



Scale: 5" / 100'
Measured Depth Log

Well Name HWY52 4H-32H-O268

Location Sec. 32 T2N R68W

State Colorado

County Weld

Country USA

Rig Number Ensign 140

API Number 05123382690000

AFE # 14179664

Geographic Region Rockies

Field Wattenberg

Spud Date 6/11/2017

Drilling Completed 6/16/2017

Surface Coordinates Lat/Long: 40.089355/-105.025035

SHL: Sec: 32 Twp: 2N 68W
Footage: 598 FSL 2054 FEL

Bottom Hole Coordinates Proposed BHL: Sec: 5 Twp: 1N 68W
Footages: 460 FSL 790 FEL

Ground Elevation 4,992'

K.B. Elevation 5,015'

Logged Interval 6,800' **To** 13,402'

Total Depth 13,402'

Formation B Chalk

Type of Drilling Fluid Syntehtic Oil Based Mud

Operator

Company Crestone Peak Resources

Address 370 17th Street #2170
Denver, CO 80202



CRESTONE PEAK

Geologist

Name John Ready

Company Crestone Peak Resources

Address 370 17th Street #2170
Denver, CO 80202



CRESTONE PEAK
RESOURCES

Zone Color Coding

Oil	Condensate	Gas
Note	Core	Pressure
Error	Water	Seal

Other

Loggers: Nicholas Watkins / Mike McAuley

Contractor: ALS Empirica
6510 Guhn Road
Houston, TX 77040

Services Provided: 2-Man Mudlogging / Geosteering

Equipment: ML-556

Rock Types

UNKNOWN
ANHYDRITE
GYPSUM
SALT
SIDERITE or LIMONITE
LIMESTONE

DOLOMITE
CHERT
COAL
MARLSTONE
CHALK
SHALE

SHALE GRAY
SHALE COLORED
SILTSTONE
SANDSTONE
CONGLOMERATE
BRECCIA

TILL
BENTONITE
TUFF
IGNEOUS
METAMORPHIC
CEMENT

Accessories

Fossils

ALGAE
AMPHIPORA
BELEMNITE
BIOCLASTIC
BRACHIOPOD
BRYOZOA
CEPHALOPOD
CORAL
CRINOID

F FOSSIL

GASTROPOD
OOLITE
OSTRACOD
PELECYPOD
PELLET
PISOLITE
PLANT REMAINS
PLANT SPORES
SCAPHOPOD
STROMATOPOROID

ARGILLACEOUS

ARGILLITE GRAIN
BENTONITE
BITUMENOUS SUBSTANCE
BRECCIA FRAGMENTS
CALCAREOUS
CARBONACEOUS FLAKES
CHTDK
CHTLT
COAL - THIN BEDS
DOLOMITIC

GLAUCONITE

GYPSIFEROUS
HEAVY MINERAL
KAOLIN
MARLSTONE
MINERAL CRYSTALS
NODULES
PHOSPHATE PELLETS
PYRITE
SALT CAST
SANDY

Stringer

ANHYDRITE STRINGER
BENTONITE STRINGER
COAL STRINGER
DOLOMITE STRINGER
GYPSUM STRINGER
LIMESTONE STRINGER
MARLSTONE (CALC) STRG
MARLSTONE (DOL) STRG
SANDSTONE STRINGER

🪦 ECHINOID

🐟 FISH

🪨 FORAMINIFERA

Minerals

⚡ ANHYDRITIC

+ FELDSPAR

● FERRUGINOUS PELLET

🦋 FERRUGINOUS

^ SILICEOUS

☁ SILTY

✓ TUFFACEOUS

— SHALE STRINGER

📌 SILTSTONE STRINGER

Oil Show

🪦 DEAD

● EVEN

⊖ QUESTIONABLE

🔍 SPOTTED STAINING

Porosity

🌱 EARTHY

🪟 FENESTRAL

🔪 FRACTURE

✂ INTERCRYSTALLINE

🪦 INTEROOLITIC

🪨 MOLDIC

🪦 ORGANIC

🪦 PINPOINT

🪦 VUGGY

Engineering

🪦 BIT

🪦 CASING

🔊 CONNECTION (LEFT)

🔊 CONNECTION (RIGHT)

🔊 CONNECTION GAS

🔊 CORE - LOST

🔊 CORE - RECOVERED

🔊 DST INTERVAL

🔊 FAULT

Other Symbols

🔊 FORMATION TOP

🔊 GAS SHOW

🔊 MNDEPTH 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

🪦 EARTHY

🪦 FINELYXLN

🪦 GRAINSTONE

🪦 LITHOGRAPHIC

🪦 MICROXLN

🪦 MUDSTONE

🪦 PACKSTONE

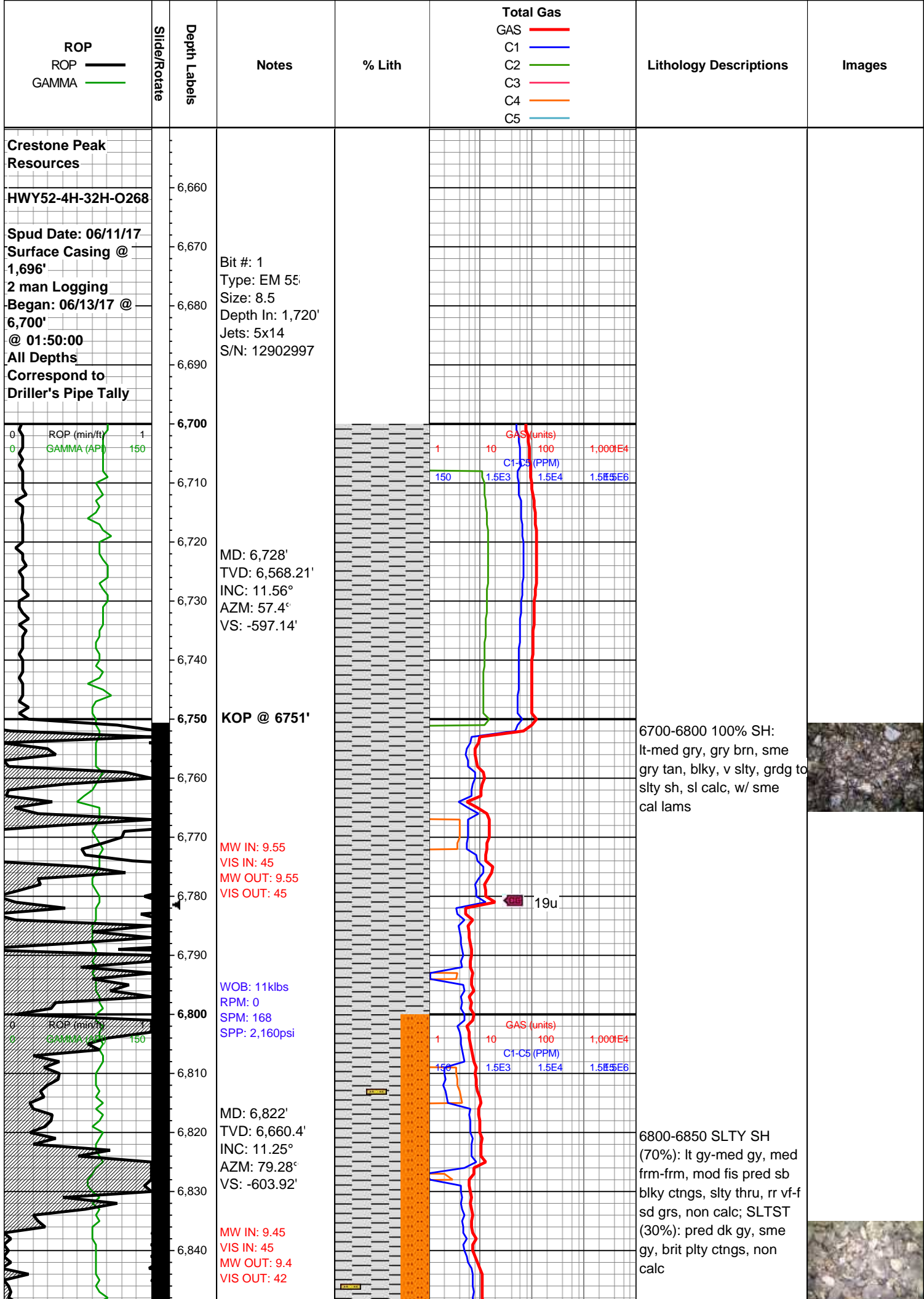
🪦 WACKESTONE

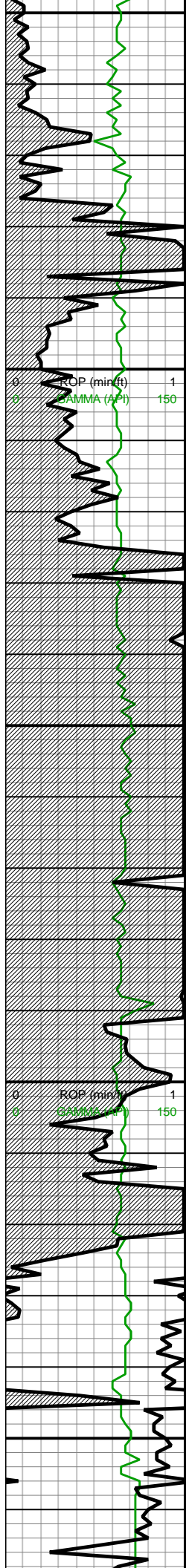
Sorting

🪦 MODERATE

🪦 POOR

🪦 WELL





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

MD: 6,917'
TVD: 6,752.74'
INC: 16.4°
AZM: 110.75°
VS: -600.89'

MD: 6,964'
TVD: 6,797.74'
INC: 17.23°
AZM: 121.47°
VS: -594.9'

MW IN: 9.5
VIS IN: 45
MW OUT: 9.5
VIS OUT: 43

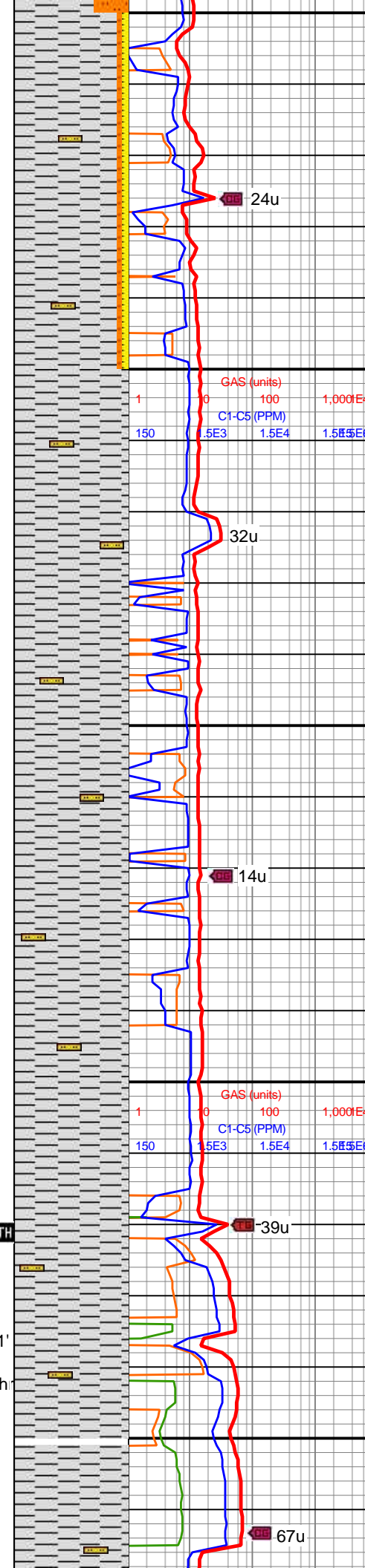
WOB: 12klbs
RPM: 0
SPM: 170
SPP: 2,170psi

MD: 7,011'
TVD: 6,842.28'
INC: 20.18°
AZM: 135.97°
VS: -585.43'

TOOH for new bit

06/14/17 MINDEPTH
Bit #: 1
Type: EM 55
Size: 8 1/2
Depth In: 1,720'
Depth Out: 7,021'
Hours: 26.1 hrs
Avg Ft/Hr: 203 1/2
Jets: 5x14
S/N: 12902997

Bit #: 2
Type: U516S
Size: 8 1/2
Depth In: 7,021'
Jets: 5x14
S/N: 25862



6850-6900 SLTY SH
(90%): lt gy-med gy, med frm-frm, mod fis pred sb blkly ctngs, slty thru, rr sdy intbds, non calc; SST (5%): off wh-lt gy, mod-w srtd f-u f sdy intbd; SLTST (5%): dk gy, frm-brit, plty, non calc

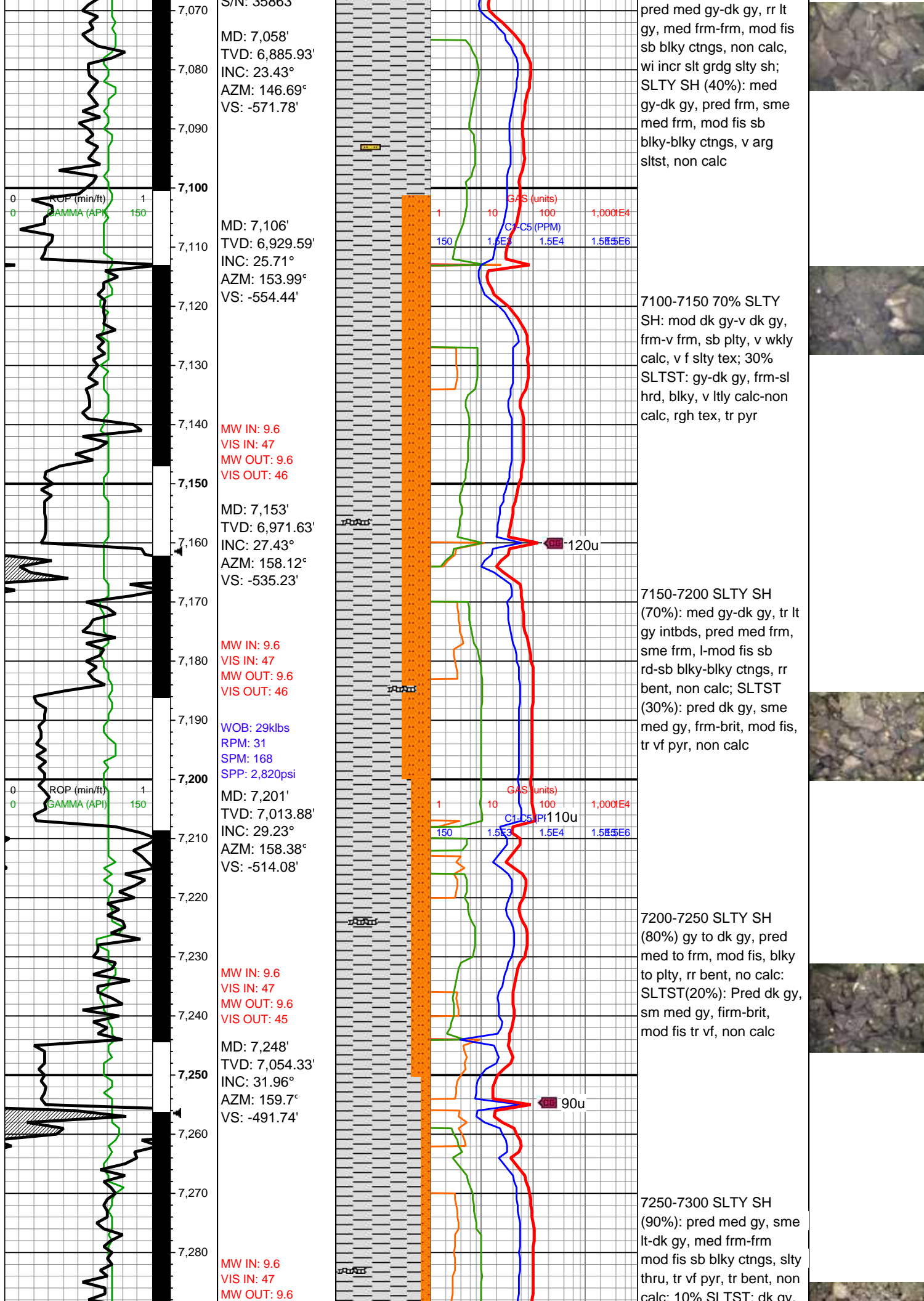
6900-6950 SLTY SH
(100%): off whv lt gy-med gy, med frm-frm v arg slty ctngs, mod fis pred sb blkly ctngs, com scalloped lamn, slty thru, non calc

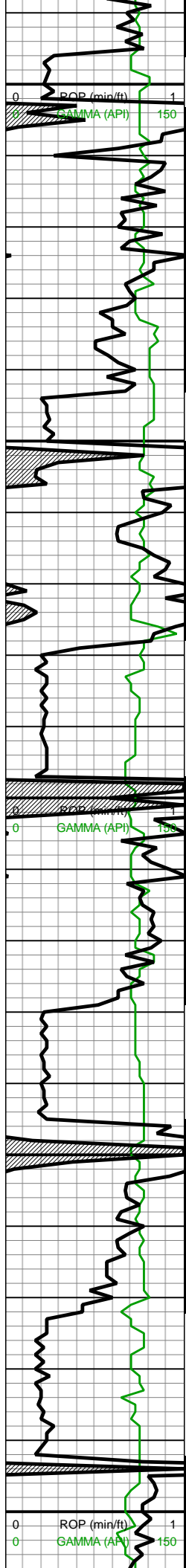
6950-7000 SLTY SH
(100%): off wh to dk gy, med frm-frm v arg sltst, mod fis sb blkly-tab, non calc

7000-7050 SLTY SH
(100%): Off wh to dk gy, med frm-frm v arg sltst, mod fis sb blkly-tab, non calc

7050-7100 SH (60%):







MD: 7,295'
TVD: 7,093.33'
INC: 35.87°
AZM: 161.9°
VS: -466.97'

MD: 7,342'
TVD: 7,130.49'
INC: 39.6°
AZM: 164.89°
VS: -439.41'

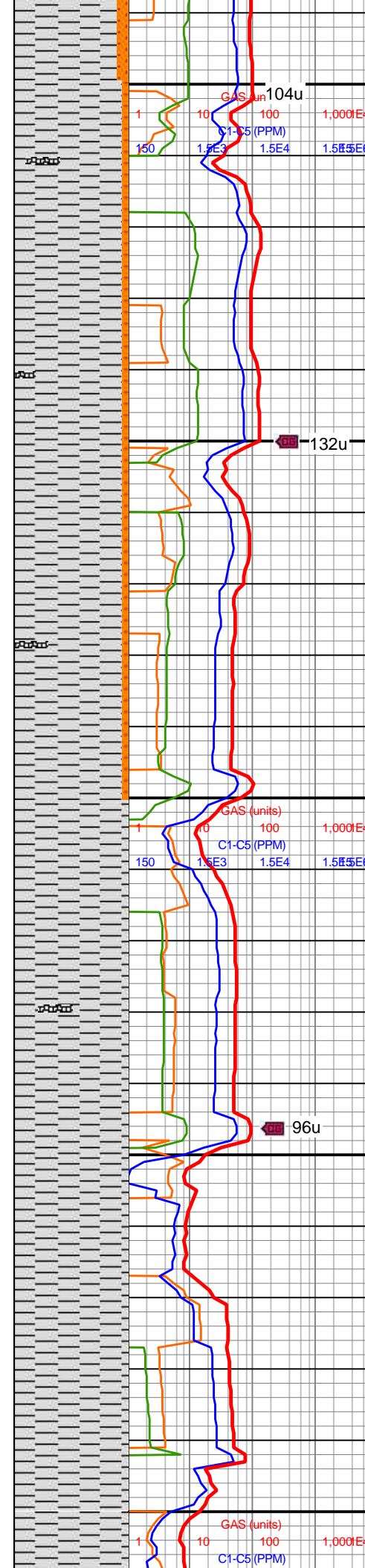
MD: 7,389'
TVD: 7,166.05'
INC: 42.07°
AZM: 166.65°
VS: -409.62'

MD: 7,436'
TVD: 7,200.28'
INC: 44.44°
AZM: 166.73°
VS: -378.28'

MD: 7,484'
TVD: 7,233.69'
INC: 47.34°
AZM: 164.98°
VS: -344.87'

MW IN: 9.6
VIS IN: 45
MW OUT: 9.6
VIS OUT: 44

WOB: 20klbs
RPM: 0
SPM: 168
SPP: 2,375psi



calc, 100% SLTY SH, dk gy,
med gy ip, frm-brit
blky-pty ctngs, tr vf pyr,
non calc

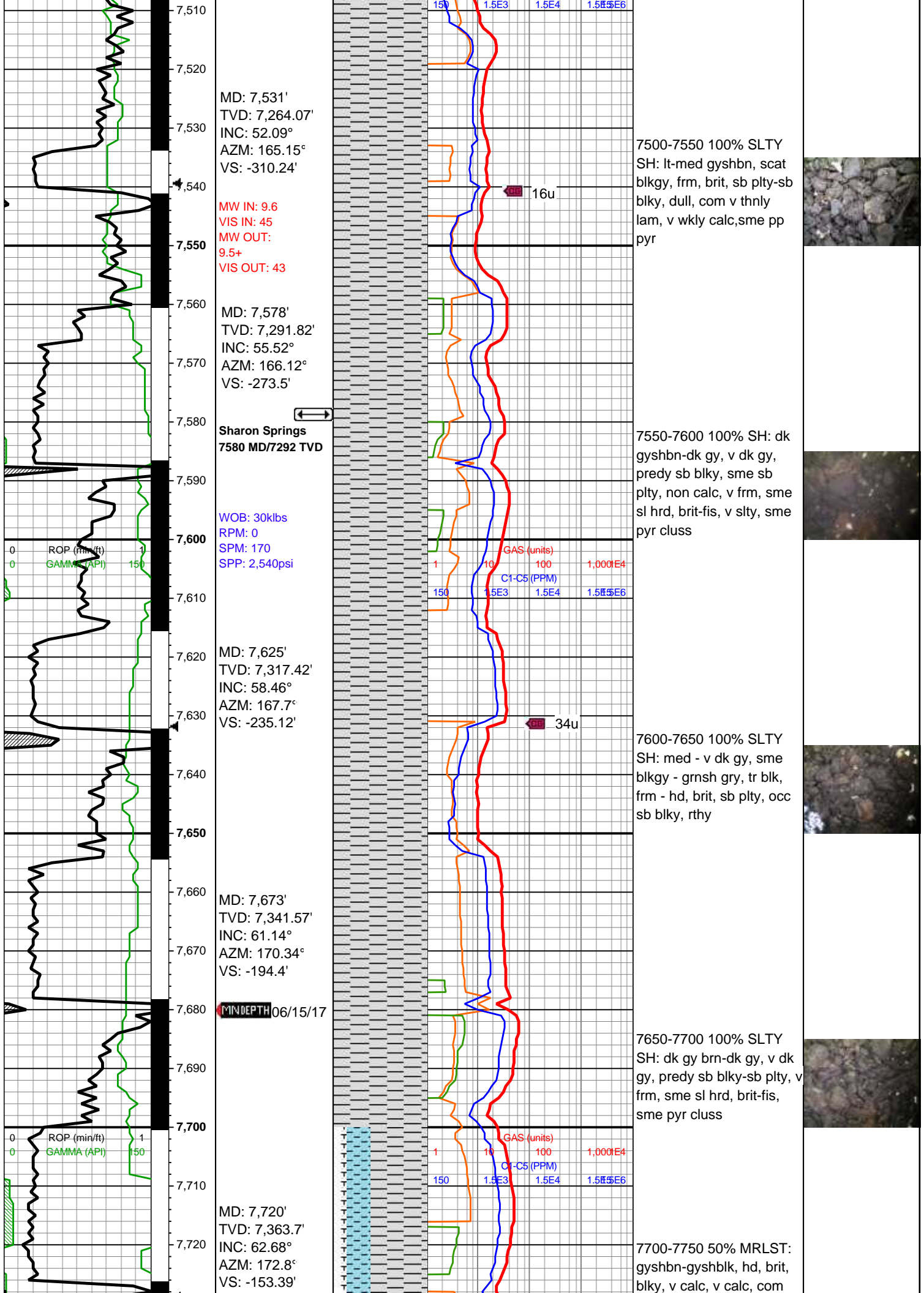
7300-7350 SLTY SH
(100%): pred gy, sm lt-dk
gy, med frm-frm, mod fis
sb blky-pty ctngs, tr bent,
non calc

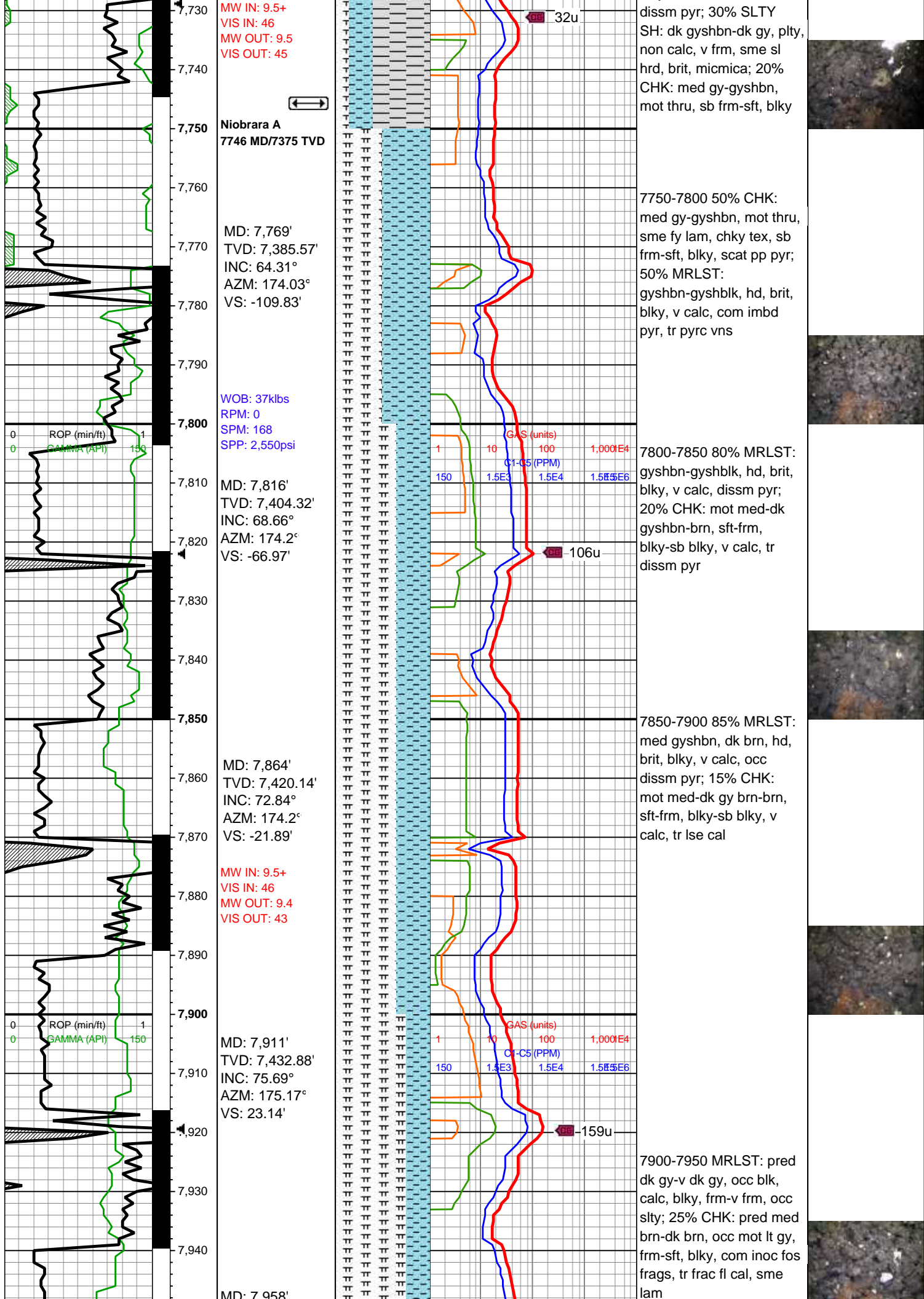
7350-7400 SLTY SH
(95%): pred med gr, sme
lt-dk gy, med frm-frm,
mod fis sb blky-pty
ctngs, tr bent, non clac;
5% SLTST: dk gy, med gy
ip, blky-pty, tr vf pyr, non
calc

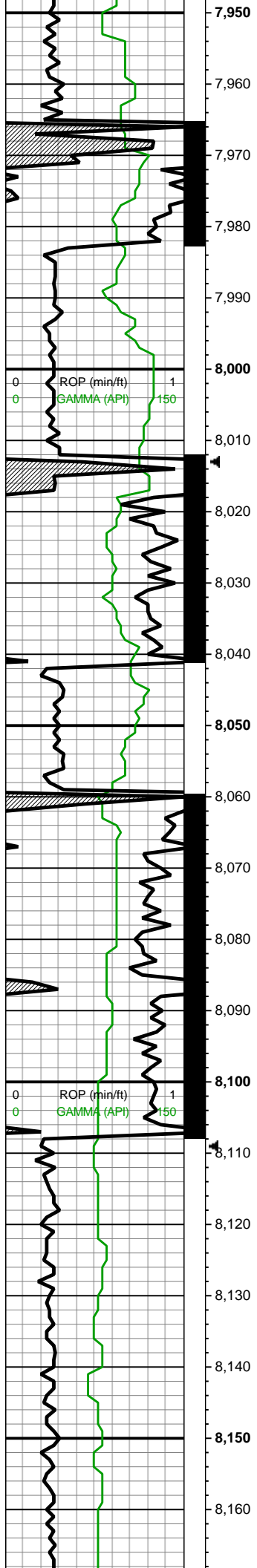
7400-7450 SLTY
SH(100%):pred med gy,
sme lt-dk gy, med
frm-frm, mod fis sb
blky-pty, tr vf pyr, non calc

7450-7500 SLTY SH
(100%) lt to med gy, lt to
med gy brn, med hd-hd,
blky, sb pty, SHLY, tr pp
pyr, tr bent









MD: 7,953'
TVD: 7,443.41'
INC: 78.42°
AZM: 175.79°
VS: 68.8'

↔

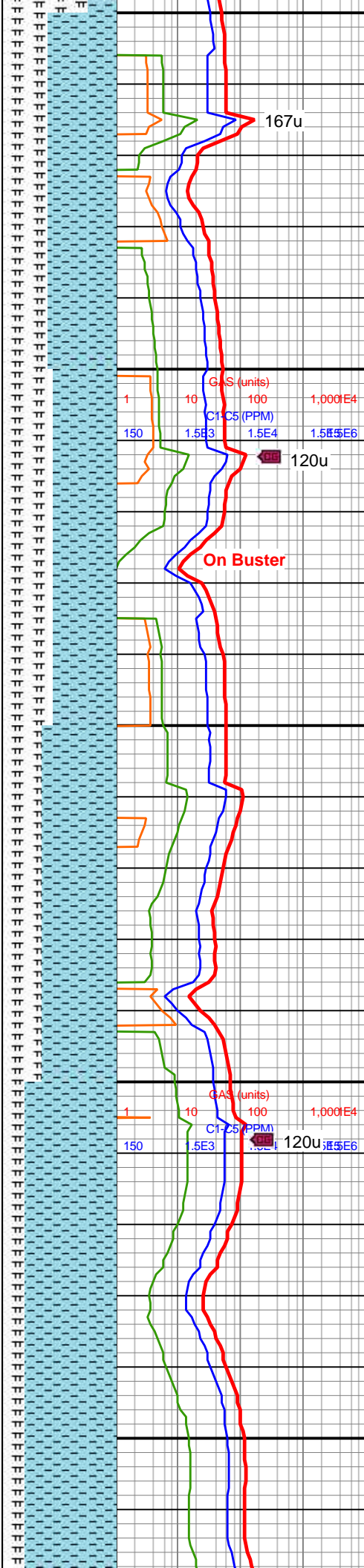
Niobrara B
7966 MD/7445 TVD
MW IN: 9.6+
VIS IN: 48
MW OUT: 9.5+
VIS OUT: 44
WOB: 40klbs
RPM: 31
SPM: 168
SPP: 3,001psi

MD: 8,005'
TVD: 7,452.28'
INC: 79.82°
AZM: 176.23°
VS: 114.85'

MW IN: 9.6
VIS IN: 46
MW OUT: 9.6
VIS OUT: 45

MD: 8,053'
TVD: 7,459.47'
INC: 82.95°
AZM: 176.66°
VS: 162.21'

MD: 8,147'
TVD: 7,465.44'
INC: 89.76°
AZM: 177.02°
VS: 255.82'



167u

120u

On Buster

120u

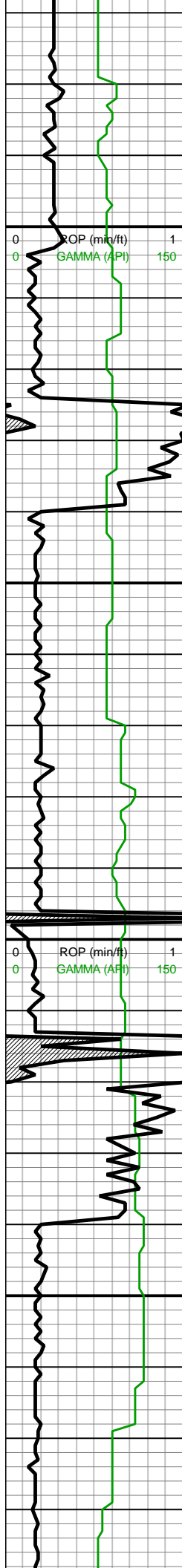
7950-8000 60% CHK:
predy lt-med gyshbn,
sme lt gy, sft-sb frm, fri,
mot ip, sb blkly - blkly;
40% MRLST: v dk
gyshbn-blkgy, frm-sb hd,
sb blkly-sb plty, tr pp pyr

8000-8050 55% CHK:
mot med gy-lt gy, sme lt
brn, rr lam, frm, blkly, chky
tex, v calc; 45% MRLST:
pred v dk gy-blk, sme
med gy, frm-v frm, blkly,
rgh

8050-8100 CHK (75%):
med gy-med gy brn, sme
lt gy ip, mot wi wh-lt gy
chky incl, rr lam, frm, mod
fis blkly ctngs, tr vf pyr, tr
forams, v calc; MRLST
(25%): pred v dk gy-dk gy
brn, sme med gy, frm-v
frm, mod fis sb blkly-blkly
ctngs, mod calc wi brn
mrly resdl

8100-8200 CHK (80%):
med gy-med gy brn, mot
wi wh-lt gy chky incl, frm,
mod fis blkly ctngs, tr vf

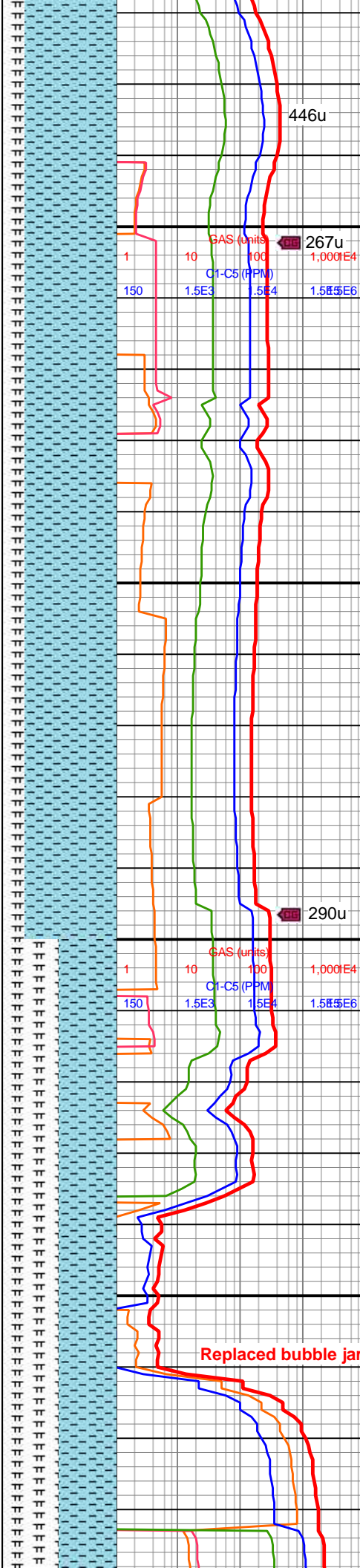




WOB: 40klbs
RPM: 31
SPM: 168
SPP: 2,990psi

MD: 8,242'
TVD: 7,465.81'
INC: 89.8°
AZM: 177.81°
VS: 350.72'

MW IN: 9.6
VIS IN: 45
MW OUT: 9.55
VIS OUT: 44
MD: 8,337'
TVD: 7,467.05'
INC: 88.7°
AZM: 179.92°
VS: 445.69'

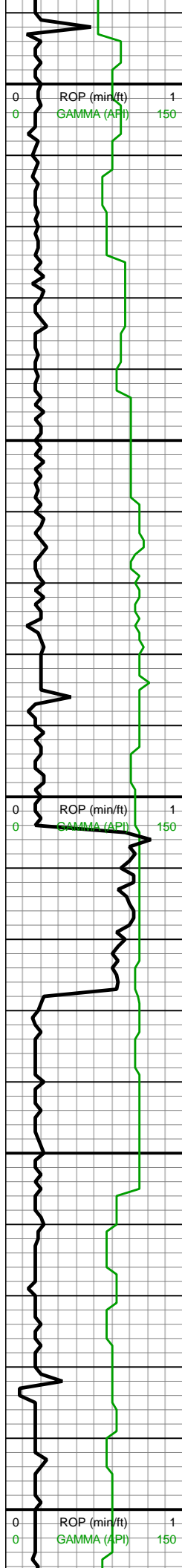


pyr-c pyr strg, mod-com
forams, v calc; MRLST
(20%): pred v dk gy-dk gy
brn, sme med gy, frm-v
frm, mod fis sb blkly-blky
ctngs, mod calc wi brn
mrly resdl

8200-8300 CHK (80%):
med gy-med gy brn, mot
wi wh-lt gy chky incl, frm,
mod fis blkly ctngs, tr vf
pyr-c pyr strg, mod-com
forams, v calc; MRLST
(20%): pred v dk gy-dk gy
brn, sme med gy, frm-v
frm, mod fis sb blkly-blky
ctngs, mod calc wi brn
mrly resdl

8300-8400 CHK (50%):
med gy-med gy brn, frm
mod fis blkly ctngs mot wi
wh-lt gy chky incl, tr vf
pyr-c pyr strg, mod
forams, tr fos frags, v
calc; MRLST (50%): pred
v dk gy-dk gy brn, sme
med gy, frm-v frm, mod
fis sb blkly-blky ctngs,
mod calc wi brn mrly





WOB: 37klbs
RPM: 80
SPM: 194
SPP: 3,640psi

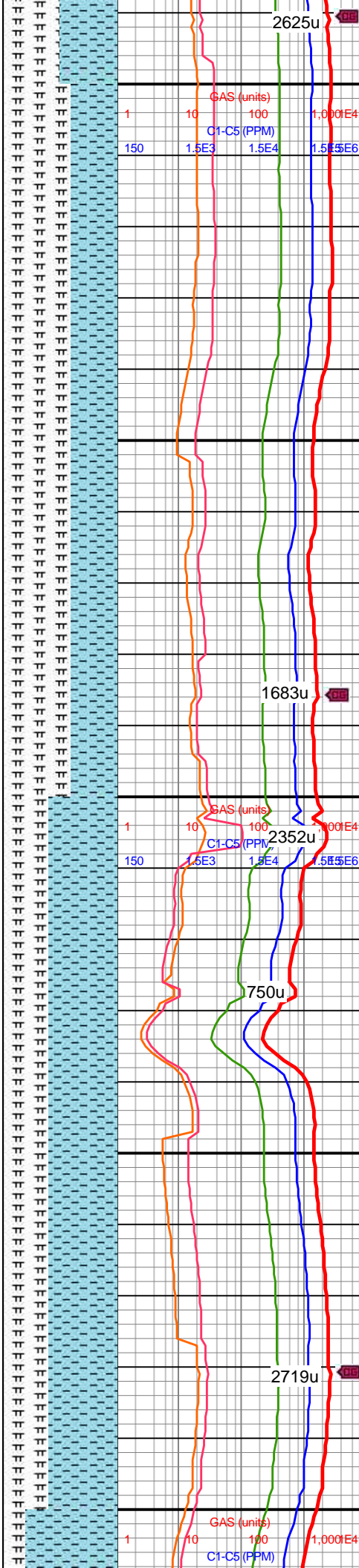
Isotube caught
2800u

MD: 8,432'
TVD: 7,468.62'
INC: 89.41°
AZM: 179.57°
VS: 540.67'

MW IN: 9.6
VIS IN: 45
MW OUT: 9.6
VIS OUT: 43

MD: 8,526'
TVD: 7,471.25'
INC: 87.38°
AZM: 178.69°
VS: 634.62'

WOB: 39klbs
RPM: 80
SPM: 196
SPP: 3,730psi



2625u

resdl

GAS (units)
C1-C5 (PPM)

1683u

GAS (units)
C1-C5 (PPM)

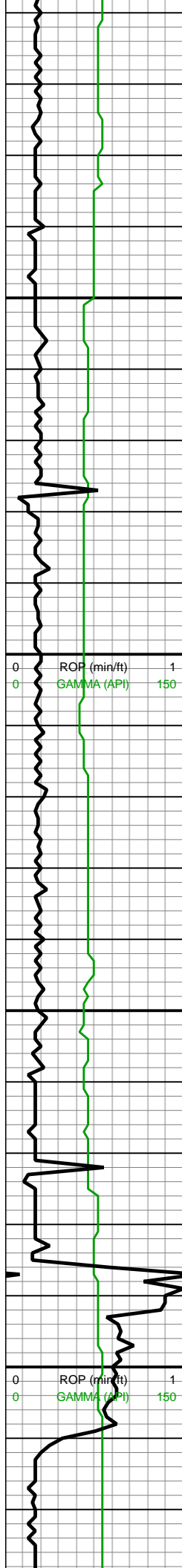
2352u

750u

2719u

8400-8500 MRLST (60%): pred v dk gy-dk gy brn, sme med gy, frm-v frm, mod fis sb blkyl-blky ctngs, mod forams, tr-mod fos frags, mod calc wi brn mrly resd; CHK (40%): med gy-med gy brn, frm mod fis blkyl ctngs mot wi wh-lt gy chky incl, tr vf pyr-c pyr strg, v calc

8500-8600 CHK (60%): med gy-med gy brn, frm mod fis blkyl ctngs mot wi wh-lt gy chky incl, tr vf pyr-c pyr strg, occ forams, v calc; MRLST (40%): pred v dk gy-dk gy brn, sme med gy, frm-v frm, mod fis sb blkyl-blky ctngs, mod calc wi brn mrly resdl



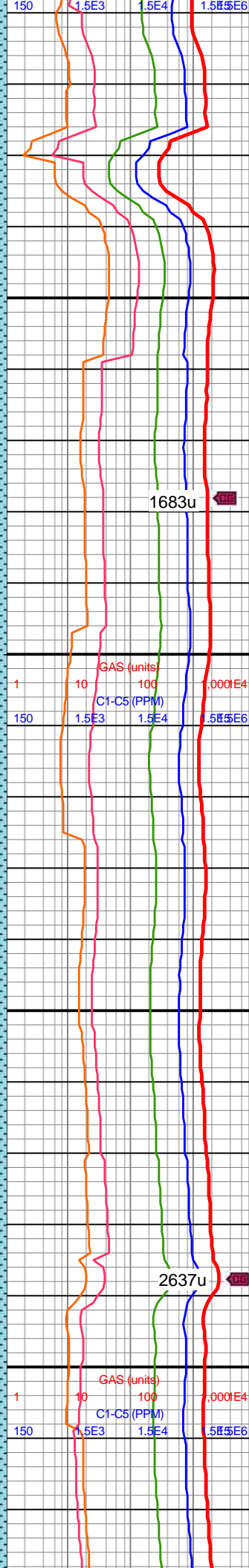
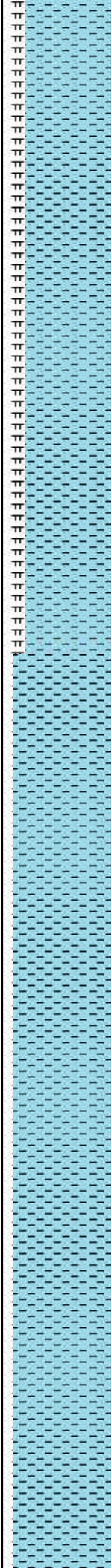
MD: 8,621'
TVD: 7,475.08'
INC: 88°
AZM: 178.25°
VS: 729.51'

MD: 8,716'
TVD: 7,476.83'
INC: 89.89°
AZM: 177.72°
VS: 824.43'

MW IN: 9.6
VIS IN: 45
MW OUT: 9.55
VIS OUT: 43

WOB: 39klbs
RPM: 0
SPM: 194
SPP: 3,410psi

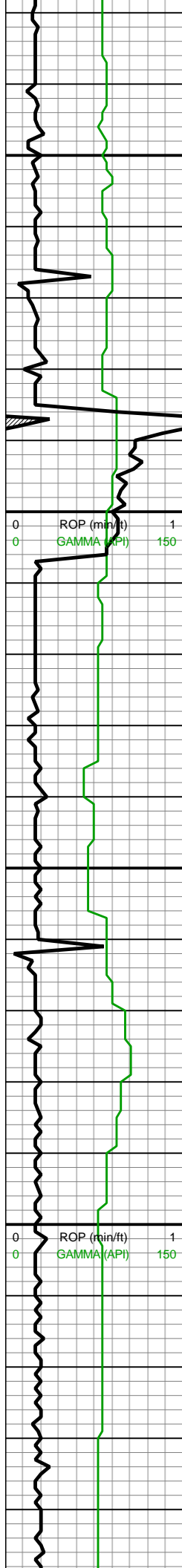
MD: 8,811'
TVD: 7,477.16'
INC: 89.71°
AZM: 179.74°
VS: 919.4'



8600-8700 CHK (80%)
dk gy-med brn, frm mod
fis blky, rr to tr forams, tr
vf pyr, v Calc: MRLST
(20%)pred v dk gy-dk gy
brn sme med gy, frm-v
frm, mod fis sb blky-blky,
mod calc wi brn mrly
resdl

8700-8800 CHK (90%):
pred med gy-med gy brn,
sme dk gy, frm, mod fis
blky ctngs, sm arg tex,
mot wi wh-lt gy chky incl
& com forams, v calc;
MRLST (10%): pred v dk
gy-dk gy brn, sme med
gy, frm-v frm, mod fis sb
blky-blky ctngs, mod calc
wi brn mrly resdl





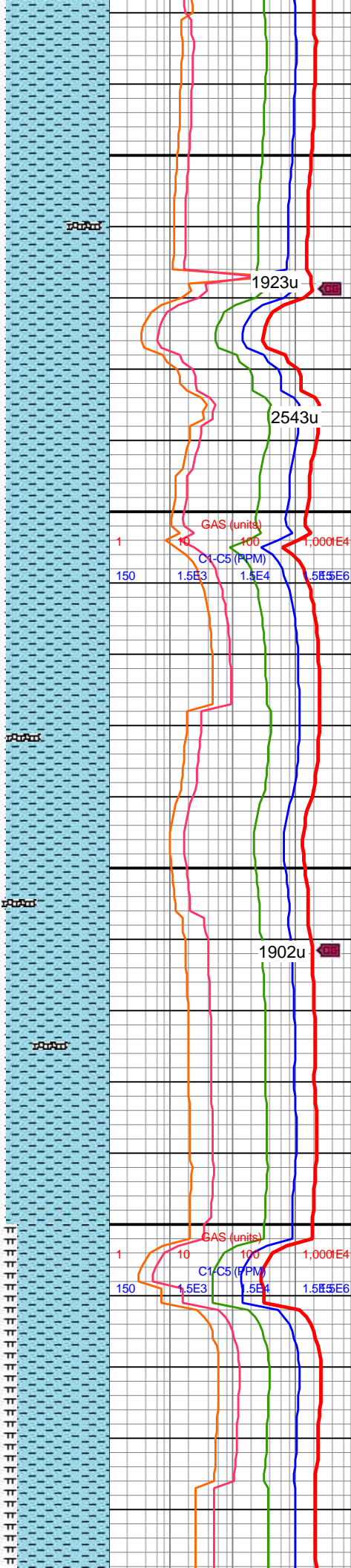
MW IN: 9.6
VIS IN: 45
MW OUT: 9.6
VIS OUT: 44

MD: 8,906'
TVD: 7,479.68'
INC: 87.25°
AZM: 179.04°
VS: 1,014.35'

MW IN: 9.6
VIS IN: 45
MW OUT: 9.6
VIS OUT: 44

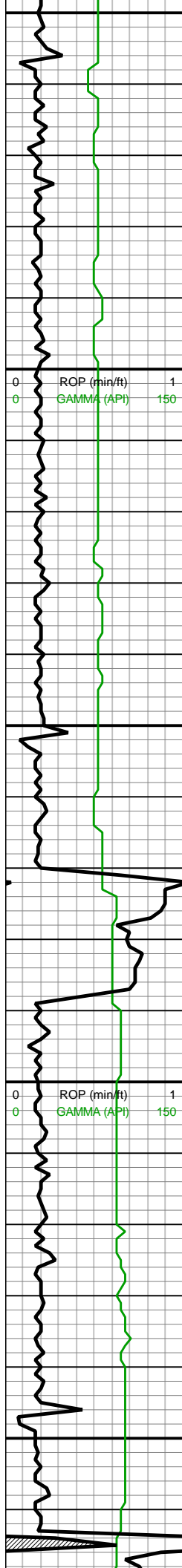
WOB: 40klbs
RPM: 80
SPM: 194
SPP: 3,830psi

MD: 9,001'
TVD: 7,483.59'
INC: 88.04°
AZM: 178.42°
VS: 1,109.25'



8800-8900 CHK (90%):
med gy-med gy brn, sme
dk gy, mot wi wh-lt gy
chky incl, frm, mod fis
blky ctngs, sm arg tex,
rr-occ forams, rr-occ
bent, v calc; MRLST
(10%): pred v dk gy-dk gy
brn, sme med gy, frm-v
frm, mod fis sb blky-blky
ctngs, mod calc wi brn
mrly resdl

8900-9000 CHK (90%):
med gy-med gy brn, sme
dk gy, mot wi wh-lt gy
chky incl, frm, mod fis
blky ctngs, sm arg tex,
rr-occ forams, rr-occ
bent, v calc; MRLST
(10%): pred v dk gy-dk gy
brn, sme med gy, frm-v
frm, mod fis sb blky-blky
ctngs, mod calc wi brn
mrly resdl

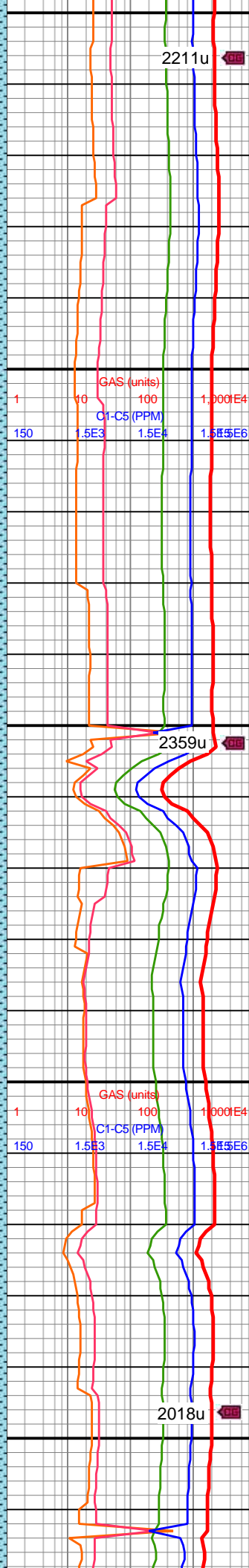
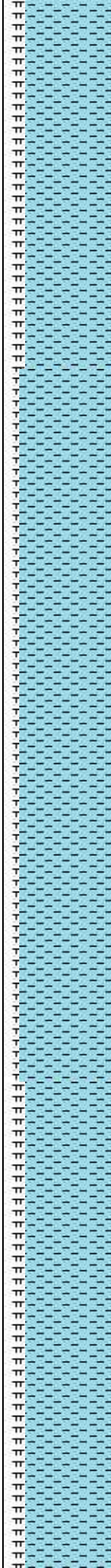


MW IN: 9.6
VIS IN: 45
MW OUT: 9.6
VIS OUT: 44

MD: 9,095'
TVD: 7,485.54'
INC: 89.58°
AZM: 178.42°
VS: 1,203.19'

MD: 9,190'
TVD: 7,486.19'
INC: 89.63°
AZM: 180.18°
VS: 1,298.18'
WOB: 41klbs
RPM: 80
SPM: 192
SPP: 3,810psi

MW IN: 9.6
VIS IN: 45
MW OUT: 9.6
VIS OUT: 44



2211u

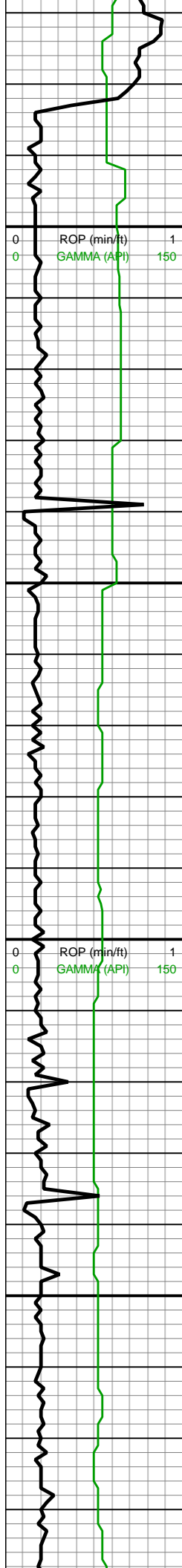
2359u

2018u

9000-9100 CHK (80%):
pred med gy, sme lt gy,
mot wi wh-lt gy elong wh
chky incl, frm, med-hi fis
sb blkyl-blky ctngs, sm
arg tex, occ forams, rr fos
frags, v calc; MRLST
(20%): dk gy, frm-v frm,
mod fis sb blkyl-blky
ctngs, mod calc wi brn
mrly resdl

9100-9200 CHK (85%):
lt-med gy mot wi wh-lt gy
f-elong chky incl, frm,
mod fis sb blkyl-blky
ctngs, sm arg tex, occ
forams, rr fos frags, v
calc; 15% MRLST: pred v
dk gy-dk gy brn, sme
med gy, frm-v frm, mod
fis sb blkyl-blky ctngs,
mod calc wi brn mrly
resdl

9200-9300 CHK (80%):
pred med av. sme lt av.



VIS OUT: 44

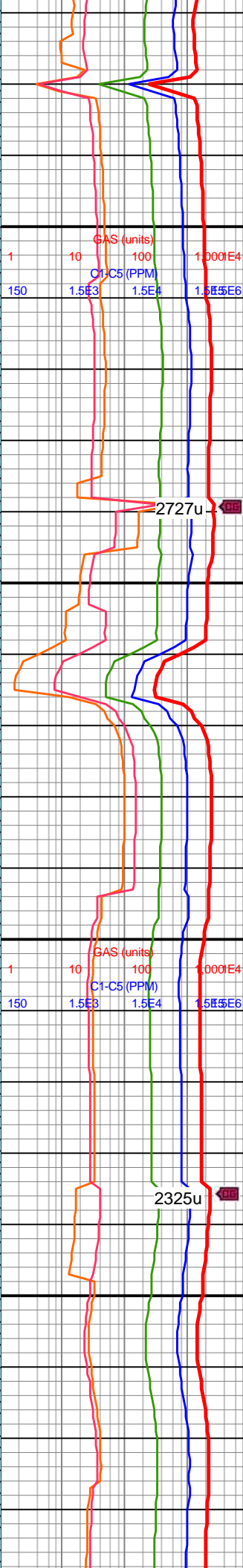
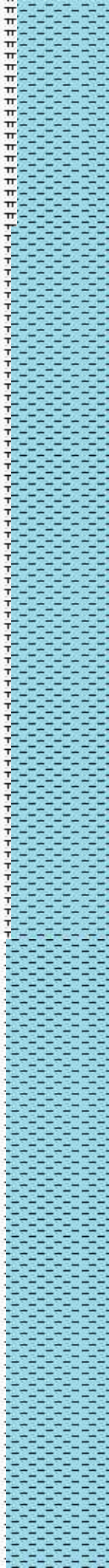
MD: 9,285'
TVD: 7,488.08'
INC: 88.09°
AZM: 179.21°
VS: 1,393.15'

MW IN: 9.6
VIS IN: 45
MW OUT: 9.6
VIS OUT: 44

MD: 9,380'
TVD: 7,490.27'
INC: 89.27°
AZM: 178.77°
VS: 1,488.11'

WOB: 41klbs
RPM: 79
SPM: 192
SPP: 3,830psi

MD: 9,475'
TVD: 7,490.42'
INC: 90.55°
AZM: 178.6°
VS: 1,583.08'

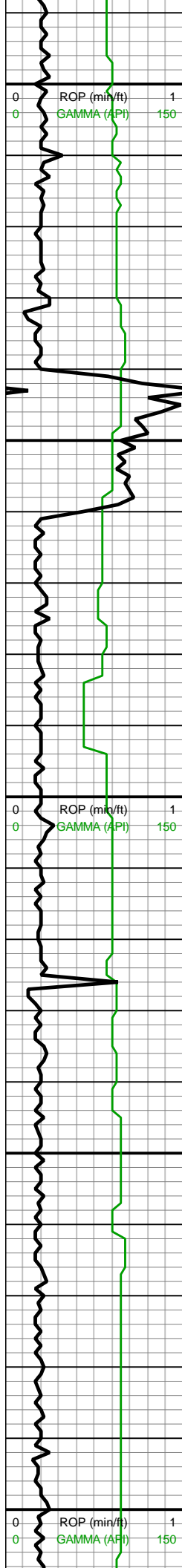


mot wi wh-lt gy along wh
chky incl, frm, med-hi fis
sb blkyl-blkyl ctngs, sm
arg tex, occ forams, rr fos
frags, v calc; MRLST
(20%): dk gy, frm-v frm,
mod fis sb blkyl-blkyl
ctngs, mod calc wi brn
mrly resdl

9300-9400 CHK (85%):
lt-med gy mot wi wh-lt gy
f-elong chky incl, frm,
mod fis sb blkyl-blkyl
ctngs, sm arg tex, occ
forams, rr fos frags, v
calc; 15% MRLST: pred v
dk gy-dk gy brn, sme
med gy, frm-v frm, mod
fis sb blkyl-blkyl ctngs,
mod calc wi brn mrly
resdl

9400-9500 CHK (90%):
lt-med gy, frm, mod fis sb
blkyl-blkyl ctngs, mot wi
wh-lt gy f-elong chky incl,
occ forams, tr vf pyr & c
pyr strg, v calc; 10%
MRLST: pred v dk gy-dk
gy brn, sme med gy.





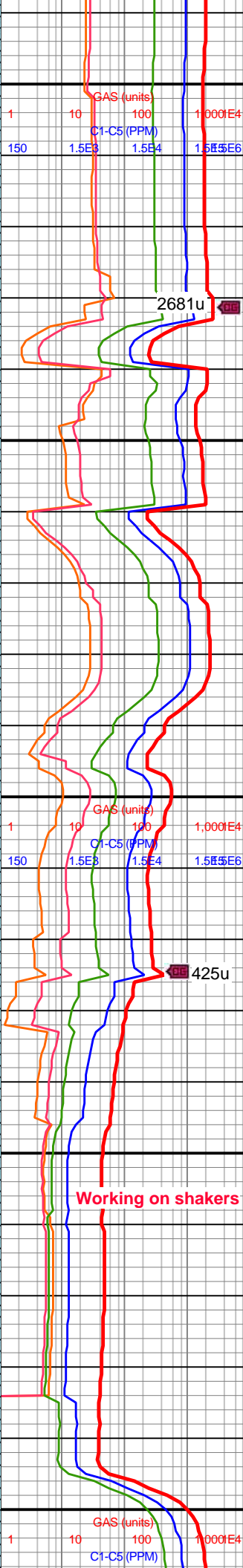
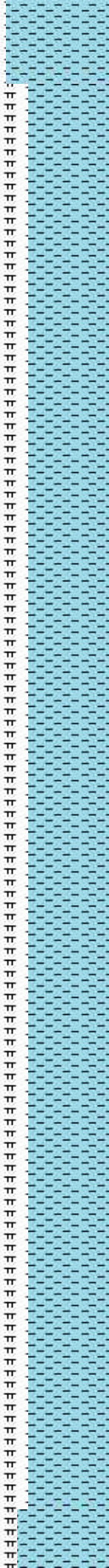
9,490
9,500
9,510
9,520
9,530
9,540
9,550
9,560
9,570
9,580
9,590
9,600
9,610
9,620
9,630
9,640
9,650
9,660
9,670
9,680
9,690
9,700

MW IN: 9.7
VIS IN: 45
MW OUT: 9.6
VIS OUT: 44

MW IN: 9.75
VIS IN: 45
MW OUT: 9.7
VIS OUT: 44
MD: 9,570'
TVD: 7,490.5'
INC: 89.36°
AZM: 179.39°
VS: 1,678.07'

WOB: 40klbs
RPM: 80
SPM: 178
SPP: 3,490psi

MD: 9,665'
TVD: 7,491.27'
INC: 89.71°
AZM: 178.86°
VS: 1,773.05'

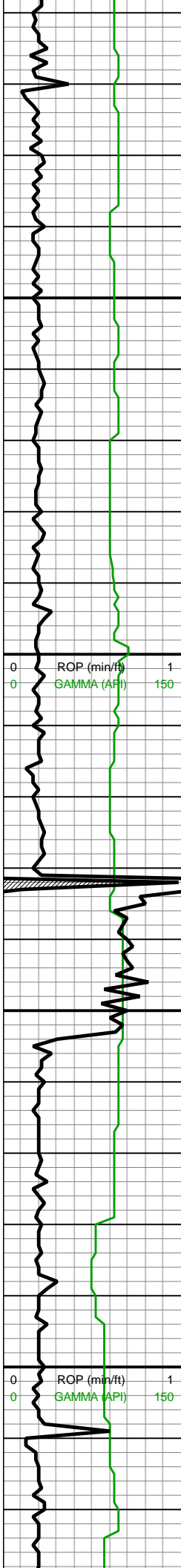


frm-v frm, mod fis sb
blky-blky ctngs, mod calc
wi brn mrly resdl

9500-9600 CHK (70%):
pred med gy, sme lt gy,
mot wi wh-lt gy along wh
chky incl, frm, med-hi fis
sb blky-blky ctngs, sm
arg tex, rr forams, rr fos
frags, v calc; MRLST
(30%): dk gy, frm-v frm,
mod fis sb blky-blky
ctngs, mod calc wi brn
mrly resdl

9600-9700 CHK (70%):
pred med gy, sme lt gy,
mot wi wh-lt gy along wh
chky incl, frm, med-hi fis
sb blky-blky ctngs, sm
arg tex, rr forams, rr fos
frags, tr vf pyr & c pyr strg,
v calc; MRLST (30%): dk
gy, frm-v frm, mod fis sb
blky-blky ctngs, mod calc
wi brn mrly resdl





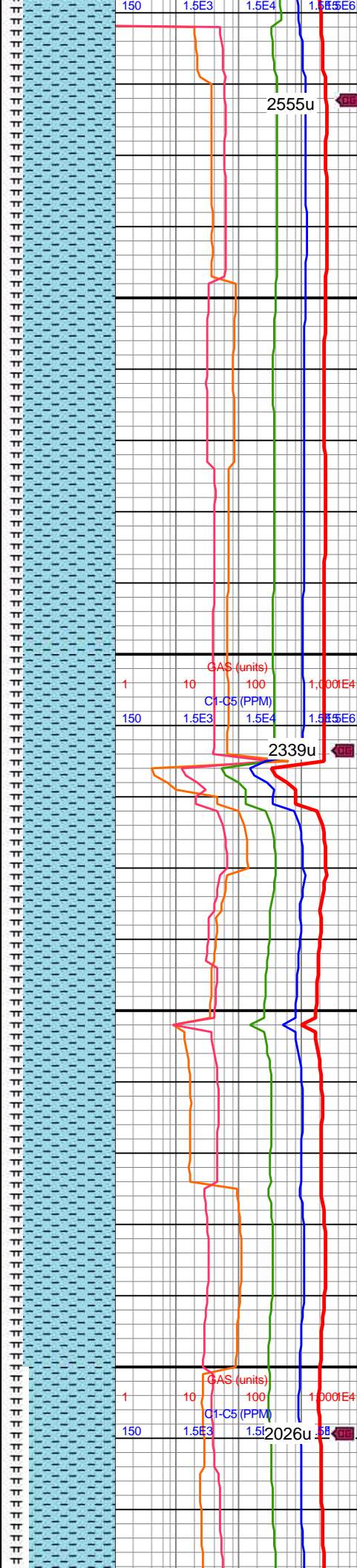
MW IN: 9.7
VIS IN: 45
MW OUT: 9.7
VIS OUT: 44

MD: 9,759'
TVD: 7,491.49'
INC: 90.02°
AZM: 178.16°
VS: 1,867.02'

WOB: 38klbs
RPM: 80
SPM: 180
SPP: 3,570psi

MD: 9,854'
TVD: 7,493.93'
INC: 87.03°
AZM: 178.16°
VS: 1,961.93'

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



2555u

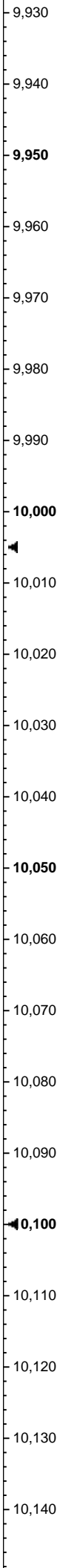
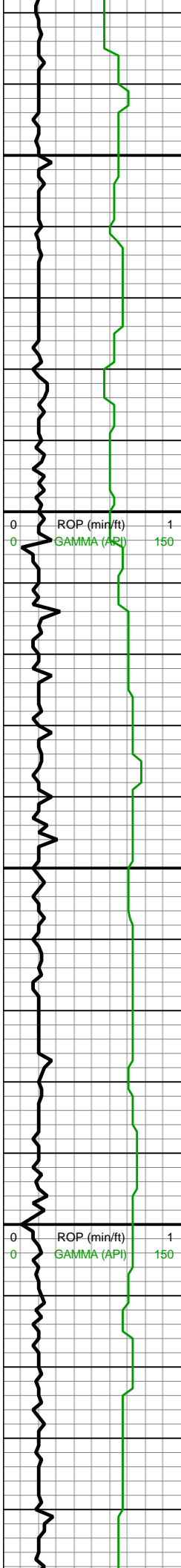
2339u

2026u

9700-9800 CHK (80%): It gy-med gy mot wi wh-lt gy elong wh chky incl, frm, med-hi fis sb blkly-blky ctngs, sm arg tex, rr forams, rr fos frags, tr vf pyr-c pyr strg, v calc; MRLST (20%): dk gy, frm-v frm, mod fis sb blkly-blky ctngs, mod calc wi brn mrly resdl

9800-9900 CHK (80%) It gy-med gy mot wi wh-lt gy frm, med-hi fis sb blkly-blky, sm arg tex, rr forams, rr fos frags, tr vf pyr, v calc; MRLST (20%): dk gy frm-v frm mod fis sb blkly-blky, mod calc wi brn mrly resdl





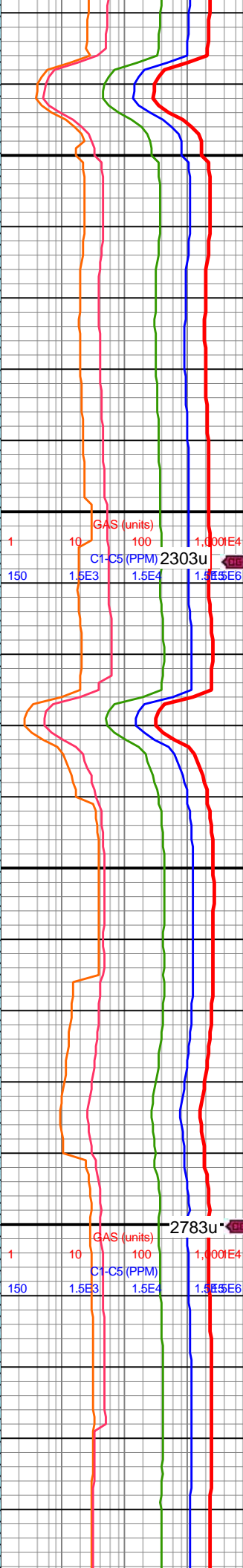
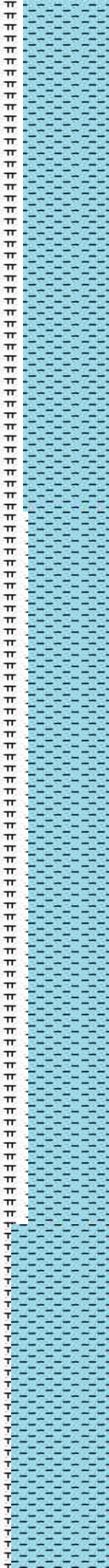
MD: 9,949'
TVD: 7,498.49'
INC: 87.47°
AZM: 177.46°
VS: 2,056.75'

WOB: 30klbs
RPM: 80
SPM: 180
SPP: 3,560psi

MW IN: 9.7
VIS IN: 45
MW OUT: 9.7
VIS OUT: 45

MD: 10,044'
TVD: 7,501.81'
INC: 88.53°
AZM: 176.84°
VS: 2,151.57'

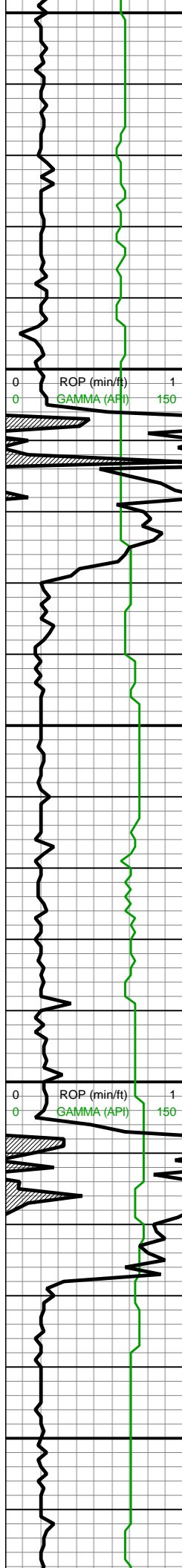
MD: 10,139'
TVD: 7,503.22'
INC: 89.76°
AZM: 176.93°
VS: 2,246.42'



9900-10000 75% CHK:
pred med brn-dk brn, lt
gy, sft frm, blk, tr frac fl
cal, sme lam; 25%
MRLST: pred dk gy-v dk
gy, occ blk, blk, frm-v
frm, occ slty

10000-10100 70% CHK:
med gy-med gy brn, sme
lt gy frm, mod fis blk
ctngs, tr fos frags, f xls
pyr, tr bent, v calc; 30%
MRLST: pred v dk gy-dk
gy brn, sme med gy,
frm-v frm, mod fis sb
blk-blk ctngs, mod calc
wi brn, resdl





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

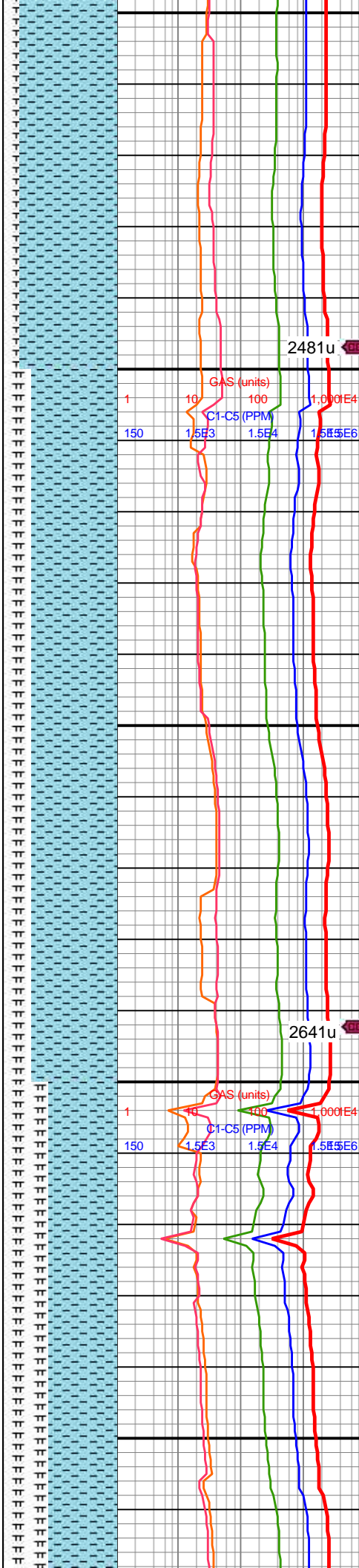
MW IN: 9.7
VIS IN: 45
MW OUT: 9.7
VIS OUT: 44

WOB: 38klbs
RPM: 80
SPM: 178
SPP: 3,578psi

MD: 10,235'
TVD: 7,501.93'
INC: 91.78°
AZM: 178.42°
VS: 2,342.32'

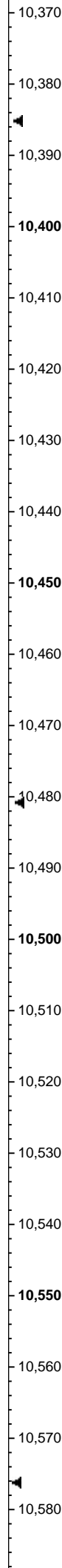
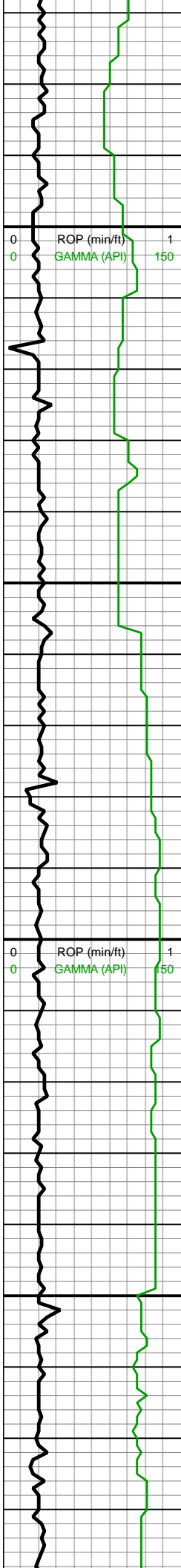
MW IN: 9.7
VIS IN: 44
MW OUT: 9.7
VIS OUT: 43

MD: 10,330'
TVD: 7,500.15'
INC: 90.37°
AZM: 179.57°
VS: 2,437.29'



10100-10200 85% CHK:
mot med-dk gyshbn-brn,
sft frm, blk-y-sb blk-y, v
calc; 15% MRLST:
gyshbn, gyshblk, brn, hd,
brit, blk-y, v calc, dissm
pyr

10200-10300 75% CHK:
pred med brn-dk brn, lt
gy, sft frm, blk-y, tr frac fl
cal, sme lam; 25%
MRLST: pred dk gy-v dk
gy, occ blk, blk-y, frm-v
frm, occ slty

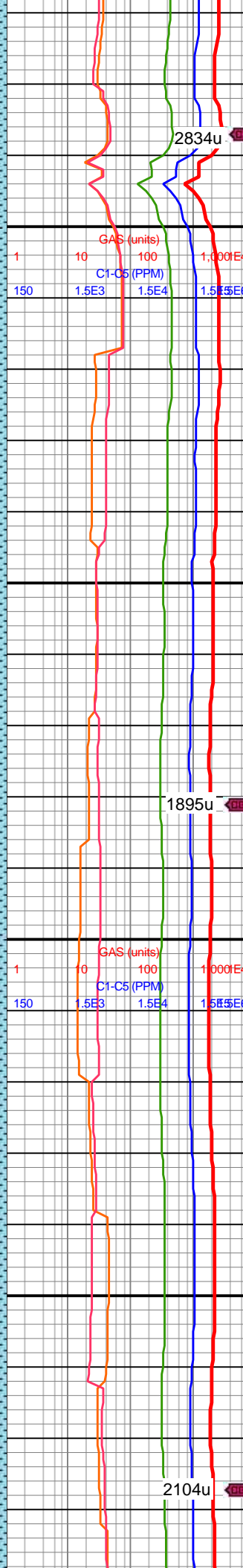
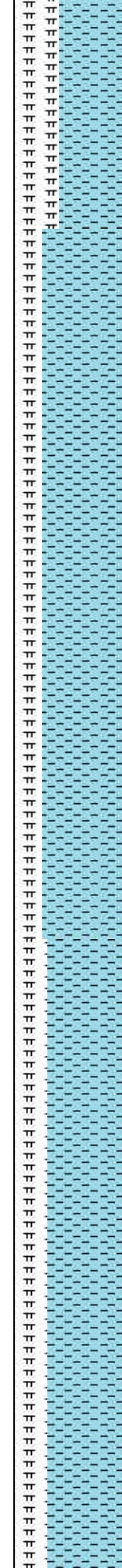


WOB: 38klbs
RPM: 80
SPM: 178
SPP: 3,698psi

4' DTS
MD: 10,425'
TVD: 7,499.36'
INC: 90.59°
AZM: 179.39°
VS: 2,532.28'

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

MD: 10,520'
TVD: 7,497.72'
INC: 91.38°
AZM: 178.95°
VS: 2,627.25'

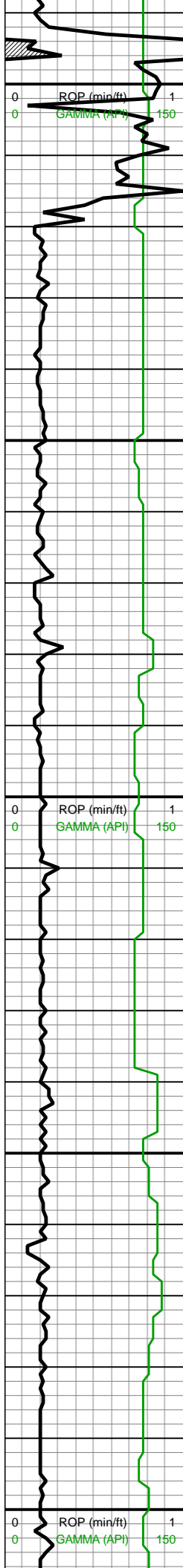


10300-10400 60% CHK:
dk gy-dk brn, gyshbn ip,
pred sft, frm ip, blk, chky
tex, calc, com inoc fos
frags, tr cal vns; 40%
MRLST: v dk gy-gyshbn,
frm-v frm, blk, v calc, rgh
tex

10400-10500 70% CHK:
dk gy-dk brn, gyshbn ip,
pred sft, frm ip, blk, chky
tex, calc, com inoc fos
frags, tr cal vns; 30%
MRLST: v dk gy-gyshbn,
frm-v frm, blk

10400-10500 85% CHK:
mot med-dk gyshbn-brn,



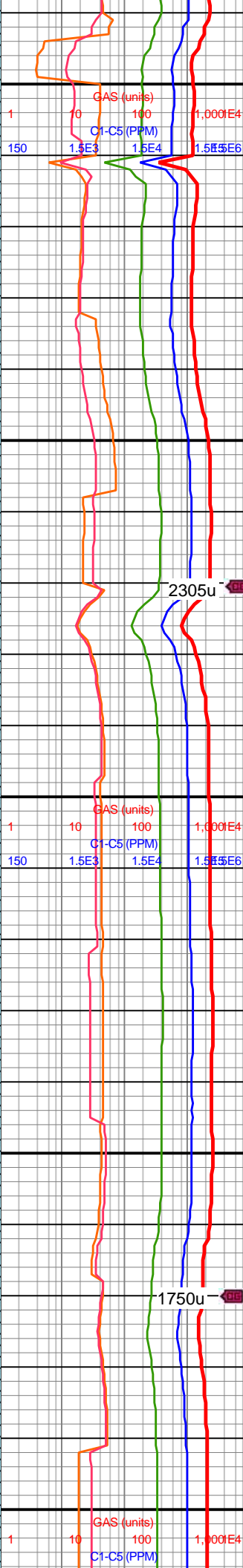
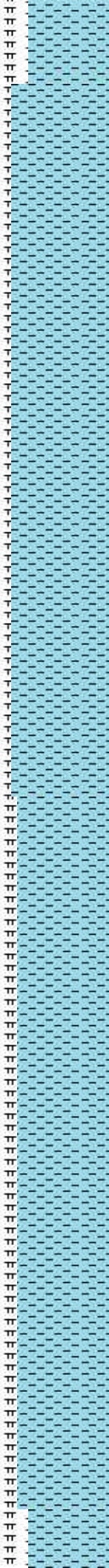


WOB: 49klbs
RPM: 0-25
SPM: 182
SPP: 3,380psi
MD: 10,615'
TVD: 7,497.03'
INC: 89.45°
AZM: 178.51°
VS: 2,722.22'

MD: 10,711'
TVD: 7,497.7'
INC: 89.76°
AZM: 177.81°
VS: 2,818.17'

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

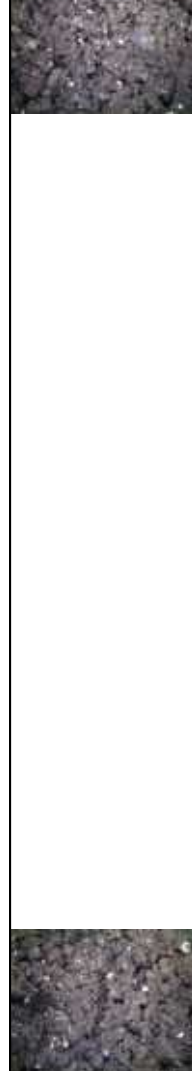
WOB: 40klbs
RPM: 80
SPM: 180
SPP: 3,807psi
MD: 10,805'

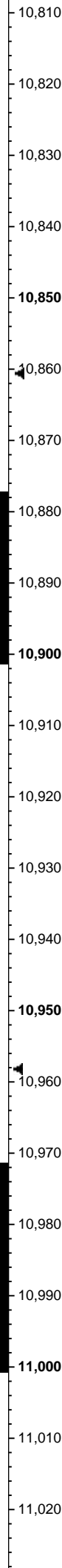
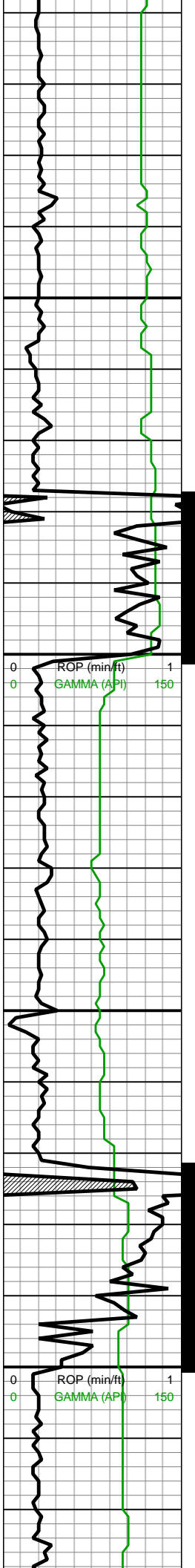


sft-frm, blk-y-sb blk-y, v
calc; 15% MRLST:
gyshbn, gyshblk, brn, hd,
brit, blk-y, v calc, diss
pyr

10600-10700 85% CHK:
mot med-dk gyshbn-brn,
sft-frm, blk-y-sb blk-y, v
calc; 15% MRLST:
gyshbn, gyshblk, brn, hd,
brit, blk-y, v calc, diss
pyr

10700-10800 80% CHK:
dk gy-dk brn, gyshbn ip,
pred sft, frm ip, blk-y, chky
tex, calc, fos frags, tr pyr;
20% MRLST: v dk
gy-gyshbn, frm-v frm,
blk-y, v calc, rgh tex



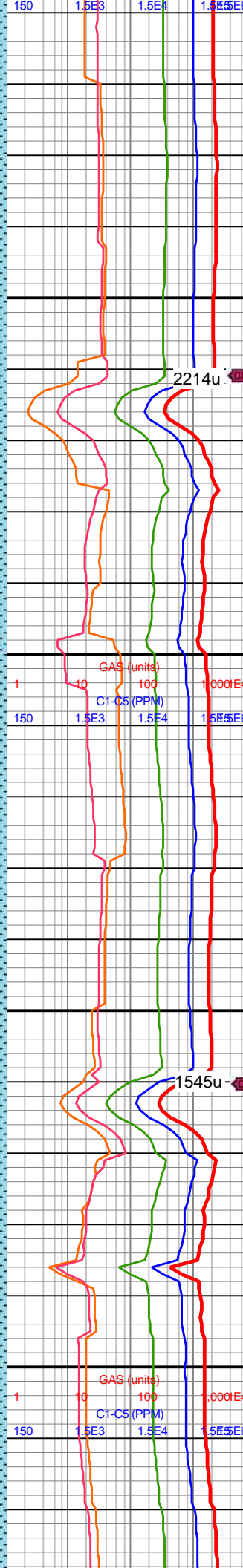
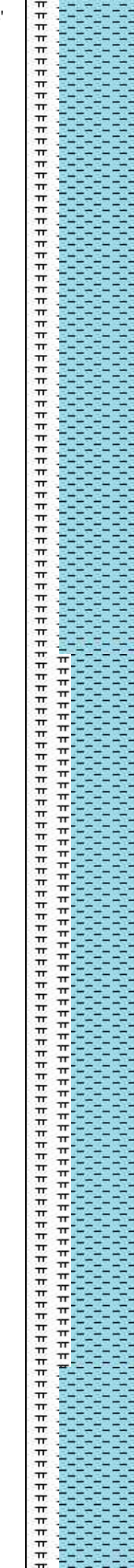


MD: 10,900'
TVD: 7,496.68'
INC: 89.41°
AZM: 176.23°
VS: 3,006.95'

MD: 10,994'
TVD: 7,498.88'
INC: 87.91°
AZM: 175.96°
VS: 3,100.7'

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

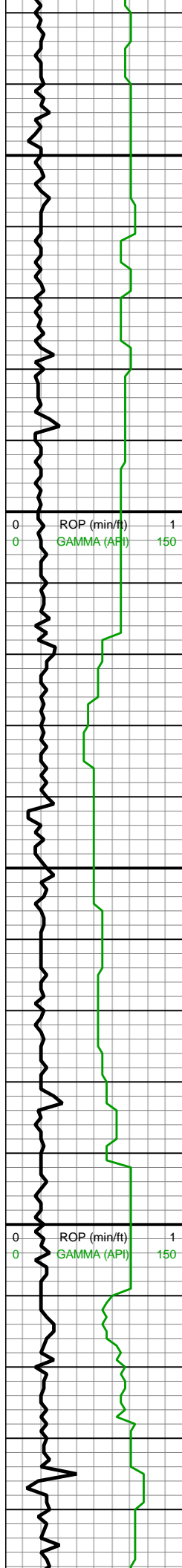
WOB: 33klbs
RPM: 80
SPM: 182
SPP: 3,600psi



10800-10900 70% CHK:
dk gy-dk brn, gyshbn ip,
pred sft, frm ip, blk, chky
tex, calc, com inoc fos
frags, tr cal vns; 30%
MRLST: v dk gy-gyshbn,
frm-v frm, blk

10900-11000 60% CHK:
dk gy-dk brn, gyshbn ip,
pred sft, frm ip, blk, chky
tex, calc, com inoc fos
frags, tr cal vns; 40%
MRLST: v dk gy-gyshbn,
frm-v frm, blk





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

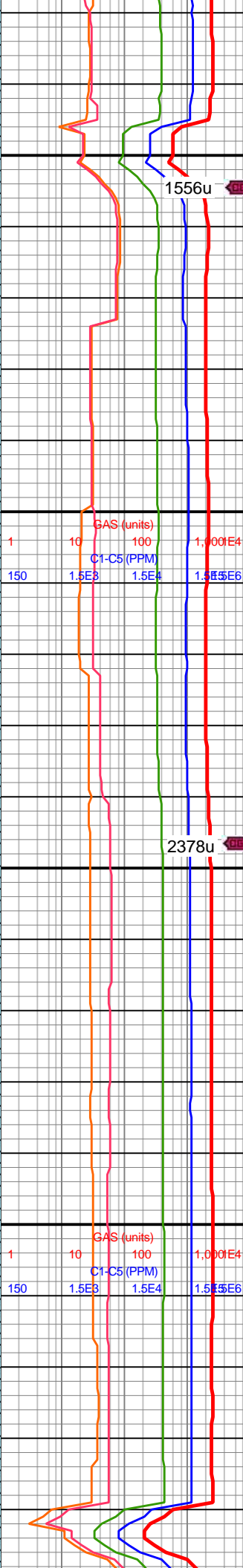
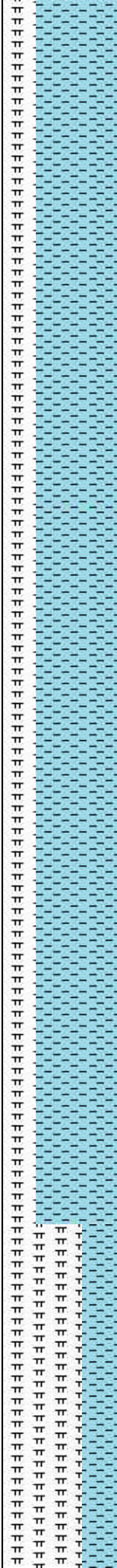
MD: 11,089'
TVD: 7,501.54'
INC: 88.88°
AZM: 176.58°
VS: 3,195.46'

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

5' DTN

MD: 11,184'
TVD: 7,501.98'
INC: 90.59°
AZM: 176.4°
VS: 3,290.28'

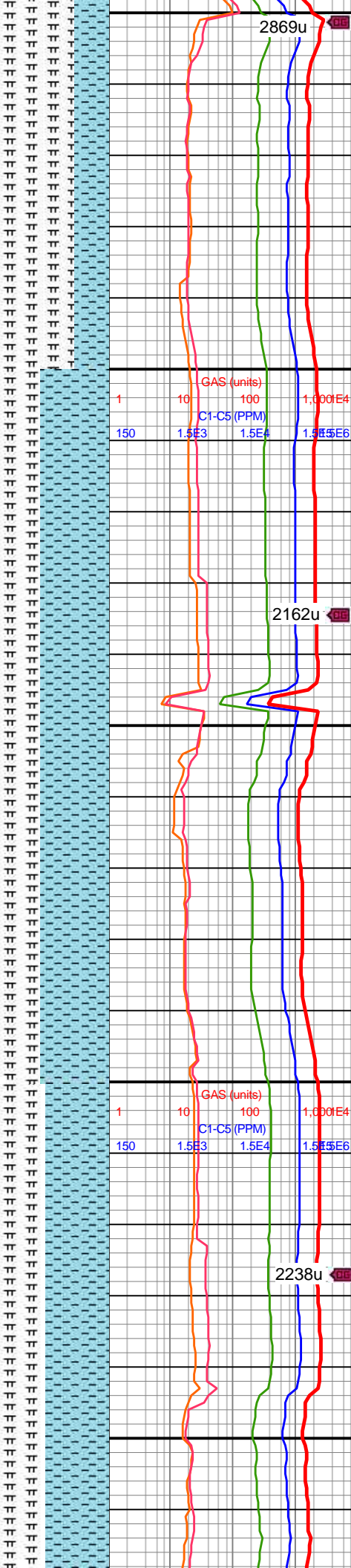
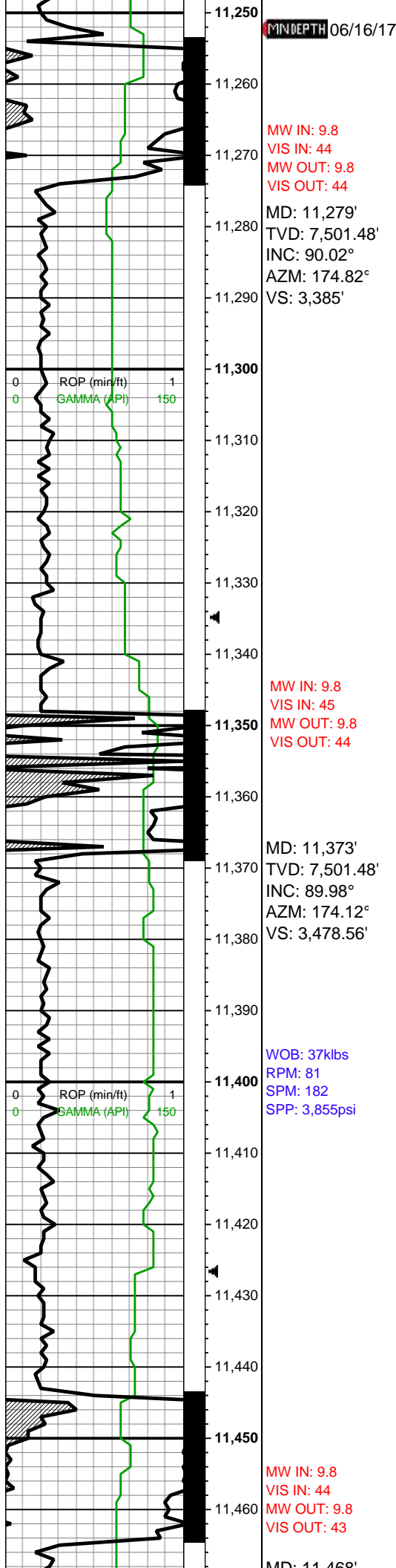
WOB: 41klbs
RPM: 80
SPM: 182
SPP: 3,861psi



11000-11100 70% CHK:
dk gy-dk brn, gy brn ip,
pred sft, frm ip, blk, chky
tex, calc, com inoc fos
frags, tr cal vns; 30%
MRLST: v dk gy-gy brn,
frm-v frm, blk, grty

11100-11200 70% CHK:
dk gy-dk brn, gyshbn ip,
pred sft, frm ip, blk, chky
tex, calc, fos frags, tr pyr;
30% MRLST: v dk
gy-gyshbn, frm-v frm,
blk, v calc, rgh tex

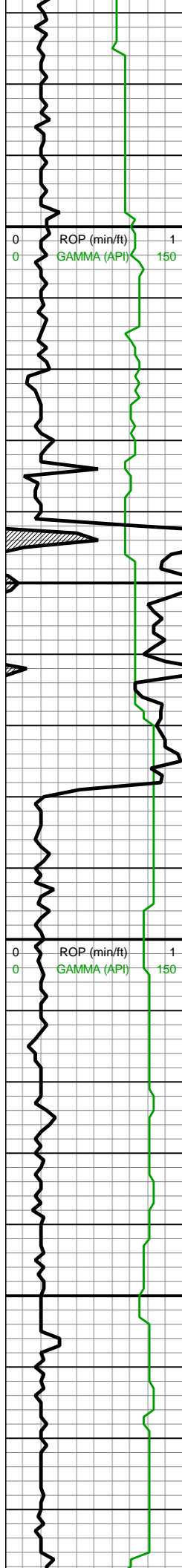




11300-11400 70%
MRLST: dk gy, frm-sb hd,
sb blk-y-sb plty, occ pp
pyr; 30% CHK: predy
med brn-dk brn, com dk
gyshbn, sft-sb frm, fri-sl
brit, mot ip, blk

11300-11400 60% CHK:
pred brn-dk brn, occ med
brn, rr lam, frm, sl sft ip,
blk-y, v calc, rr fos incl, tr
pp pyr; 40% MRLST: pred
v dk gy-blk, occ gyshbn,
frm-v frm, blk-y, calc





MD: 11,408
TVD: 7,502.39'
INC: 88.92°
AZM: 174.82°
VS: 3,573.11'

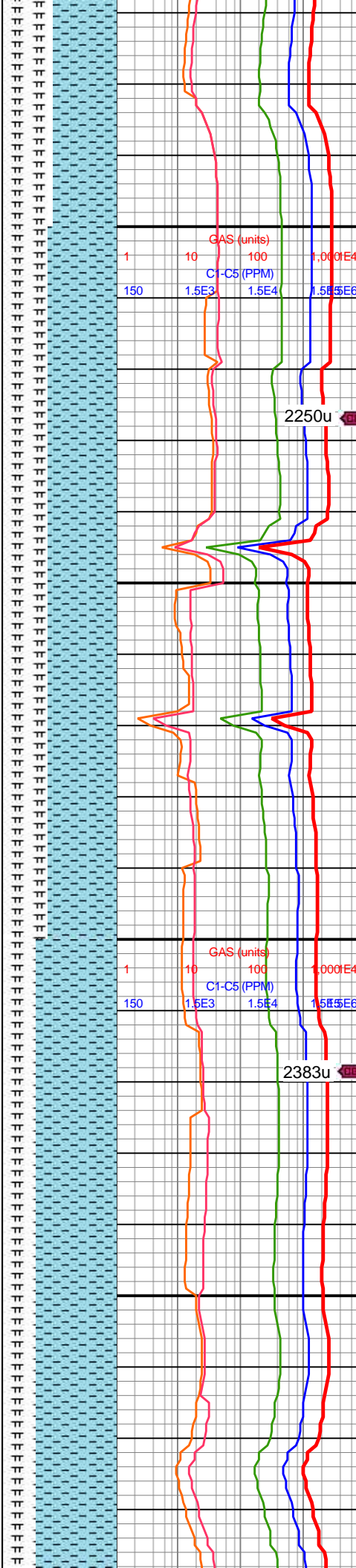
MD: 11,562'
TVD: 7,504.37
INC: 88.66°
AZM: 177.81°
VS: 3,666.88'

Niobrara A Marl
11581' MD /
7504' TVD

MW IN: 9.75
VIS IN: 44
MW OUT: 9.8
VIS OUT: 43

WOB: 41klbs
RPM: 80
SPM: 182
SPP: 3,910psi

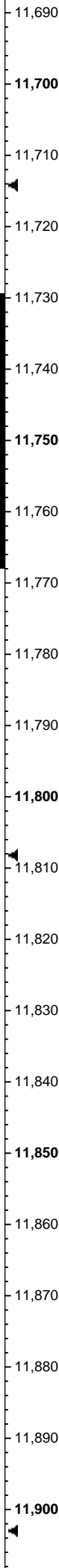
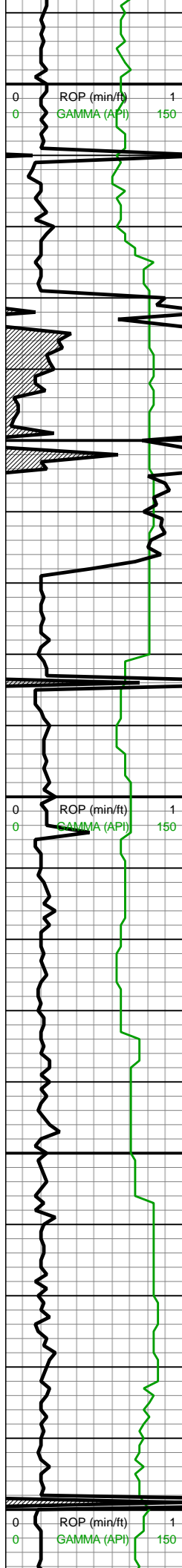
MD: 11,658'
TVD: 7,506.51'
INC: 88.79°
AZM: 179.3°
VS: 3,762.83'



11400-11500 55% CHK:
pred mot gy-brn, sme lt
gy, sft, bkly, v calc, tr-scat
fos incl, tr frac fl cal; 45%
MRLST: pred gy-dk gy,
bkly, frm-sl hrd, v calc,
rgh

11500-11600 60% CHK:
dk gy-dk brn, gyshbn ip,
pred sft, frm ip, blk, chky
tex, calc, com fos frags, tr
cal vns; 40% MRLST: v dk
gy-gyshbn, frm-v frm, blk

11600-11700 70% CHK :
med gy-med gy brn, sme
lt gy wi occ-com lt gy
lamn & vns thru, frm,
mod fis blkty cntngs, tr vf
pyr, tr bent, v calc; 30%
MRLST: pred v dk gy-dk



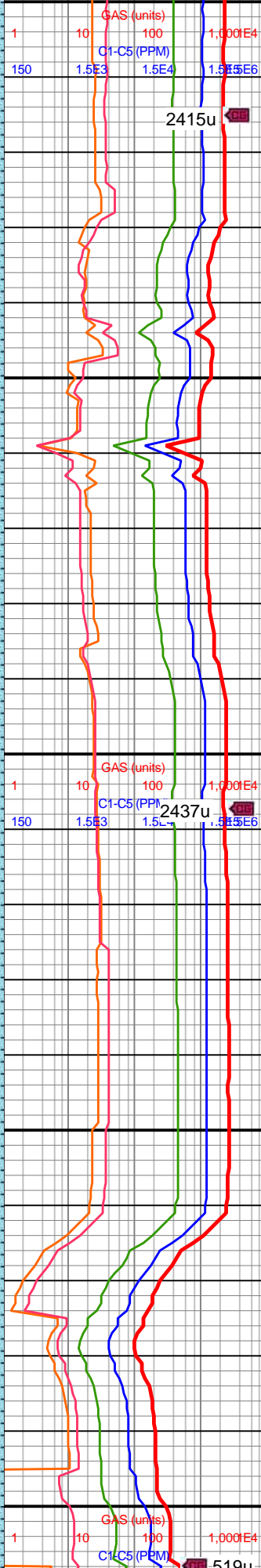
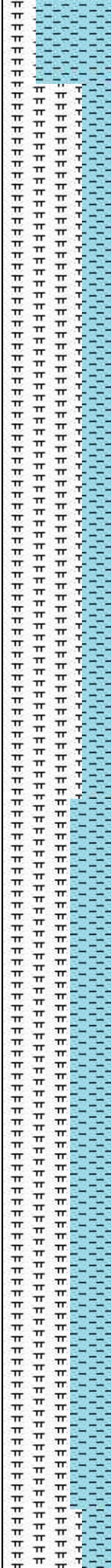
MW IN: 9.8
VIS IN: 44
MW OUT: 9.75
VIS OUT: 43

MD: 11,753'
TVD: 7,508.47'
INC: 88.84°
AZM: 182.2°
VS: 3,857.79'

WOB: 40klbs
RPM: 80
SPM: 182
SPP: 3,790psi

MD: 11,847'
TVD: 7,508.72'
INC: 90.86°
AZM: 183.78°
VS: 3,951.65'

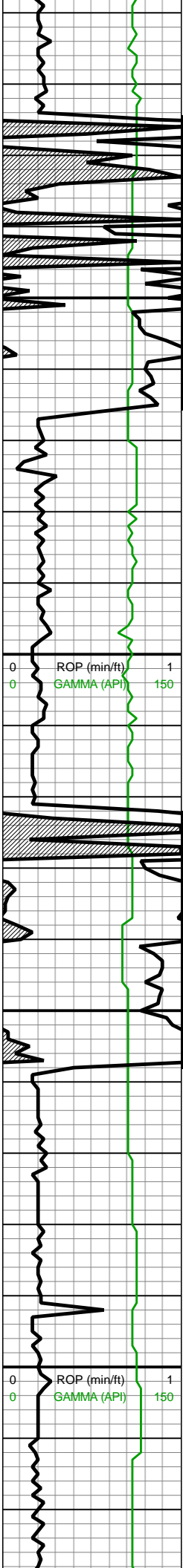
MW IN: 9.8
VIS IN: 44
MW OUT: 9.8
VIS OUT: 44



gy brn, sme med gy,
frm-v frm, mod fis sb
blky-blky

11700-11800 MRLST
(70%): med-dk gy, frm-v
frm, mod fis sb blky-blky
ctngs, mot, tr forams,
mod calc wi brn mrly
resdl; CHK (30%): med
gy-med gy brn, frm l-mod
fis sb rd-sb blky ctngs
mot wi wh-lt gy along wh
chky incl, sm arg tex, tr vf
pyr, v calc

11800-11900 MRLST
(60%): med-dk gy, frm-v
frm, mod fis sb blky-blky
ctngs, mot, tr forams,
mod calc wi brn mrly
resdl; CHK (40%): med
gy-med gy brn v arg LS,
frm l-mod fis sb rd-sb
blky ctngs, sm arg tex,
mot wi vf-u f chky incl, tr vf
pyr, v calc



11,910
11,920
11,930
11,940
11,950
11,960
11,970
11,980
11,990
12,000
12,010
12,020
12,030
12,040
12,050
12,060
12,070
12,080
12,090
12,100
12,110
12,120

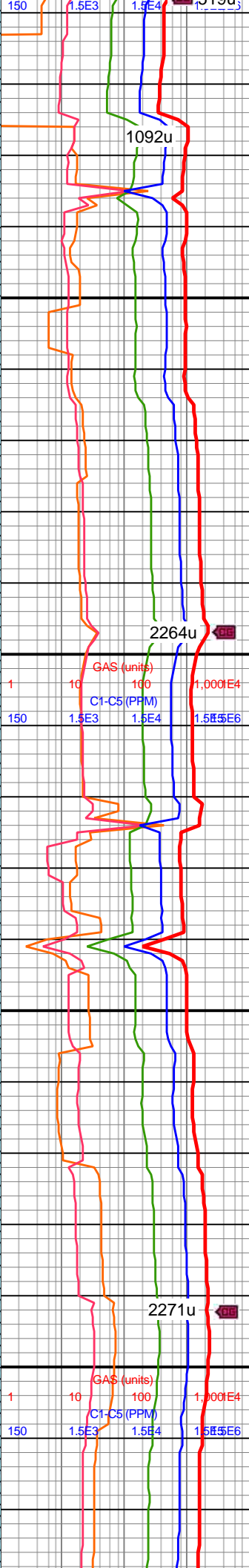
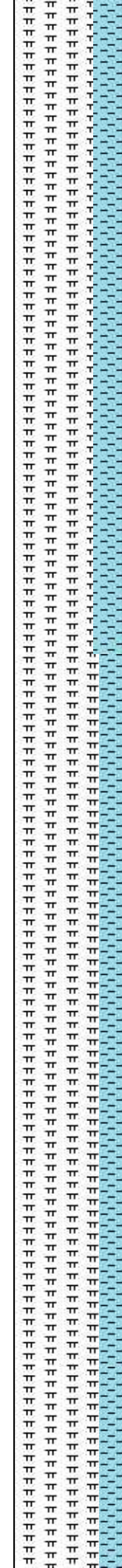
MW IN: 9.7
VIS IN: 44
MW OUT: 9.7
VIS OUT: 44
MD: 11,942'
TVD: 7,506.06'
INC: 92.35°
AZM: 184.93°
VS: 4,046.34'

WOB: 17klbs
RPM: 80
SPM: 178
SPP: 3,210psi

MW IN: 9.7
VIS IN: 44
MW OUT: 9.7
VIS OUT: 44

MD: 12,037'
TVD: 7,504.39'
INC: 89.67°
AZM: 187.04°
VS: 4,140.79'

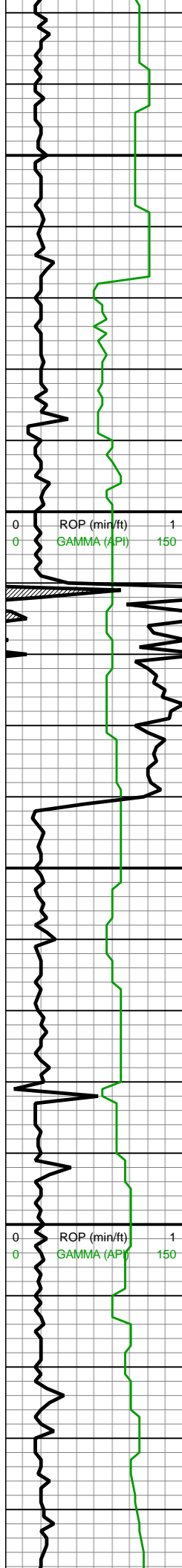
MD: 12,132'
TVD: 7,505.10'



11900-12000 MRLST
(70%): med-dk gy, frm-v
frm, mod fis sb blkly-blky
ctngs, mot, rr-occ forams,
rr-occ vf-u f pyr, mod calc
wi brn mrly resdl; CHK
(30%): med gy-med gy
brn, frm l-mod fis sb
rd-sb blkly ctngs mot wi
wh-lt gy along wh chky
incl, sm arg tex, tr vf pyr, v
calc

12000-12100 75%
MRLST: dk gy, frm-sb hd,
sb blkly-sb plty, occ to rr
pyr; 25% CHK: predy
med brn-dk brn, dk
gyshbn, sft-sb frm, sl brit,
mot ip, blkly





VD: 7,505.48'
INC: 89.01°
AZM: 187.39°
VS: 4,235.03'

MW IN: 9.7
VIS IN: 44
MW OUT: 9.7
VIS OUT: 44

32' DTN

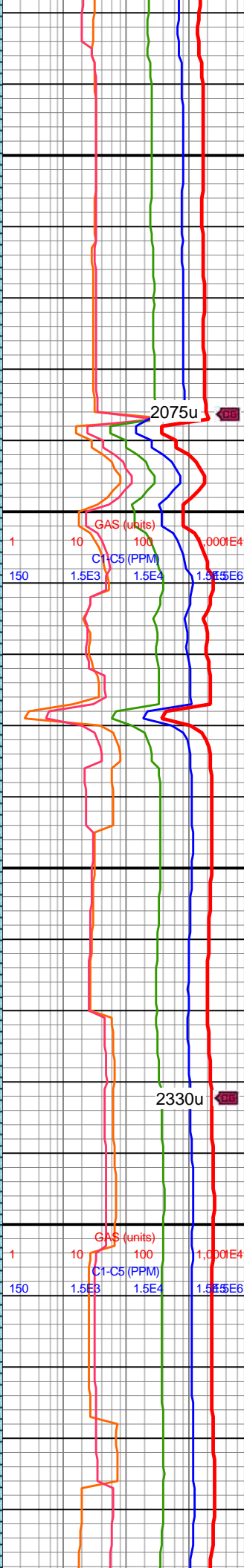
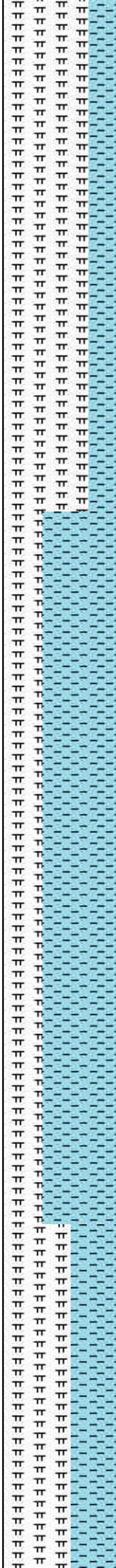
B Chalk
12166' MD/
7506' TVD

WOB: 35klbs
RPM: 80
SPM: 182
SPP: 3,870psi

MD: 12,227'
TVD: 7,507.78'
INC: 88.22°
AZM: 188.71°
VS: 4,329.06'

MW IN: 9.7
VIS IN: 44
MW OUT: 9.7
VIS OUT: 44

MD: 12,321'
TVD: 7,510.15'
INC: 88.88°
AZM: 188.79°
VS: 4,421.94'



2075u

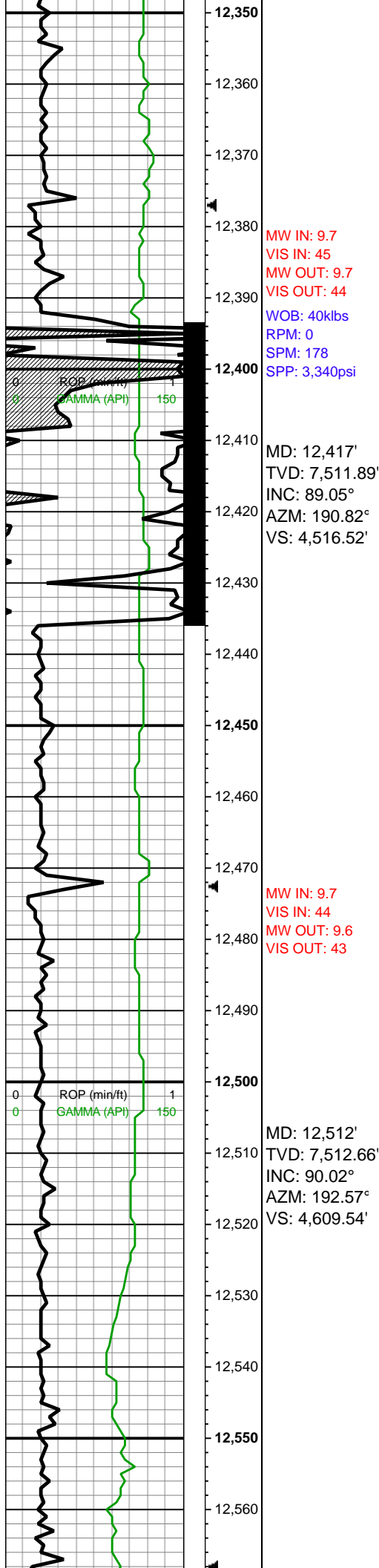
12100-12200 75%
MRLST: dk gy, frm-sb hd,
sb blk-y-sb plty, rr pyr;
25% CHK: predy med
brn-dk brn, dk gyshbn,
sft-sb frm, sl brit, mot ip,
blk-y



12200-12300 CHK
(65%): med gy-med gy
brn, sme lt gy ip, frm,
mod fis blk-y ctngs, v arg
LS mot wi rr vf wh-lt gy
chky incl & rr pred f occ c
forams, tr vf-c pyr, v calc;
MRLST (35%): pred v dk
gy-dk gy brn, sme med
gy, frm-v frm, mod fis sb
blk-y-blk-y ctngs, mod calc
wi brn mrly resdl

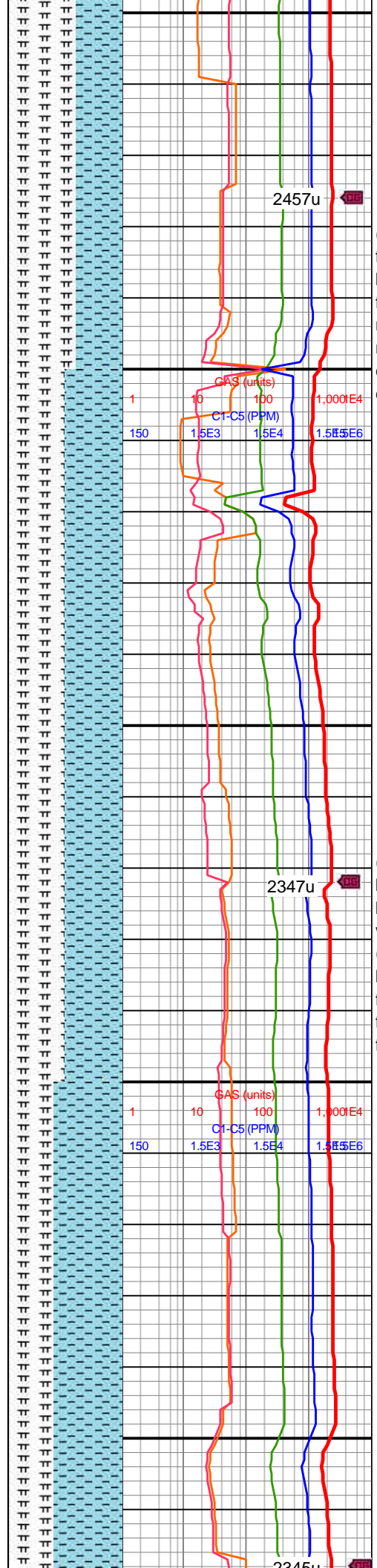


2330u



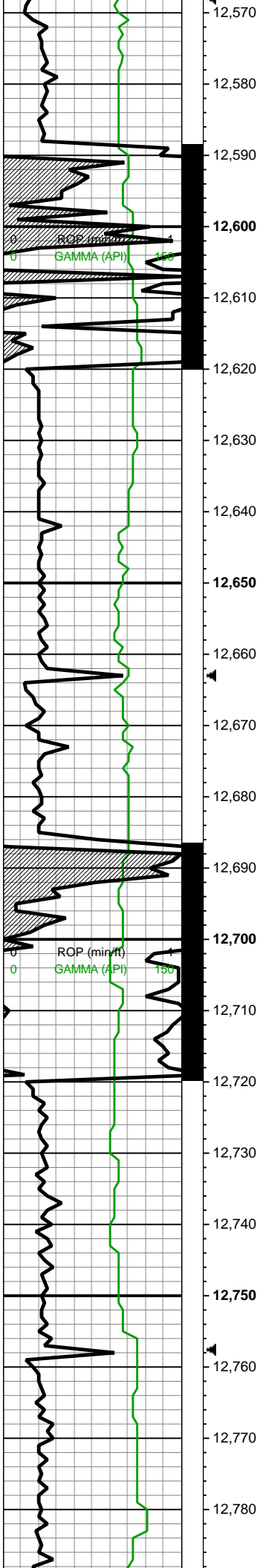
MW IN: 9.7
VIS IN: 45
MW OUT: 9.7
VIS OUT: 44
WOB: 40klbs
RPM: 0
SPM: 178
SPP: 3,340psi

MW IN: 9.7
VIS IN: 44
MW OUT: 9.6
VIS OUT: 43



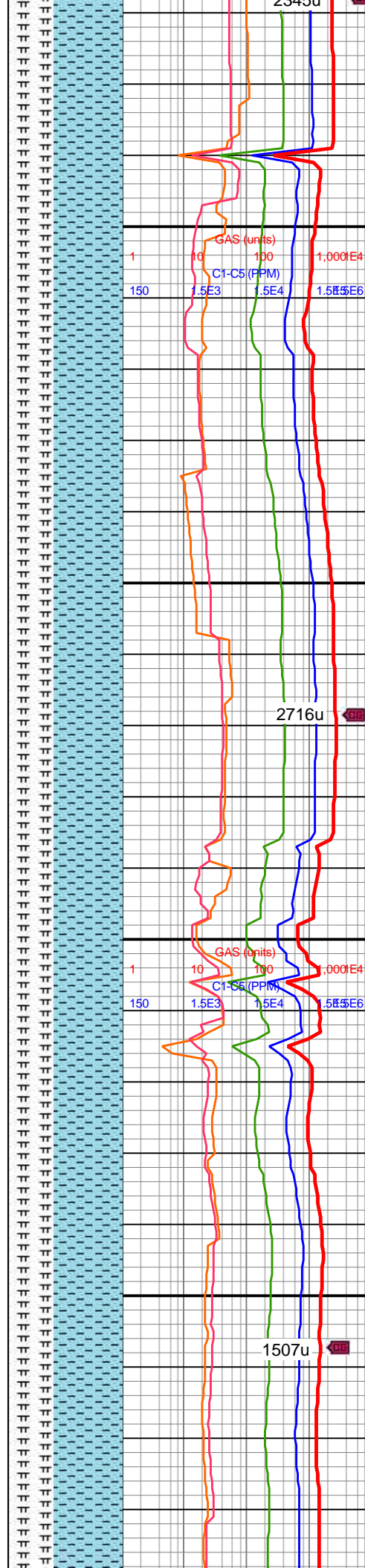
12300-12400 MRLST
(60%): med-dk gy to brn,
frm-v frm, mod fis sb
blky-blky ctngs, mot wi tr
forams, mod calc wi brn
mrly resdl; CHK (40%):
med gy to dk gy, mod blky
ctngs, mot wi tr vf pyr, v
calc

12400-12500 MRLST
(50%): pred dk gy-dk gy
brn, frm-v frm, mod fis sb
blky-blky ctngs, mod calc
wi brn mrly resdl; CHK
(50%): med gy-med gy
brn, sme lt gy, frm, l-mod
fis sb blky-blky ctngs, tr
forams, tr f-vf pyr, tr fos
frags, v cal



WOB: 37klbs
RPM: 0
SPM: 178
SPP: 3,410psi
MD: 12,607'
TVD: 7,513.13'
INC: 89.41°
AZM: 192.22°
VS: 4,702.32'
MW IN: 9.7
VIS IN: 44
MW OUT: 9.7
VIS OUT: 43

MW IN: 9.8
VIS IN: 44
MW OUT: 9.75
VIS OUT: 43
MD: 12,702'
TVD: 7,515.31'
INC: 87.96°
AZM: 192.92°
VS: 4,795.02'

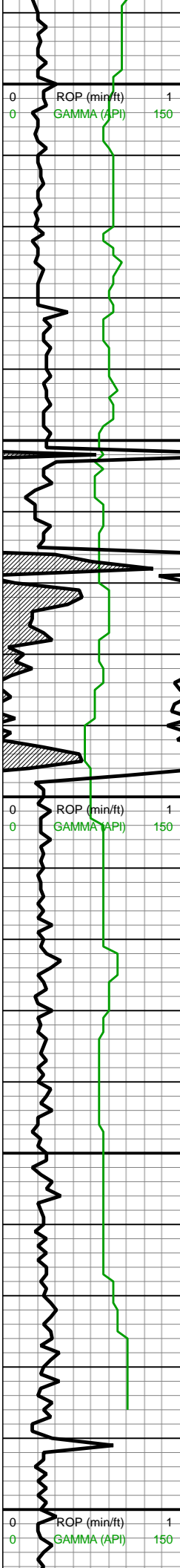


12500-12600 60% CHK
pred dk gy-dk brn, frm-v
frm, l-mod fis, mod fos,
mod forams, wi tr pyrt, v
calc; 40% MRLST dk
gy-dk brn, frm-v frm, mod
fis, sb ang ctngs, v calc w
brn resdl

12600-12700 60% CHK
pred dk gy-dk brn, frm-v
frm, l-mod fis, mod fos,
mod forams, wi tr f-v-f
pyrt, v calc; 40% MRLST
dk gy-dk brn, frm-v frm,
mod fis, sb ang ctngs,
mod-v calc wi brn mrly
resdl

12700-12800 CHK
(60%): med gy-gy brn,
sme dk gy, frm pred mod
fis sb ang-sb blkly ctngs,
rr fos & forams, tr vf-u f
pyr, v calc; 40% MRLST
dk gy-dk brn, frm-v frm,





12,790
12,800
12,810
12,820
12,830
12,840
12,850
12,860
12,870
12,880
12,890
12,900
12,910
12,920
12,930
12,940
12,950
12,960
12,970
12,980
12,990
13,000

WOB: 40klbs
RPM: 80
SPM: 180
SPP: 3,840psi

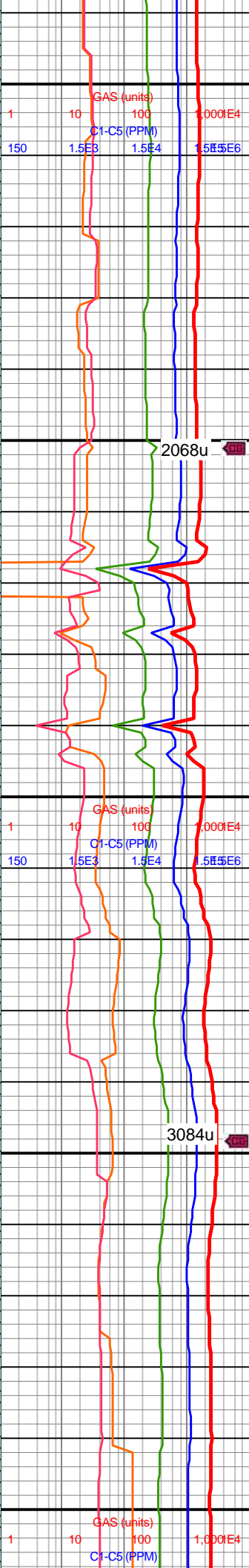
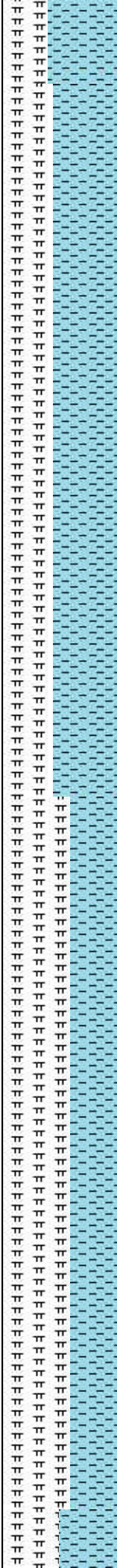
MD: 12,797'
TVD: 7,519.03'
INC: 87.56°
AZM: 193.01°
VS: 4,887.52'

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

MD: 12,891'
TVD: 7,523.64'
INC: 86.81°
AZM: 195.21°
VS: 4,978.57'

MD: 12,986'
TVD: 7,527.87'
INC: 88.09°
AZM: 194.51°
VS: 5,070.3'

WOB: 35klbs
RPM: 80
SPM: 180
SPP: 3,810psi

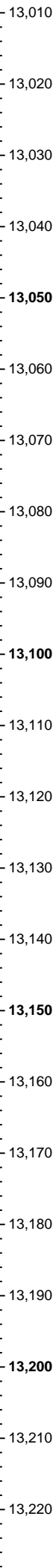
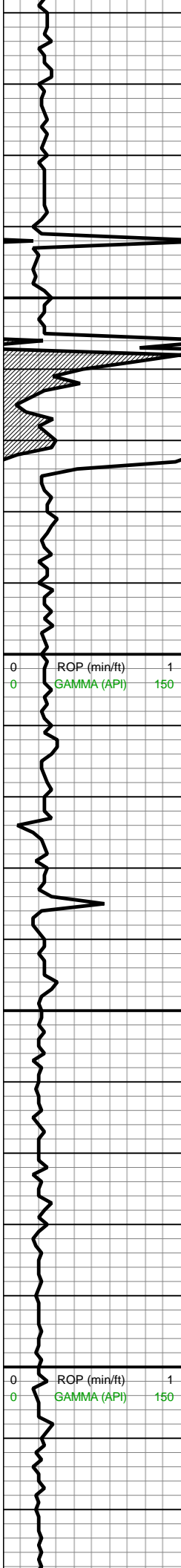


mod fis, sb ang ctngs,
mod-v calc wi brn mrly
resdl

12800-12900 55% CHK:
med gy-med gy brn, occ lt
gy, thn lt gy lamn thru,
frm, mod fis blkly ctngs, tr
vf pyr, tr bent, v calc; 45%
MRLST: pred v dk gy-dk
gy brn, sme med gy,
frm-v frm, mod fis sb
blkly-blky

12900-13000 60%
MRLST: med-dk gy to
brn, frm-v frm, mod fis sb
blkly-blky, mot wi tr fos,
mod calc wi brn mrly
resdl; CHK (40%): med
gy to dk gy, mod blkly, mot
wi tr vf pyr, v calc





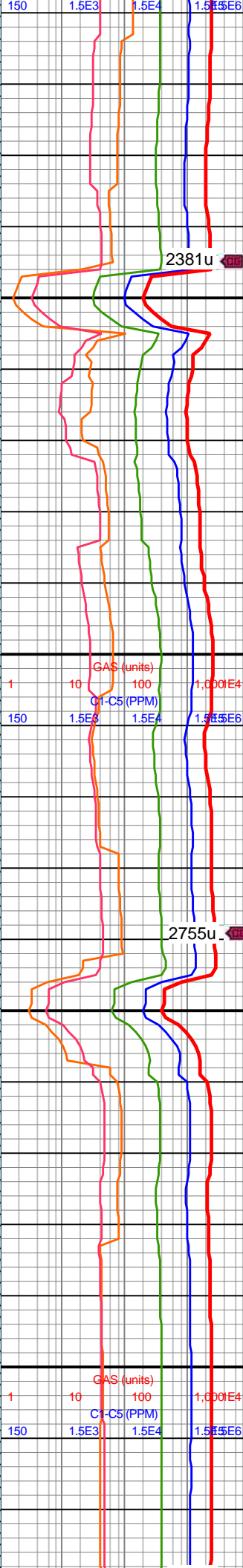
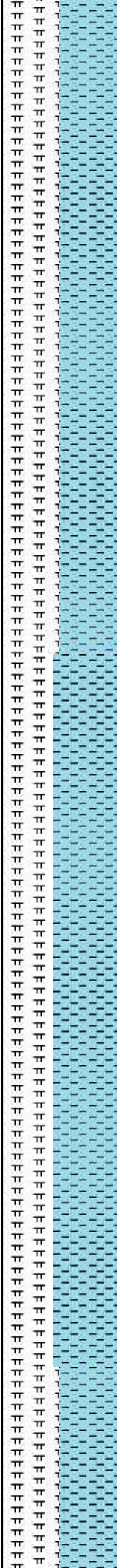
MW IN: 9.8
VIS IN: 44
MW OUT: 9.7
VIS OUT: 44

MD: 13,081'
TVD: 7,531.69'
INC: 87.3°
AZM: 194.15°
VS: 5,162.27'

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

MD: 13,176'
TVD: 7,535.51'
INC: 88.09°
AZM: 193.8°
VS: 5,254.38'

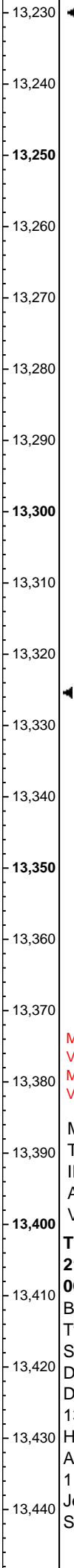
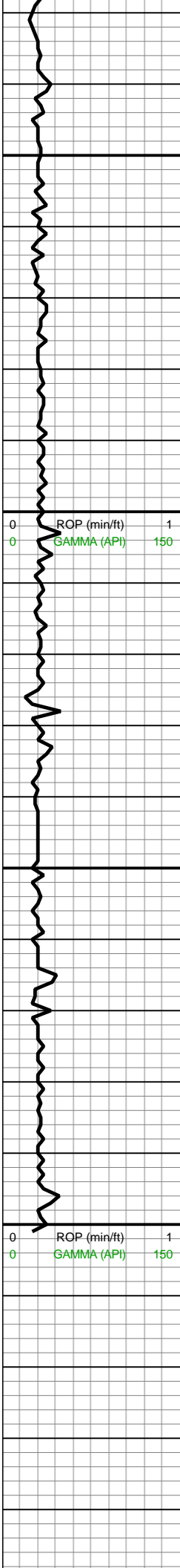
WOB: 38klbs
RPM: 81
SPM: 184
SPP: 4,020psi



13000-13100 50%
MRLST: dk gy, frm-sb hd,
sb blk-y-sb plty, occ pp
pyr; 50% CHK: predy
med brn-dk brn, com dk
gyshbn, sft-sb frm, fri-sl
brit, mot ip, blk;

13100-13200 55% CHK:
pred brn-dk brn, occ lt
gy-lt brn, rr lam, frm, sl sft
ip, blk-y, v calc, rr fos incl,
tr pp pyr; 45% MRLST:
pred v dk gy-blk, occ
gyshbn, frm-v frm, blk



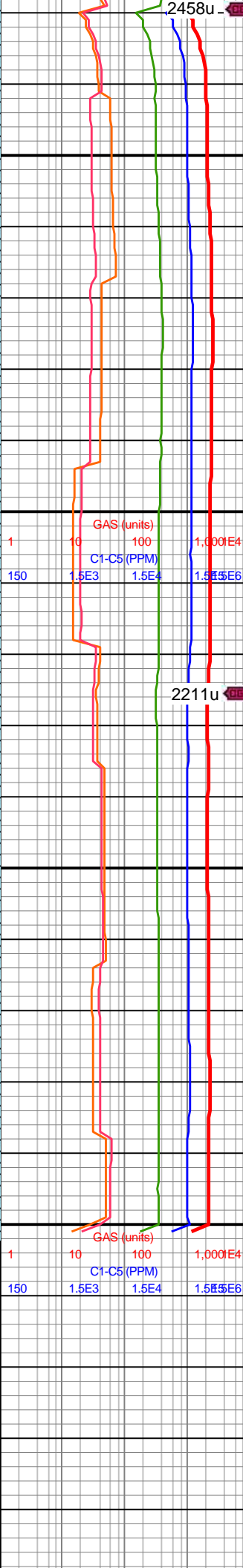
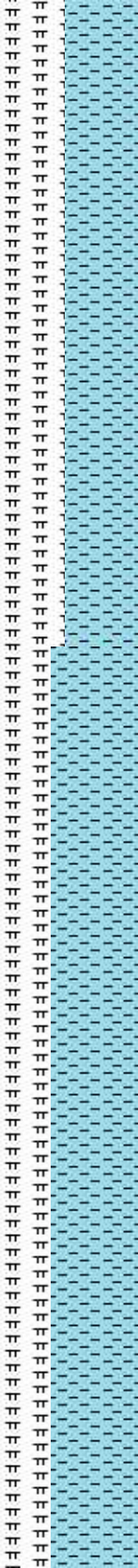


MD: 13,271'
TVD: 7,537.62'
INC: 89.36°
AZM: 193.19°
VS: 5,346.74'

MW IN: 9.7
VIS IN: 44
MW OUT: 9.7
VIS OUT: 44

MD: 13,402'
TVD: 7,536.86'
INC: 90.73°
AZM: 192.66°
VS: 5,474.47'

TD Well @
21:30 hrs
06/16/17
Bit #: 2
Type: U516S
Size: 8.5
Depth In: 7,021'
Depth Out:
13,402'
Hours: 53.5 hrs
Avg Ft/Hr:
119.27 '/hr
Jets: 5x14
S/N: 35863



13200-13300 MRLST
(50%): pred dk gy-dk gy
brn, frm-v frm, mod fis sb
blky-blky ctngs, mod calc
wi brn mrly resdl; CHK
(50%): med gy-med gy
brn, sme lt gy, frm, l-mod
fis sb blky-blky ctngs, tr
forams, tr f-vf pyr , tr fos
frags

13300-13402 60% CHK:
lt-med gy-gy brn, frm, brit,
l-mod fis sb rd-sb blky
ctngs, rr-occ bent &
forams, rr c pyr strg, tr fos
frags, v calc; 40%
MRLST: med gy brn-dk
gy, frm-v frm, mod fis sb
blky-blky



