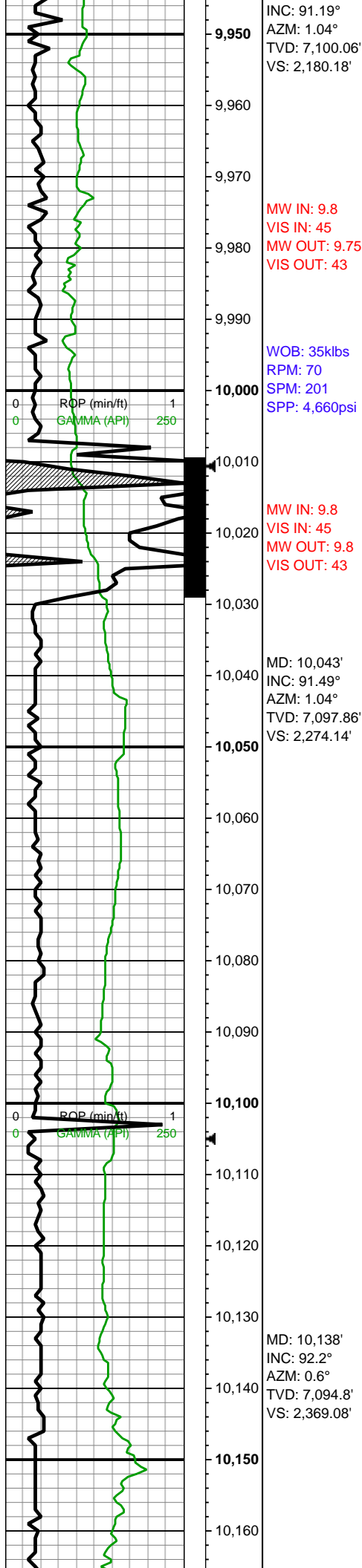
MD: 9,949'



9700-9800 CHK (65%):  
med gy, occ dk gy wi f wh  
chky lamn & incl, brit-frm,  
mod fis sb rd-sb blk  
ctngs, hi calc; MRLST  
(35%): dk gy, v dk gy ip,  
frm-brit, hd ip, med fis sb  
blk-sb plty ctngs wi brit  
sl slty tex, rr vf-ptch pyr  
strg ip, occ sp brn marl  
incl, mod calc wi brn mrly  
resdl

9800-9900 MRLST  
(75%): dk gy, v dk gy ip,  
frm-brit, hd ip, med fis sb  
blk-plty ctngs wi brit sl  
slty tex, rr vf-ptch pyr strg  
ip, occ sp brn marl incl,  
mod calc wi brn mrly  
resdl; CHK (25%): med  
gy, wi f wh chky lamn &  
incl, frm, mod fis sb rd-sb  
blk ctngs, hi calc

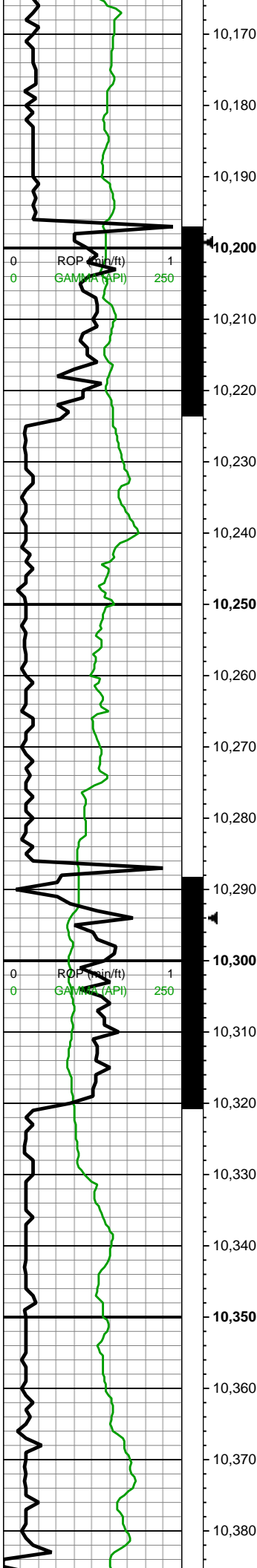




9900-10000 MRLST  
(75%): dk gy, v dk gy ip,  
frm-brit, hd ip, med fis sb  
blky-pty ctngs wi brit sl  
silty tex, rr vf-ptch pyr strg  
ip, occ sp brn marl incl,  
mod calc wi brn mrly  
resdl; CHK (25%): med  
gy, wi f wh chky lamn &  
incl, frm, mod fis sb rd-sb  
blky ctngs, hi calc

10000-10100 MRLST  
(65%): dk gy-v dk gy-blk,  
frm-hd, brit, med-hi fis sb  
blky-blky ctngs, sm sl silty  
tex, tr pvf pyr, rr-tr tn bent,  
mod calc wi brn mrly  
resdl; CHK (35%): lt  
gyshbn wi f wh incl, frm,  
brit, sb blky mod fis  
ctngs, rr-tr fos frags &  
forams, mict cal, hi calc



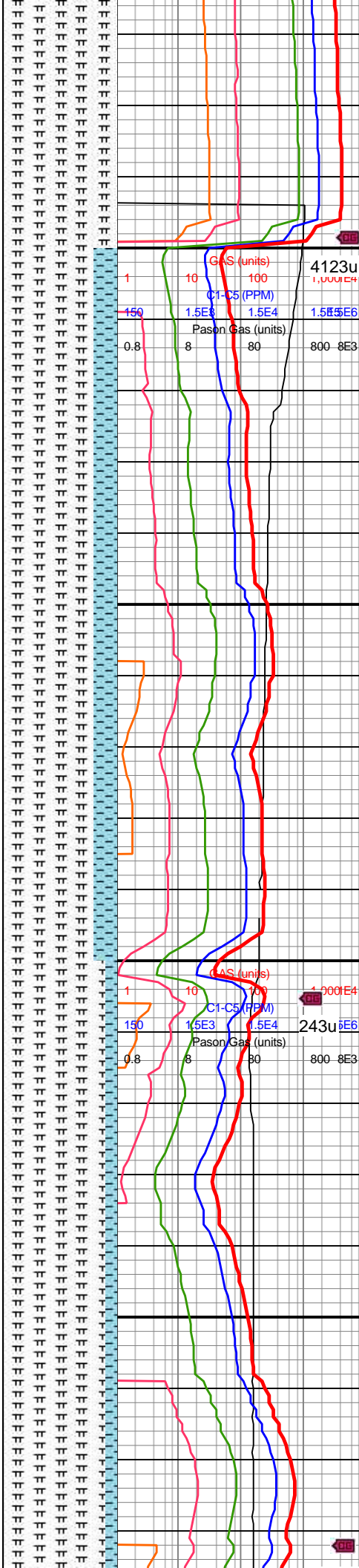


WOB: 46klbs  
RPM: 0-25  
SPM: 202  
SPP: 4,210psi

MD: 10,233'  
INC: 91.85°  
AZM: 1.83°  
TVD: 7,091.44'  
VS: 2,464'

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

MD: 10,327'  
INC: 89.56°  
AZM: 2.18°  
TVD: 7,090.29'  
VS: 2,557.93'



10100-10200 MRLST  
(100%): dk gy-v dk gy-blk,  
frm-hd, brit, med-hi fis sb  
blky-blky ctngs, sm sl slty  
tex, tr pvf pyr, rr-tr tn bent,  
mod calc wi brn mrly  
resdl

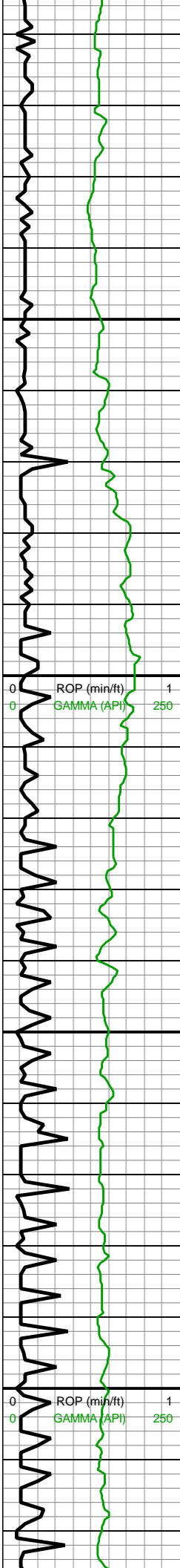
10200-10300 MRLST  
(80%): med  
gy-gyshbn-dk gy-dk  
gyshbn, frm-hd-brit, sb  
blky-blky mod fis ctngs,  
sm-sl slty tex, tr vf pyr, tr  
fos frags; CHK (20%):  
med gy wi f wh chky  
lamn, sb frm-frm, l-mod  
fis sb blky-blky ctngs, hi  
calc

10300-10400 CHK  
(10%): lt gy-med gy wi f  
wh chky incl & lamn,  
frm-brit, mod fis sb  
blky-blky ctngs, sl slty tex,  
tr bent & tr forams, tr bent  
wi pyr strg, hi calc;  
MRLST (90%): dk gy-dk  
blky-blky ctngs, sm sl slty  
tex, tr pvf pyr, rr-tr tn bent,  
mod calc wi brn mrly  
resdl









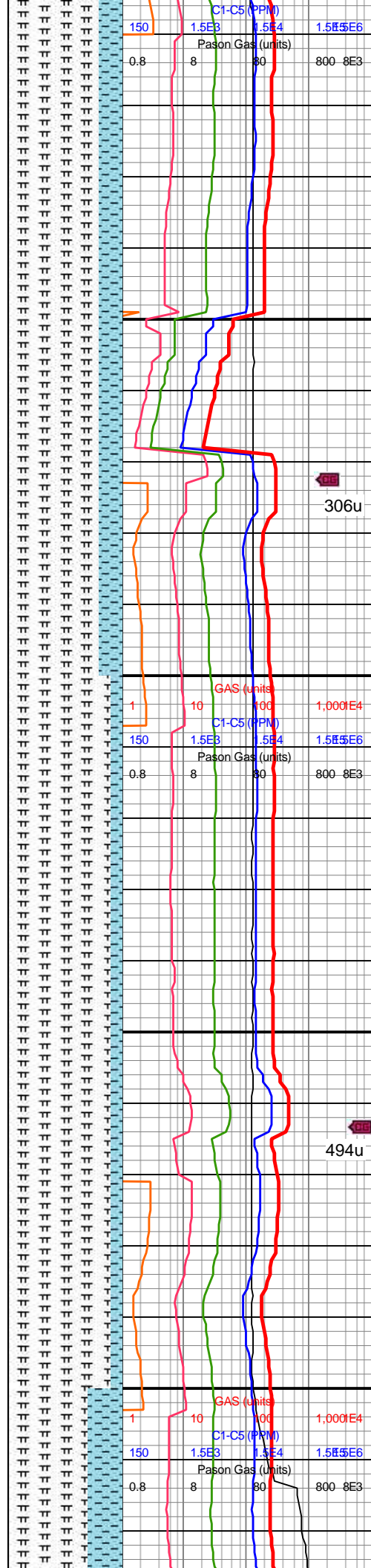
MD: 10,611'  
INC: 90.4°  
AZM: 1.39°  
TVD: 7,088.79'  
VS: 2,841.68'

MD: 10,706'  
INC: 89.47°  
AZM: 359.99°  
TVD: 7,088.9'  
VS: 2,936.67'

MD: 10,801'  
INC: 89.52°  
AZM: 0.16°  
TVD: 7,089.74'  
VS: 3,031.67'

WOB: 27.9klbs  
RPM: 70  
SPM: 204  
SPP: 4,930psi

MW IN: 9.9+  
VIS IN: 46  
MW OUT: 9.9  
VIS OUT: 43



10600-10700 MRLST  
(80%): med  
gy-gyshbn-dk gy,  
frm-hd-brit, mod fis sb  
blky-blky ctngs, sm-sl slty  
tex, rr fos frags & forams,  
tr vf pyr, mod calc wi brn  
mrly resdl; CHK (20%):  
med gy wi f wh chky  
lamn, sb frm-frm-brit ip,  
l-mod fis sb blky-blky  
ctngs, hi calc

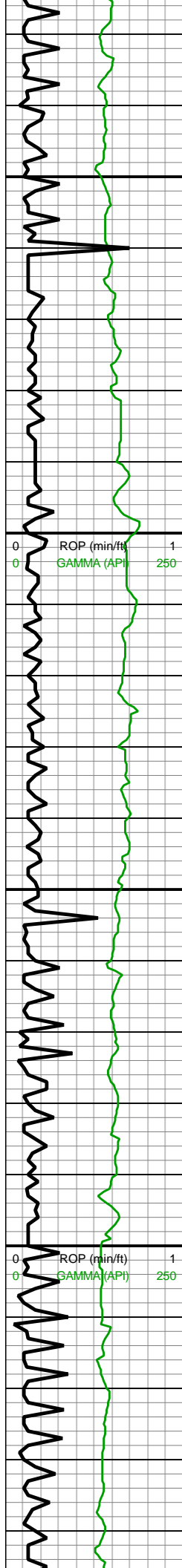
306u

10700-10800 CHK  
(10%): lt gy-med gy wi f  
wh chky incl & lamn,  
frm-brit, mod fis sb  
blky-blky ctngs, sl slty tex,  
tr bent & tr forams, tr bent  
wi pyr strg, hi calc;  
MRLST (90%): dk gy-dk  
gyshbn, frm-hd-brit, sb  
blky-blky mod fis ctngs,  
sm-sl slty tex, mod calc  
wi brn mrly resdl

494u





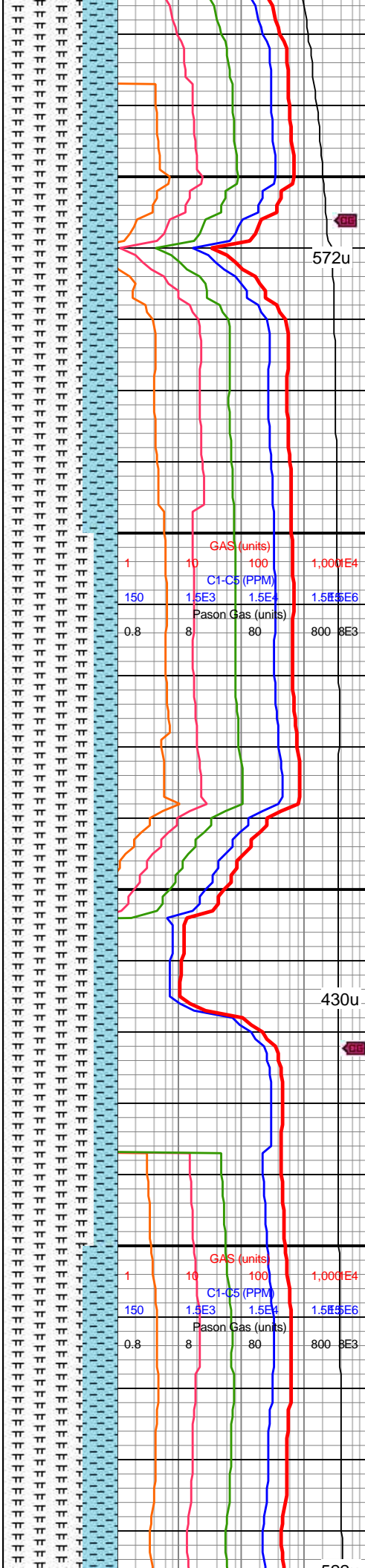


10,830  
10,840  
10,850  
10,860  
10,870  
10,880  
10,890  
10,900  
10,910  
10,920  
10,930  
10,940  
10,950  
10,960  
10,970  
10,980  
10,990  
11,000  
11,010  
11,020  
11,030  
11,040

MD: 10,896'  
INC: 89.74°  
AZM: 359.72°  
TVD: 7,090.35'  
VS: 3,126.67'

MD: 10,990'  
INC: 89.12°  
AZM: 359.02°  
TVD: 7,091.29'  
VS: 3,220.66'

WOB: 27.6klbs  
RPM: 70  
SPM: 204  
SPP: 4,910psi

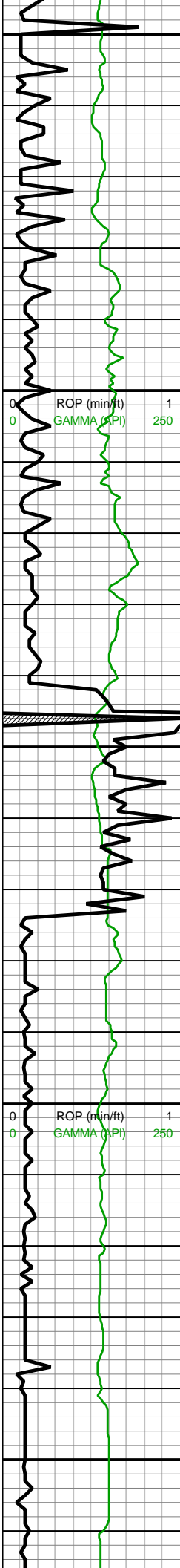


10800-10900 MRLST  
(70%): med  
gy-gyshbn-dk gy-dk  
gyshbn, frm-hd-brit, sb  
blky-blky mod fis ctngs,  
sm-sl slty tex, tr vf pyr, tr  
fos frags; CHK (30%):  
med gy wi f wh chky  
lamn, sb frm-frm, l-mod  
fis sb blky-blky ctngs, hi  
calc



10900-11000 MRLST  
(80%): med  
gy-gyshbn-dk gy,  
frm-hd-brit, mod fis sb  
blky-blky ctngs, sm-sl slty  
tex, rr fos frags & forams,  
tr vf pyr, mod calc wi brn  
mrly resdl; CHK (20%):  
med gy wi f wh chky  
lamn, sb frm-frm-brit ip,  
l-mod fis sb blky-blky  
ctngs, hi calc



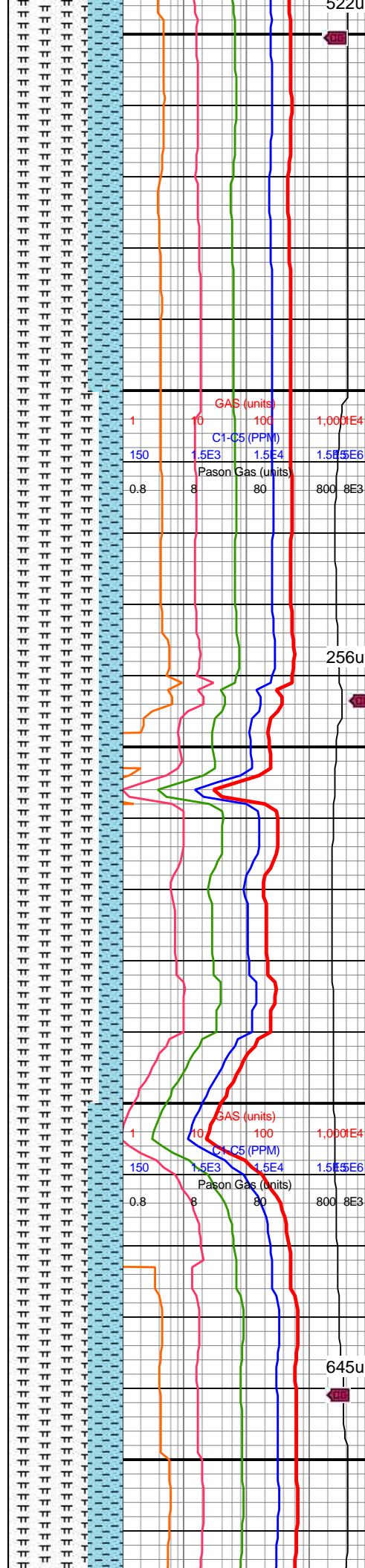


11,050  
11,060  
11,070  
11,080  
11,090  
11,100  
11,110  
11,120  
11,130  
11,140  
11,150  
11,160  
11,170  
11,180  
11,190  
11,200  
11,210  
11,220  
11,230  
11,240  
11,250  
11,260

MD: 11,084'  
INC: 88.37°  
AZM: 356.91°  
TVD: 7,093.34'  
VS: 3,314.57'

MD: 11,179'  
INC: 90.4°  
AZM: 0.87°  
TVD: 7,094.36'  
VS: 3,409.52'

WOB: 35.1klbs  
RPM: 70  
SPM: 204  
SPP: 4,975psi

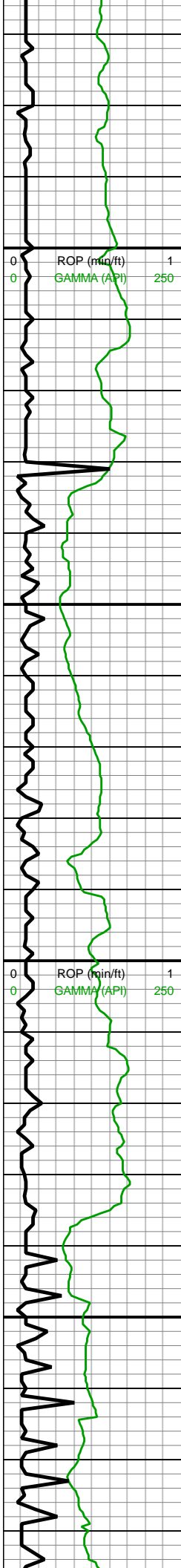


11000-11100 MRLST  
(70%): med  
gy-gyshbn-dk gy-dk  
gyshbn, frm-hd-brit, sb  
blky-blky mod fis ctngs,  
sm-sl slty tex, tr vf pyr, tr  
fos frags; CHK (30%):  
med gy wi f wh chky  
lamn, sb frm-frm, l-mod  
fis sb blky-blky ctngs, hi  
calc

11100-11200 MRLST  
(80%): med  
gy-gyshbn-dk gy,  
frm-hd-brit, mod fis sb  
blky-blky ctngs, sm-sl slty  
tex, rr fos frags & forams,  
tr vf pyr, mod calc wi brn  
mrly resdl; CHK (20%):  
med gy wi f wh chky  
lamn, sb frm-frm-brit ip,  
l-mod fis sb blky-blky  
ctngs, hi calc

11200-11300 MRLST  
(70%): med  
gy-gyshbn-dk gy-dk





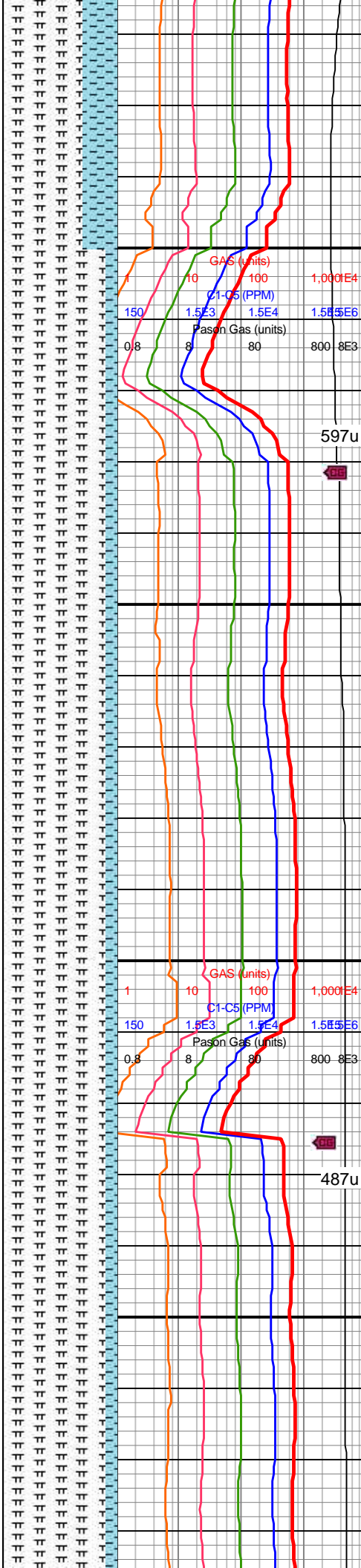
MD: 11,273'  
INC: 90.44°  
AZM: 1.04°  
TVD: 7,093.68'  
VS: 3,503.51'

MW IN: 10  
VIS IN: 47  
MW OUT: 10.0  
VIS OUT: 44

MD: 11,368'  
INC: 90.09°  
AZM: 0.25°  
TVD: 7,093.24'  
VS: 3,598.5'

WOB: 28.9klbs  
RPM: 70  
SPM: 203  
SPP: 5,110psi

MD: 11,462'  
INC: 89.52°  
AZM: 359.46°  
TVD: 7,093.56'  
VS: 3,692.5'



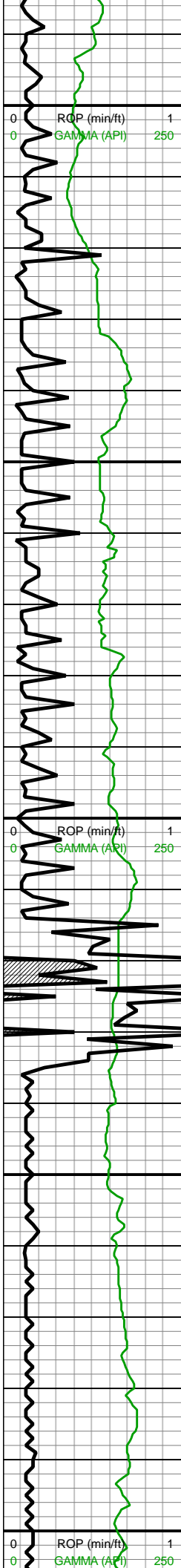
gyshbn, frm-hd-brit, sb  
blky-blky mod fis ctngs,  
sm-sl slty tex, tr vf pyr, tr  
fos frags; CHK (30%):  
med gy wi f wh chky  
lamn, sb frm-frm, l-mod  
fis sb blky-blky ctngs, hi  
calc

11300-11400 CHK  
(10%): lt gy-med gy wi f  
wh chky incl & lamn,  
frm-brit, mod fis sb  
blky-blky ctngs, sl slty tex,  
tr bent & tr forams, tr bent  
wi pyr strg, hi calc;  
MRLST (90%): dk gy-dk  
gyshbn, frm-hd-brit, sb  
blky-blky mod fis ctngs,  
sm-sl slty tex, mod calc  
wi brn mrly resdl

11400-11500 MRLST  
(90%): med  
gy-gyshbn-dk gy-dk  
gyshbn, frm-hd-brit, sb  
blky-blky mod fis ctngs,  
sm-sl slty tex, tr vf pyr, tr  
fos frags; CHK (10%):  
med gy wi f wh chky







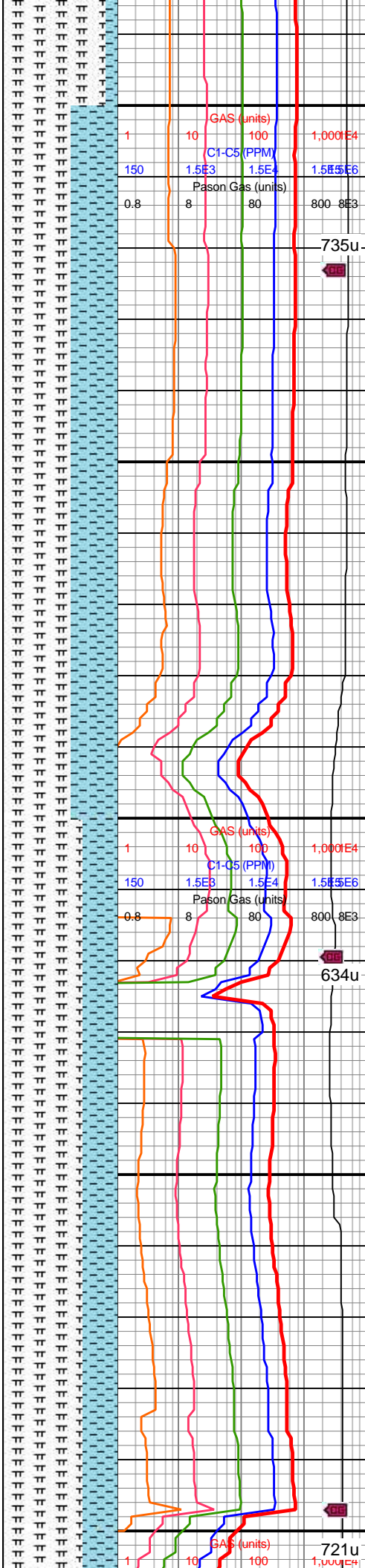
11,490  
11,500  
11,510  
11,520  
11,530  
11,540  
11,550  
11,560  
11,570  
11,580  
11,590  
11,600  
11,610  
11,620  
11,630  
11,640  
11,650  
11,660  
11,670  
11,680  
11,690  
11,700

MW IN: 10  
VIS IN: 47  
MW OUT: 10.0  
VIS OUT: 44

MD: 11,557'  
INC: 88.81°  
AZM: 358.84°  
TVD: 7,094.94'  
VS: 3,787.47'

WOB: 32.9klbs  
RPM: 70  
SPM: 204  
SPP: 4,990psi

MD: 11,651'  
INC: 89.74°  
AZM: 0.78°  
TVD: 7,096.13'  
VS: 3,881.46'

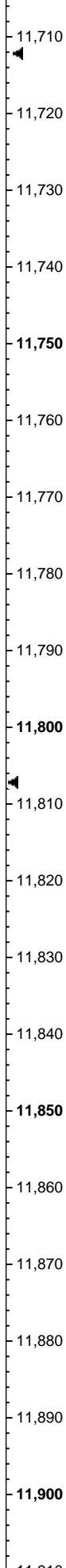
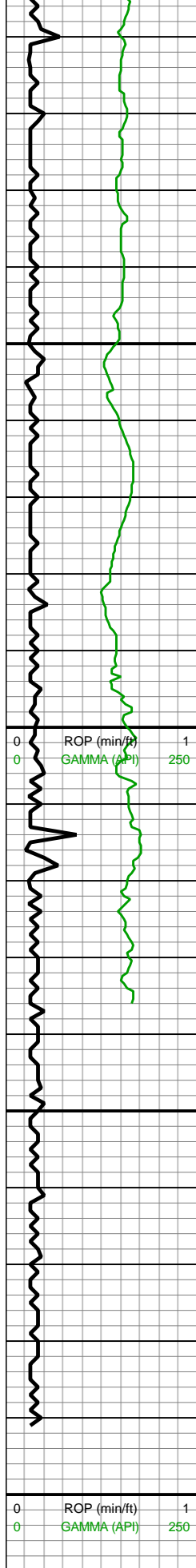


lamn, sb frm-frm, l-mod  
fis sb blkly-blky ctngs, hi  
calc

11500-11600 MRLST  
(60%): med  
gy-gyshbn-dk gy-dk  
gyshbn, frm-hd-brit, sb  
blkly-blky mod fis ctngs,  
sm-sl slty tex, tr vf pyr, tr  
fos frags; CHK (40%):  
med gy wi f wh chky  
lamn, sb frm-frm, l-mod  
fis sb blkly-blky ctngs, hi  
calc

11600-11700 MRLST  
(70%): dk gy-dk gyshbn-v  
dk gy wi occ sp brn marl  
incl, frm-v hd, l-mod fis  
rd-sb rd-sb blkly-blky  
ctngs, sm-sl slty tex, tr tn  
bent, tr vf pyr, mod calc wi  
brn mrly resdl; 30% CHK:  
med gy-dk gy, occ brn,  
frm-brit, mod fis sb  
blkly-blky ctngs wi rr f wh  
chky incl, sl slty tex, tr vf  
pyr, hi calc





MD: 11,746'  
INC: 88.99°  
AZM: 359.46°  
TVD: 7,097.18'  
VS: 3,976.45'

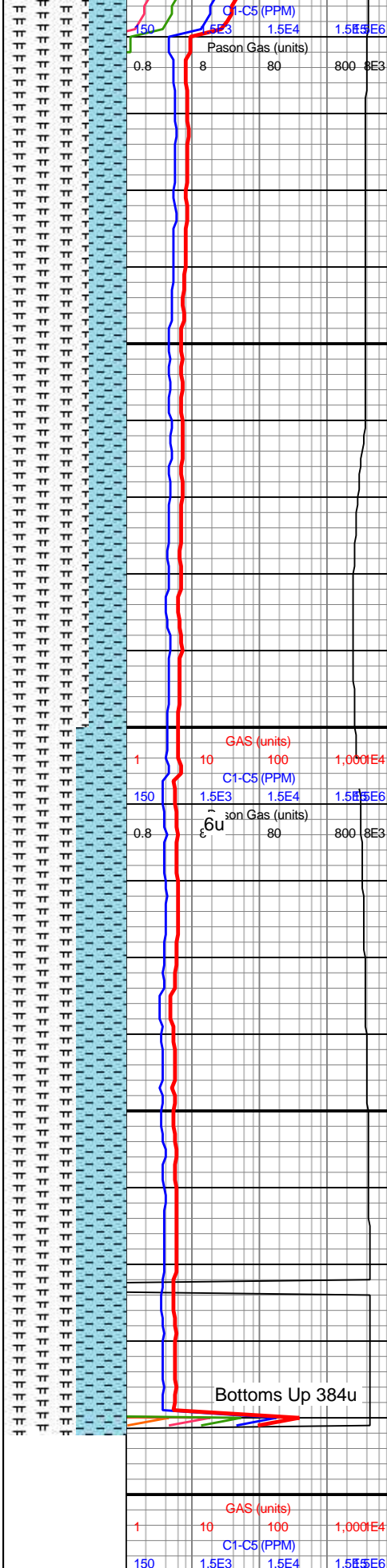
WOB: 31.7klbs  
RPM: 70  
SPM: 203  
SPP: 5,080psi

MD: 11,831'  
INC: 89.34°  
AZM: 359.64°  
TVD: 7,098.42'  
VS: 4,061.44'

**\*Bit Projection\***

MD: 11,892'  
INC: 89.34°  
AZM: 359.64°  
TVD: 7,099.12'  
VS: 4,132.52'

**MINDEPTH 7/6/18**  
**Reached TD @**  
**11,892' MD on**  
**7/5/18.**



11700-11800 MRLST  
(70%): med  
gy-gyshbn-dk gy-dk  
gyshbn, frm-hd-brit, sb  
blky-blky mod fis ctngs,  
sm-sl slty tex, tr vf pyr, tr  
fos frags; CHK (30%):  
med gy wi f wh chky  
lamn, sb frm-frm, l-mod  
fis sb blky-blky ctngs, hi  
calc

11800-11892 MRLST  
(60%): med  
gy-gyshbn-dk gy-dk  
gyshbn, frm-hd-brit, sb  
blky-blky mod fis ctngs,  
sm-sl slty tex, tr vf pyr, tr  
fos frags; CHK (40%):  
med gy wi f wh chky  
lamn, sb frm-frm, l-mod  
fis sb blky-blky ctngs, hi  
calc

