

Texas Geologic Services

Scale: 5" / 100'
Measured Depth Log

Well Name Wilhelm #1-21 5in

State Kansas

County Rush

Country USA

Rig Number Duke #1

Spud Date 9/24/2015

Surface Coordinates E/2 NW 1/4, SEC 21, T18S R16W

Bottom Hole Coordinates E/2 NW 1/4, SEC 21 T18S R16W

Ground Elevation 1968

K.B. Elevation 1978

Logged Interval 98

Type of Drilling Fluid WBM

Operator

Company Blackstone Operating, Kansas

Geologist

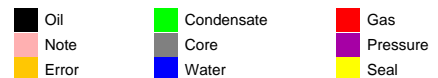
Name Thomas D Bowman

Other

Day Logger: Dennis Weaver

Night Logger: Dillon Catlett

Zone Color Coding



Rock Types

Rock Types

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

Accessories

Fossils

- ALGAE
- AMPHIPORA
- BELEMNITE
- BIOCLASTIC
- BRACHIOPOD
- BRYOZOA
- CEPHALOPOD
- CORAL
- CRINOID
- ECHINOID
- FISH
- FORAMINIFERA

F 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 PELLETT
- FERRUGINOUS

∨ GLAUCONITE

- GYPSIFEROUS
- HEAVY MINERAL
- KAOLIN
- MARLSTONE
- MINERAL CRYSTALS
- NODULES
- PHOSPHATE PELLETS
- PYRITE
- SALT CAST
- SANDY
- SILICEOUS
- SILTY
- TUFFACEOUS

Stringer

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

Other Symbols

Oil Show

- DEAD
- EVEN
- QUESTIONABLE
- SPOTTED STAINING

- ORGANIC
- PINPOINT
- VUGGY

Engineering

- BIT
- CASING
- CONNECTION (LEFT)
- CONNECTION (RIGHT)
- CONNECTION GAS
- CORE - LOST
- CORE - RECOVERED
- DST INTERVAL
- FAULT

Porosity

- EARTHY
- FENESTRAL
- FRACTURE
- INTERCRYSTALLINE
- INTEROOLITIC
- MOLDIC

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

L LITHOGRAPHIC

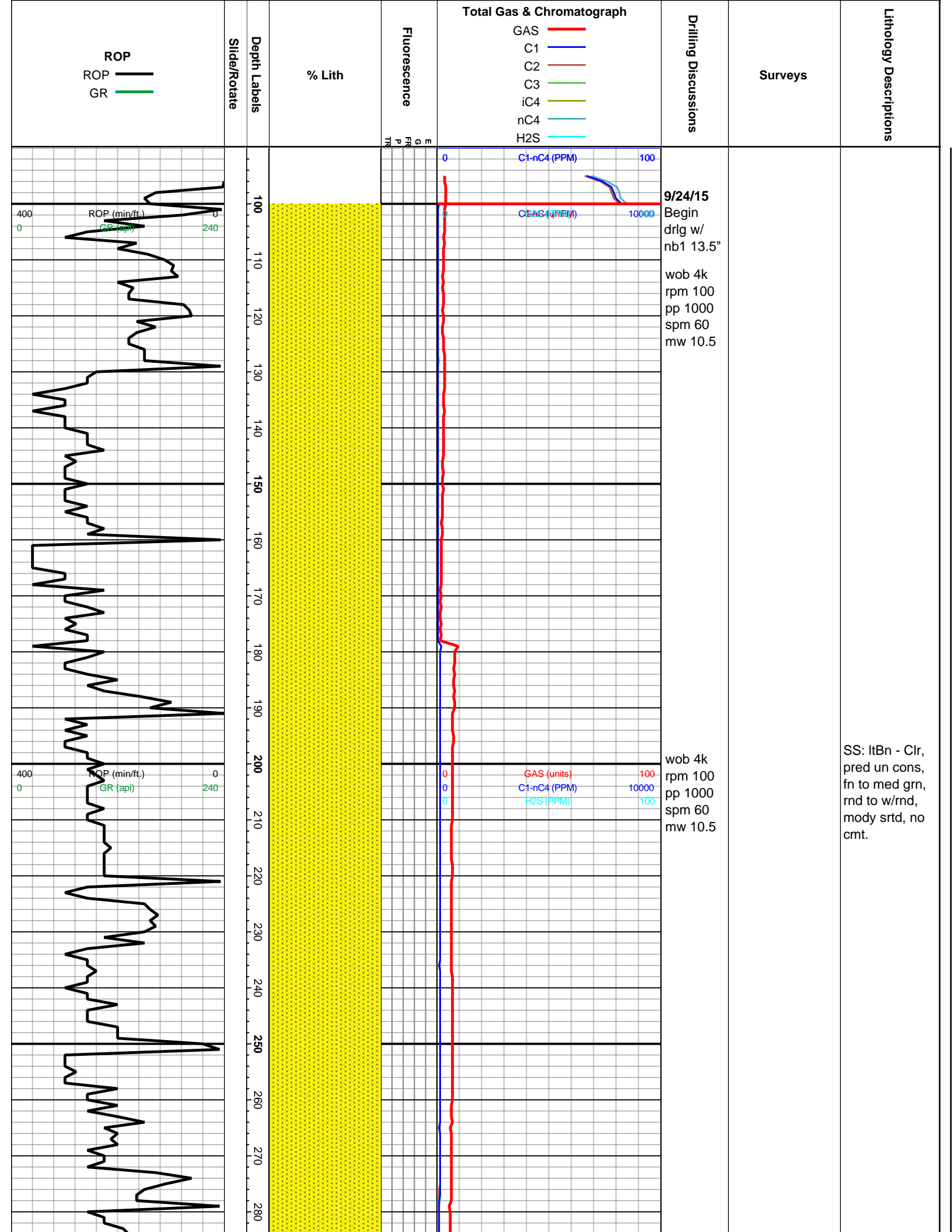
- MICROXLN
- MUDSTONE
- PACKSTONE
- WACKESTONE

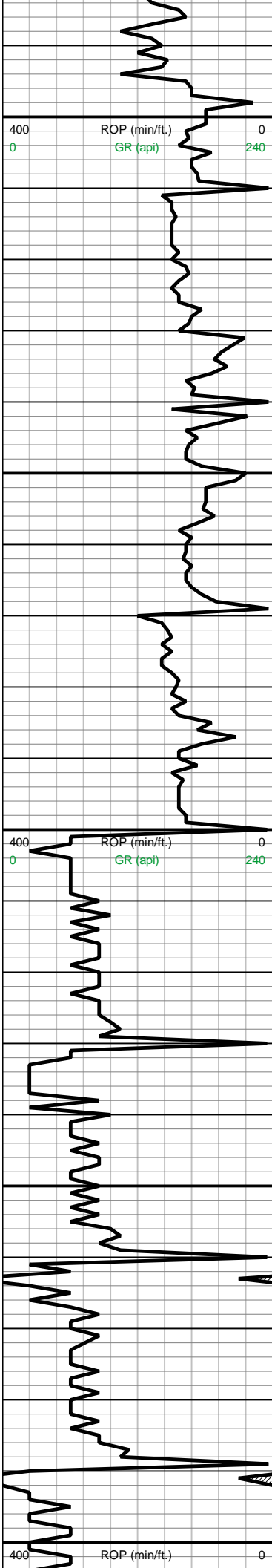
Textures

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

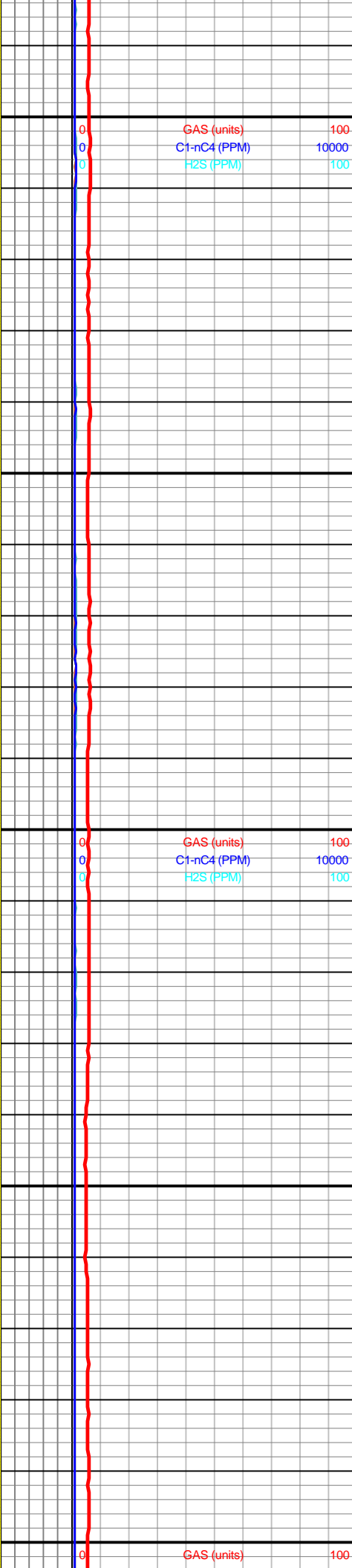
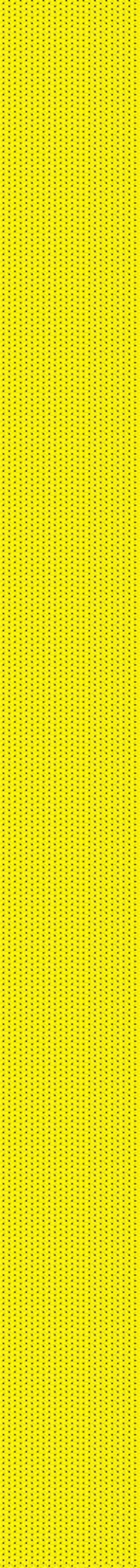
Sorting

- MODERATE
- POOR
- WELL





290
300
310
320
330
340
350
360
370
380
390
400
410
420
430
440
450
460
470
480
490
500



wob 4k
rpm 100
pp 1000
spm 51
mw 11.0
vis 56

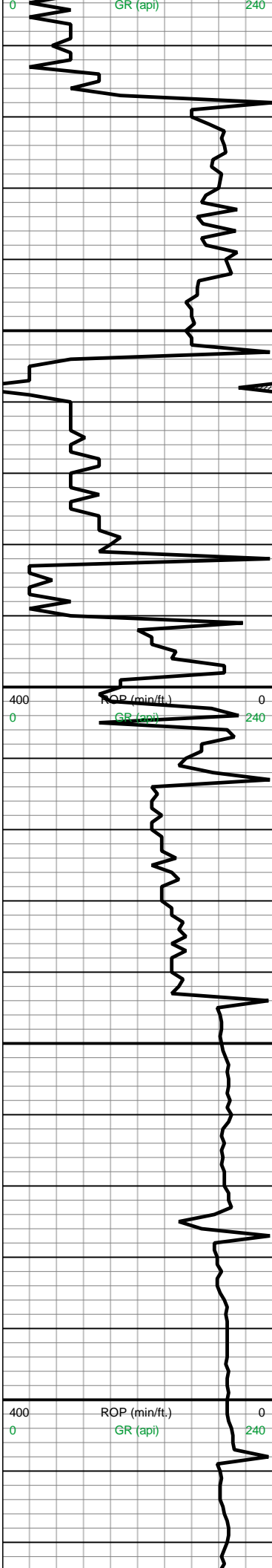
wob 4k
rpm 100
pp 1000
spm 60
mw 11.0
vis 56

wob 4k
rpm 100
pp 1000
spm 51
mw 11.0
vis 56

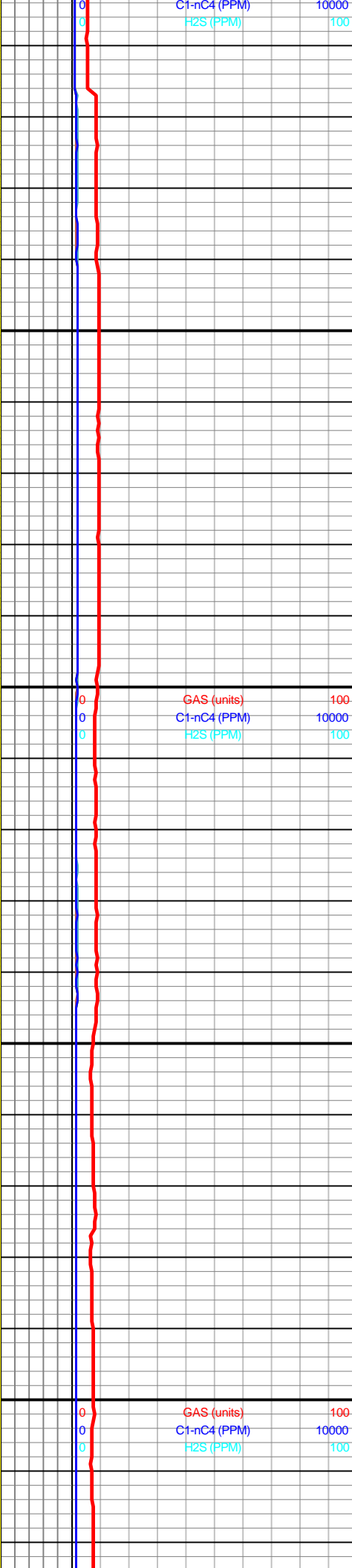
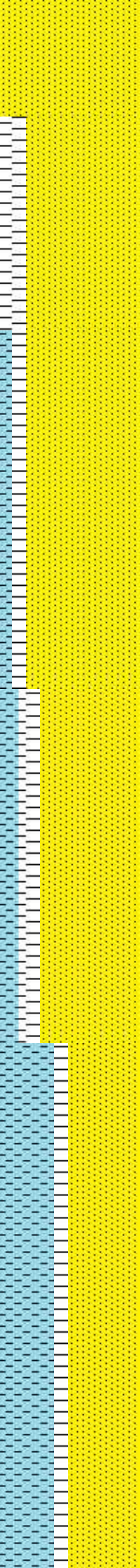
SS: ltBn - Clr,
pred un cons,
fn to med grn,
rnd to w/rnd,
mody srted, no
cmt.

SS: pred Clr -
v/ltGy, pred un
to lsey cons,
v/fn to med
grn, ang to
rnd, p srted.

SS: pred Clr -
v/ltGy, pred un



510
520
530
540
550
560
570
580
590
600
610
620
630
640
650
660
670
680
690
700
710
720



pp 1000
spm 60
mw 11.0
vis 56
9/25/15
521' Trip

wob 6k
rpm 100
pp 750
spm 57
mw 11.2
vis 43

wob 6k
rpm 100
pp 750
spm 57
mw 11.2
vis 43

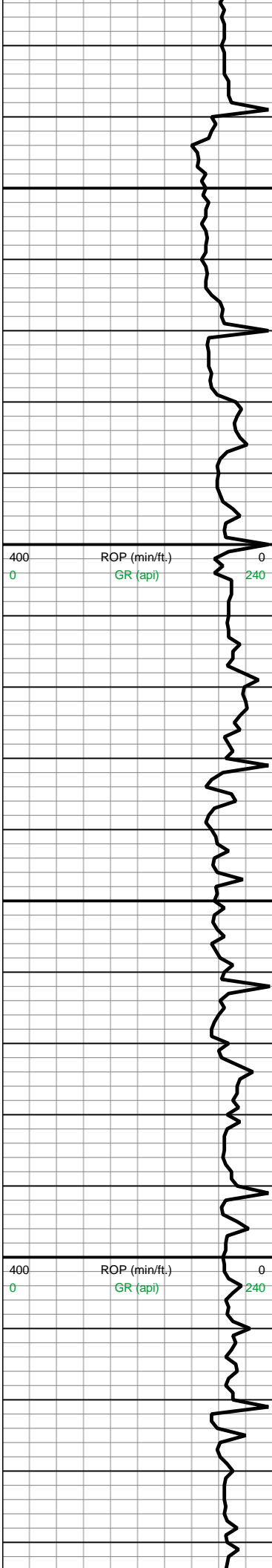
to lsey cons,
v/fn to med
grn, ang to
rnd, p srted.

SS: pred Clr -
v/ltGy, pred un
to lsey cons,
v/fn to med
grn, ang to
rnd, p srted, sh.

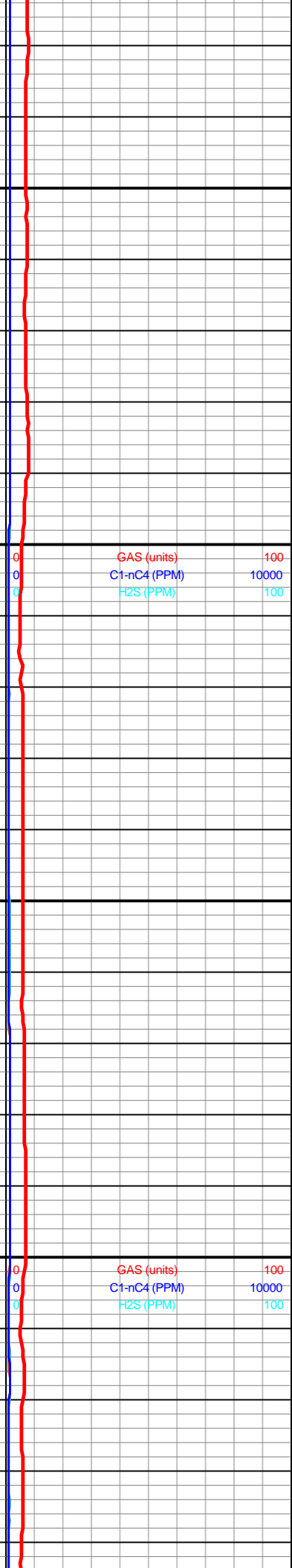
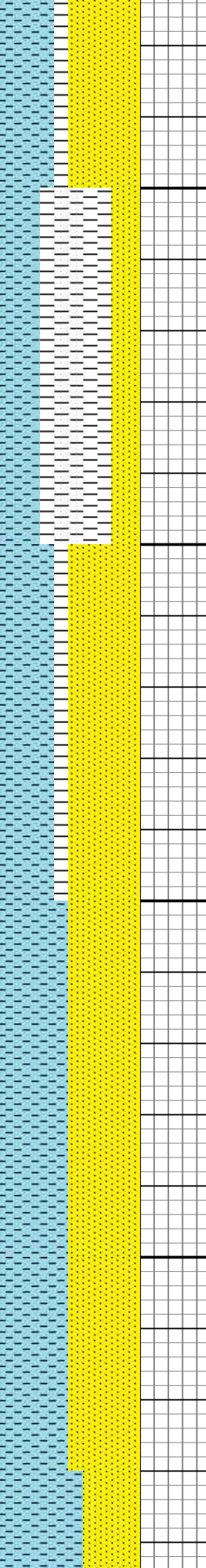
SS: Milky - Clr,
un cons, pred
med grn,
subang to rnd,
w srted. red
clay, sh

SS: Milky - Clr,
un cons, pred
med grn,
subang to rnd,
w srted, tr pyr,
red clay, sh

SS: Milky - Clr,
un cons, pred
med grn,
subang to rnd,
w srted, tr pyr,
red clay, sh



730
740
750
760
770
780
790
800
810
820
830
840
850
860
870
880
890
900
910
920
930
940



wob 6k
rpm 100
pp 750
spm 57
mw 11.3
vis 42

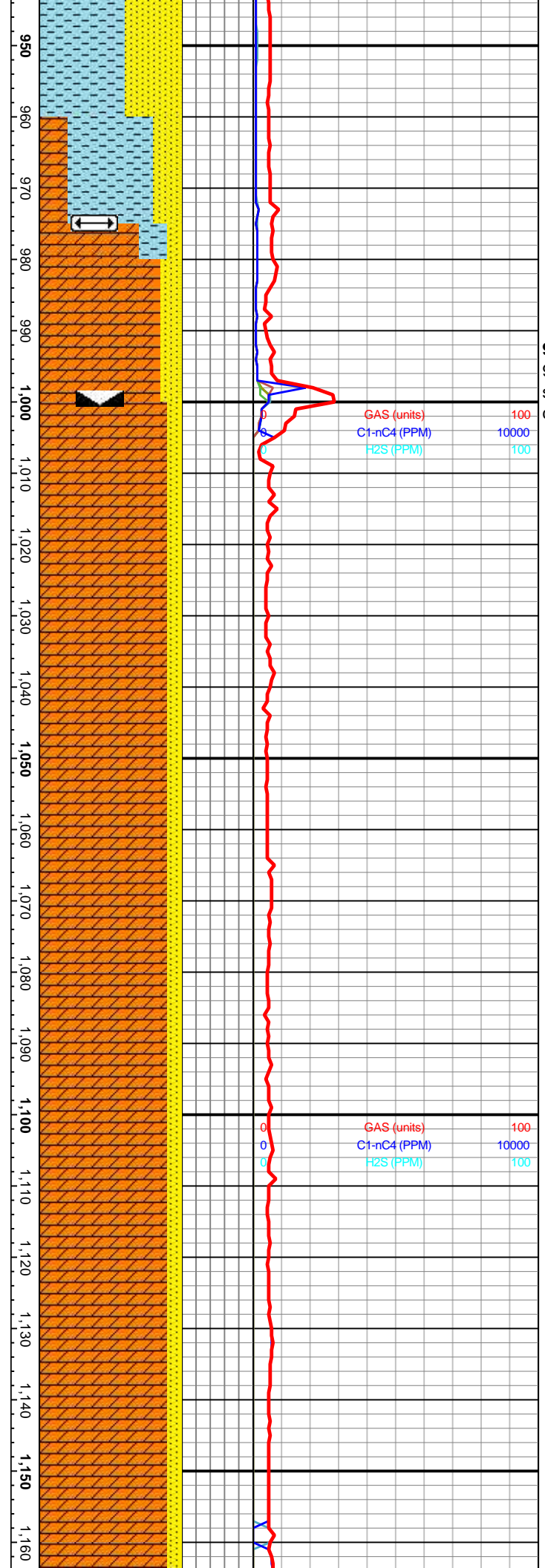
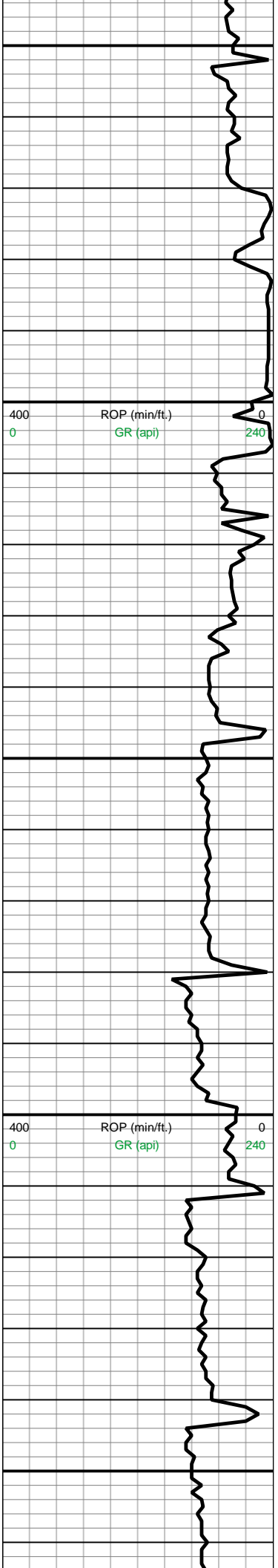
wob 6k
rpm 100
pp 750
spm 57
mw 11.3
vis 42

SS: Milky - Clr,
un cons, pred
med grn,
subang to rnd,
w srted, tr pyr,
red clay, sh

SH: ltGy -
medltGy, rnd
to subblky, grty
txt, frm, red
clay, ss

SS: Milky - Clr,
un cons, pred
med grn,
subang to rnd,
w srted, tr pyr,
red clay, sh

SS: Milky - Clr,
un cons, pred
med grn,
subang to rnd,
w srted, tr pyr,
red clay



9/26-27/15
 975' Set
 surface
 csg, nb#2
 9/28/15

GAS (units) 100
 C1-nC4 (PPM) 10000
 H2S (PPM) 100

wob 10k
 rpm 100
 pp 650
 spm 69
 mw 9.0
 vis 33

SS: Milky - Clr,
 un cons, pred
 med grn,
 subang to rnd,
 w srted, red clay

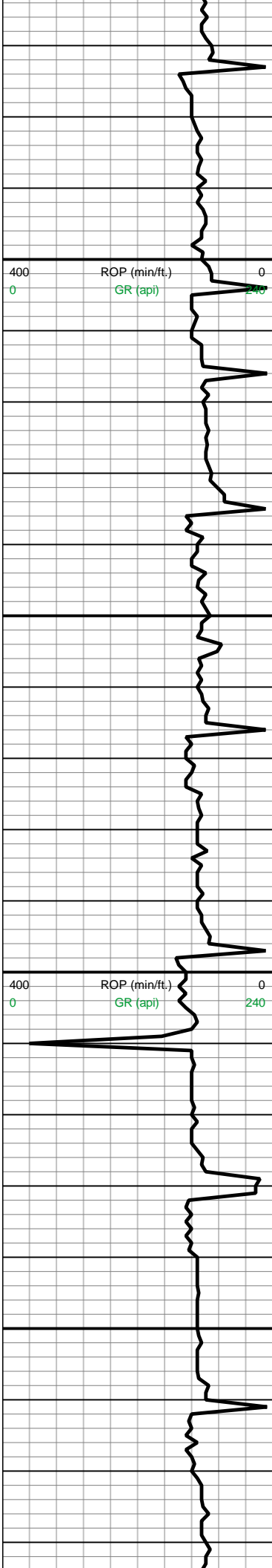
**Top of Stone
 Corral**
 975' MD
 975' TVD

SS: modRdBn
 - v/litGy, mod
 cons, v/fn to fn
 grn, rnd, v/w
 srted, tr anhy

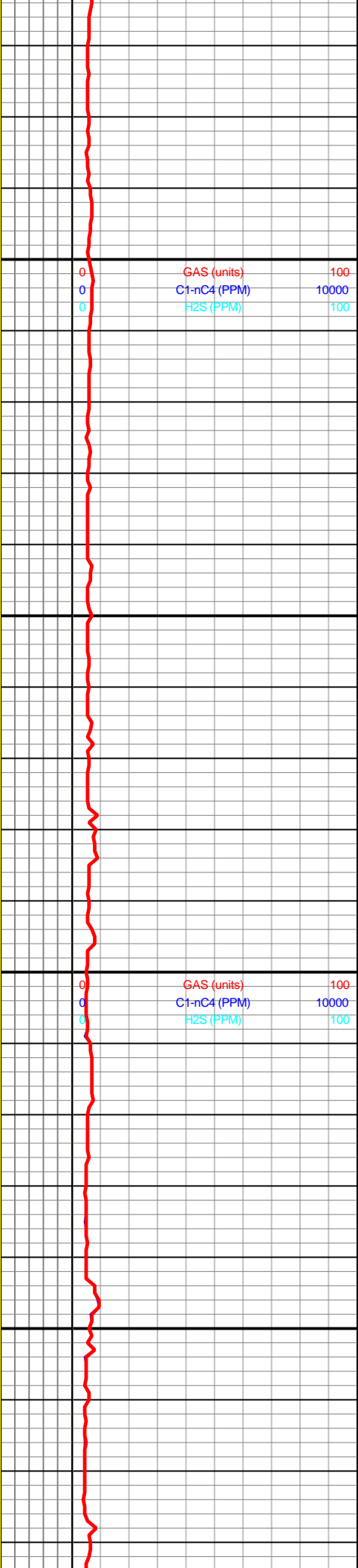
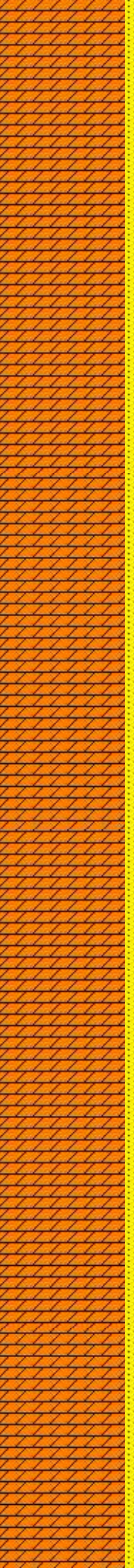
SS: modRdBn
 - v/litGy, mod
 cons, v/fn to fn
 grn, rnd, v/w
 srted, tr anhy

SS: modRdBn
 - medltGy,
 mod cons, fn
 to med grn,
 ang to
 subang, mody
 srted.

SS: modRdBn
 - medltGy,
 mod cons, fn
 to med grn,
 ang to



1,170
1,180
1,190
1,200
1,210
1,220
1,230
1,240
1,250
1,260
1,270
1,280
1,290
1,300
1,310
1,320
1,330
1,340
1,350
1,360
1,370
1,380



wob 11k
rpm 100
pp 650
spm 69
mw 9.0
vis 33

wob 12k
rpm 100
pp 650
spm 70
mw 9.0
vis 33

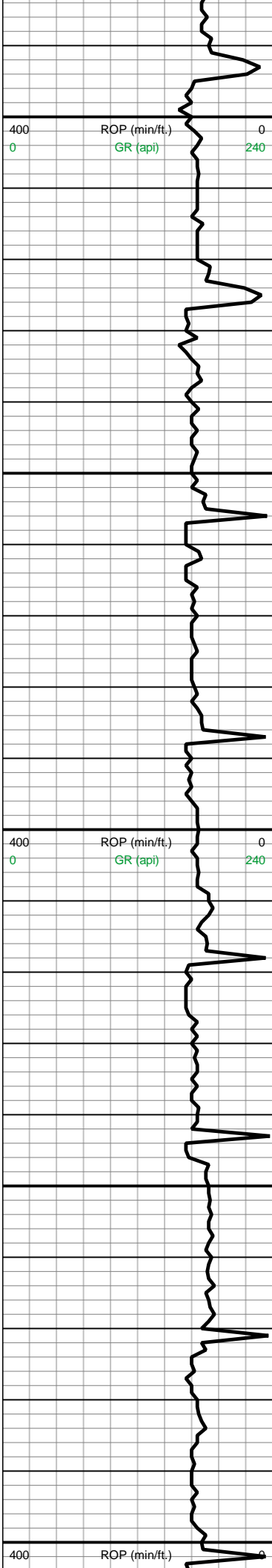
ang to subang, mody srted.

SS: modOrPk - ltGy, mod cons, v/fn to fn grn, rnd, v/w to w srted.

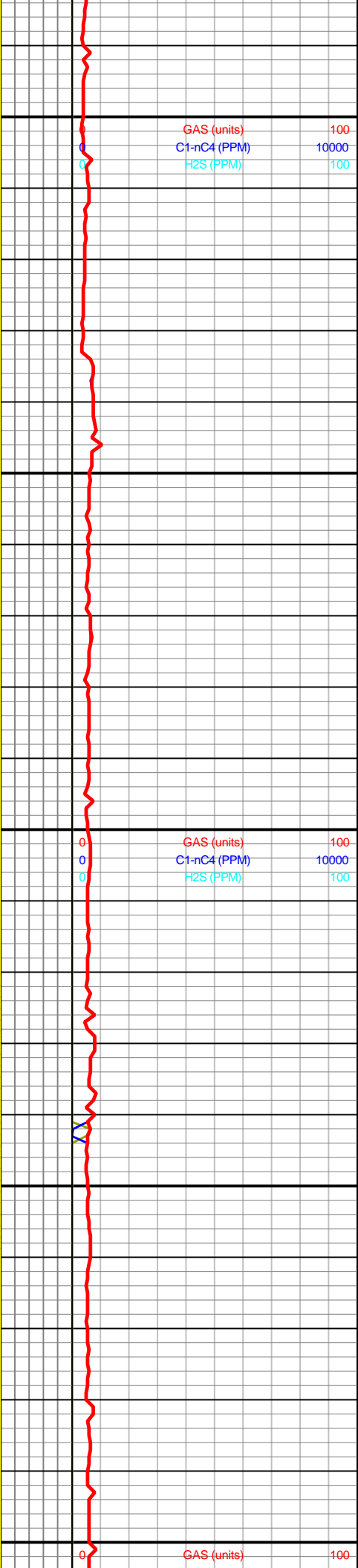
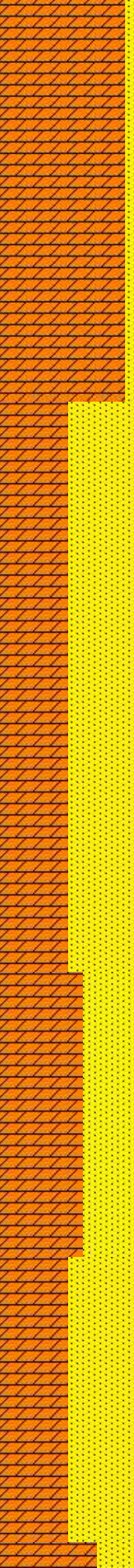
SS: modOrPk - ltGy, mod cons, v/fn to fn grn, rnd, v/w to w srted.

SS: medGy - ltGy - modOrPk, w cons, v/fn to med grn, subang, w srted.

SS: medGy - ltGy - modOrPk, w cons, v/fn to med grn, subang, w srted.



1,390
1,400
1,410
1,420
1,430
1,440
1,450
1,460
1,470
1,480
1,490
1,500
1,510
1,520
1,530
1,540
1,550
1,560
1,570
1,580
1,590
1,600



wob 12k
rpm 100
pp 650
spm 70
mw 9.0
vis 33

wob 10k
rpm 120
pp 750
spm 65
mw 9.0
vis 33

wob 10k

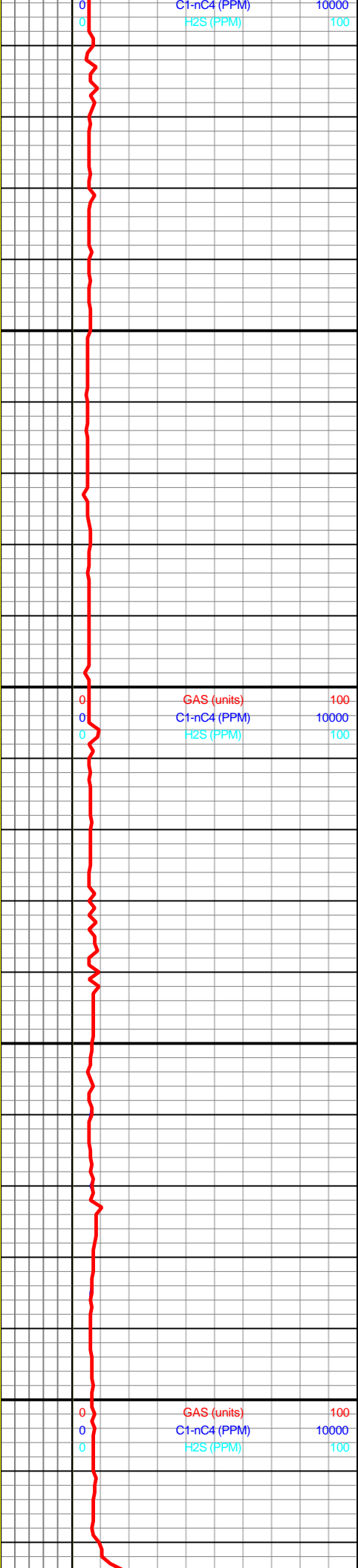
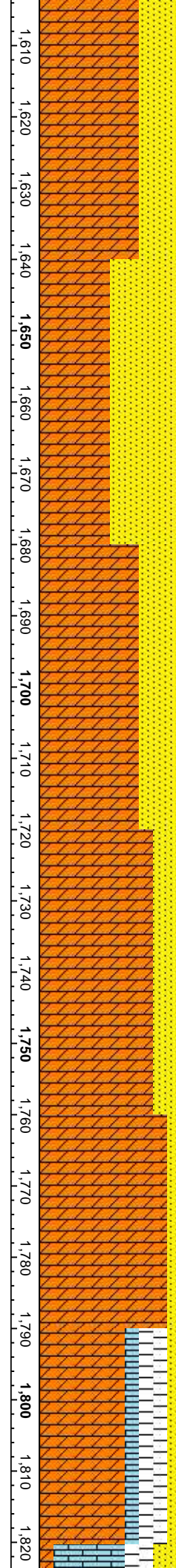
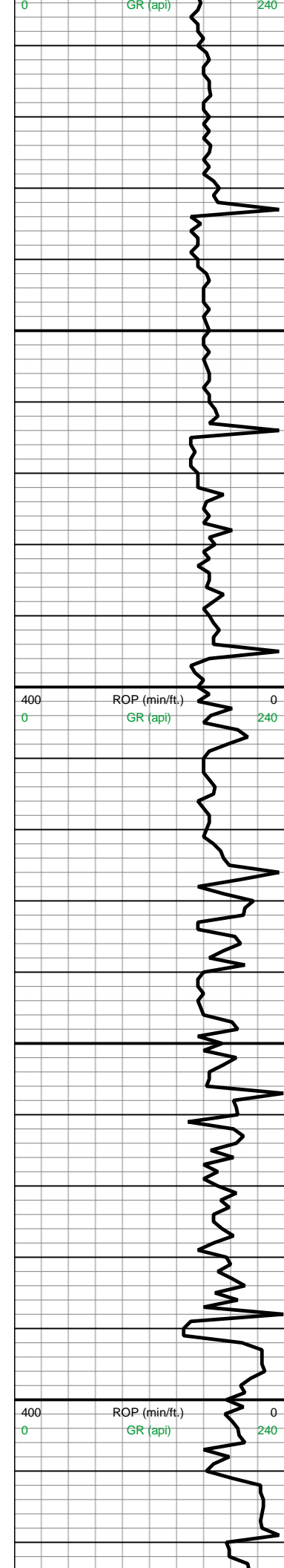
SS: meddrkGy
- v/ltGy, mod
cons, v/fn to fn
grn, w/rnd,
mody srted.
abdt anhy

SS: meddrkGy
- v/ltGy, mod
cons, v/fn to fn
grn, w/rnd,
mody srted.
abdt anhy

SS: meddrkGy
- Red-occ ltGy,
w cons, v/fn
grn, subang, w
srted, calc cmt,
abdt anhy

SS: meddrkGy
- occ Red-occ
ltGy, w cons,
v/fn grn,
subang, w
srted, calc cmt,
abdt anhy

SS: meddrkGy
- occ Red-occ



rpm 120
pp 750
spm 65
mw 9.0
vis 33

wob 10k
rpm 120
pp 750
spm 65
mw 9.0
vis 33

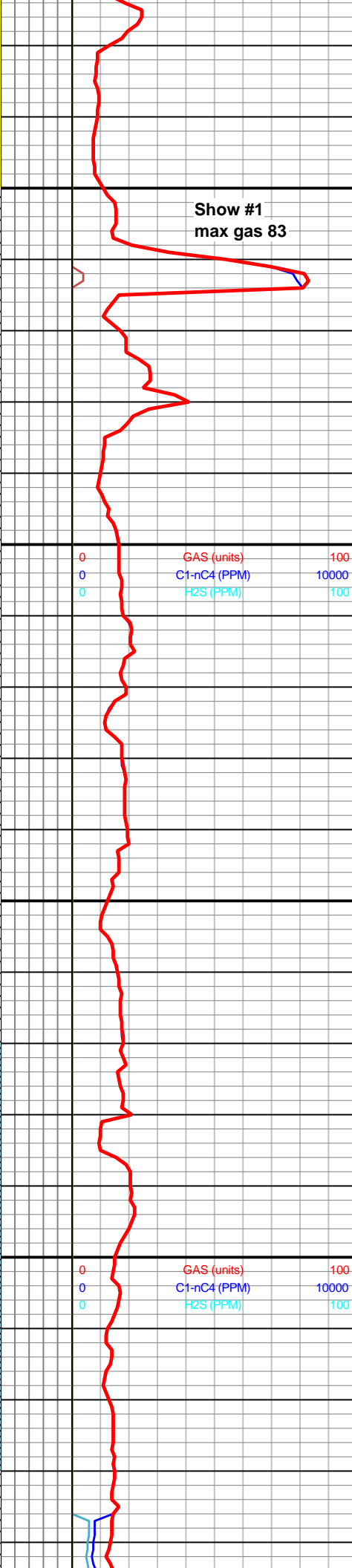
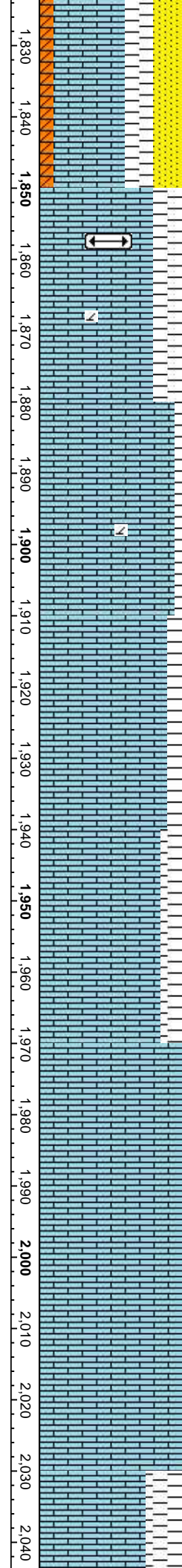
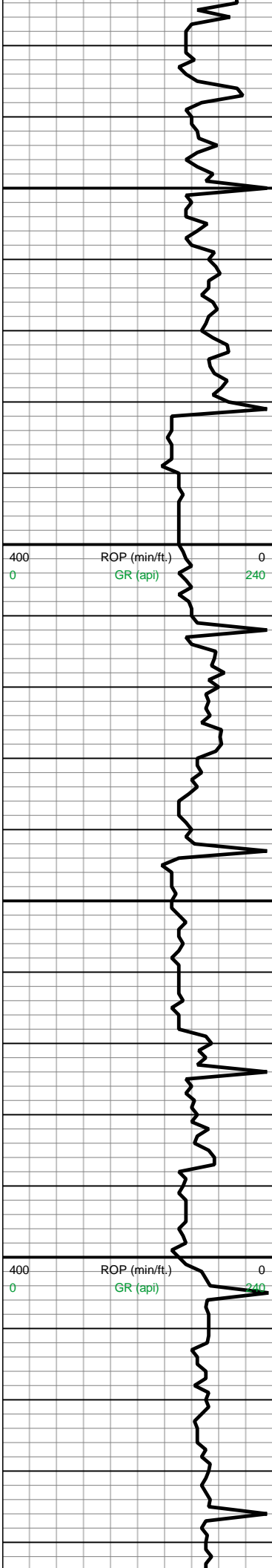
wob 10k
rpm 120
pp 750
spm 70
mw 9.2
vis 33

ltGy, w cons,
v/fn grn,
subang, w
srtd, calc cmt,
abdt anhy

SS: meddrkGy
-Red-occ ltGy,
w cons, v/fn
grn, subang, w
srtd, calc cmt,
abdt anhy

SS: meddrkGy
- occ Red-occ
ltGy, w cons,
v/fn grn,
subang, w
srtd, calc cmt,
abdt anhy

SS: meddrkGy
-occ ltGy, w
cons, v/fn grn,
subang, w
srtd, calc cmt,
abdt anhy



Show #1
max gas 83

wob 14k
rpm 120
pp 1000
spm 69
mw 9.4
vis 34

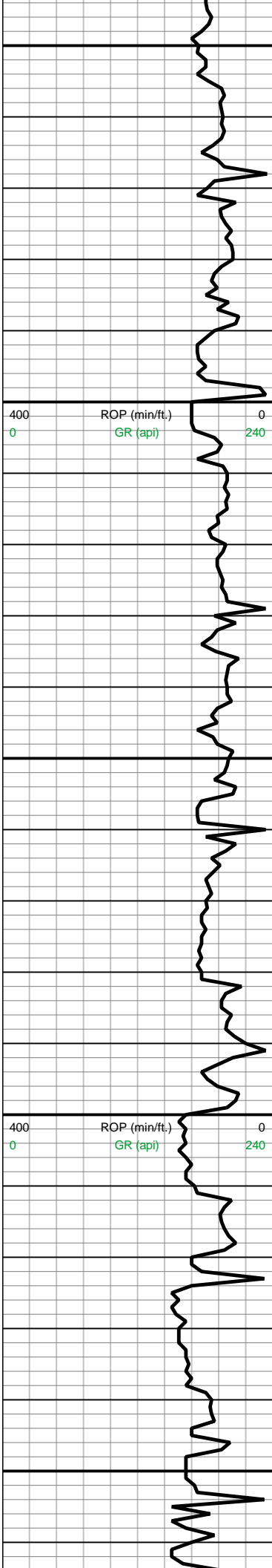
wob 14k
rpm 120
pp 1000
spm 69
mw 9.4
vis 34

LS: v/lTgy,
subblky, v/fxln
to medxln, hd,
imbd DOL,
intgr por.
Top of Chase
1857' MD
1857' TVD

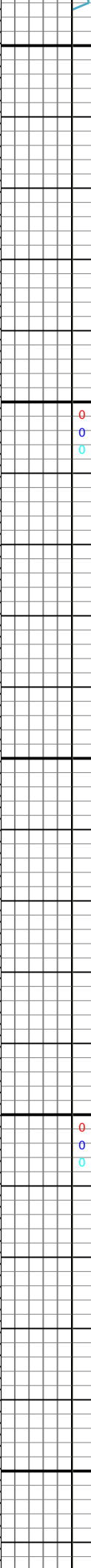
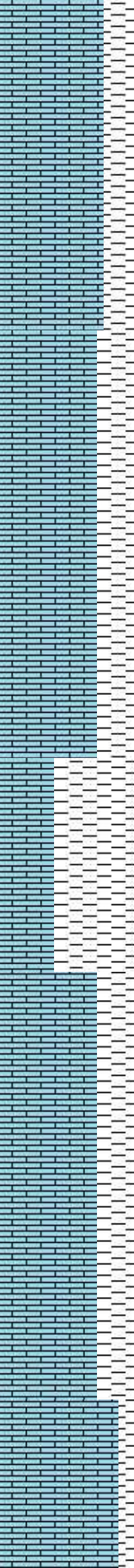
LS: v/lTgy,
subblky, v/fxln
to medxln, hd,
imbd DOL,
vugy - intragr
por.

LS: v/lTgy - occ
modRdOr,
subblky, v/fxln
to medxln, hd,
imbd DOL,
vugy - intragr
por.

LS: Wh,
subblky, v/fxln
to fxln, frm to
hd, imbd DOL,
vugy - intragr
por.



2050
2060
2070
2080
2090
2100
2110
2120
2130
2140
2150
2160
2170
2180
2190
2200
2210
2220
2230
2240
2250
2260



0
0
0

GAS (units)
C1-nC4 (PPM)
H2S (PPM)

100
10000
100

wob 14k
rpm 120
pp 1000
spm 68
mw 9.6
vis 33

LS: Wh - medltGy, subblky, v/fxln to fxln, hd to frm, vugy - intragr por.

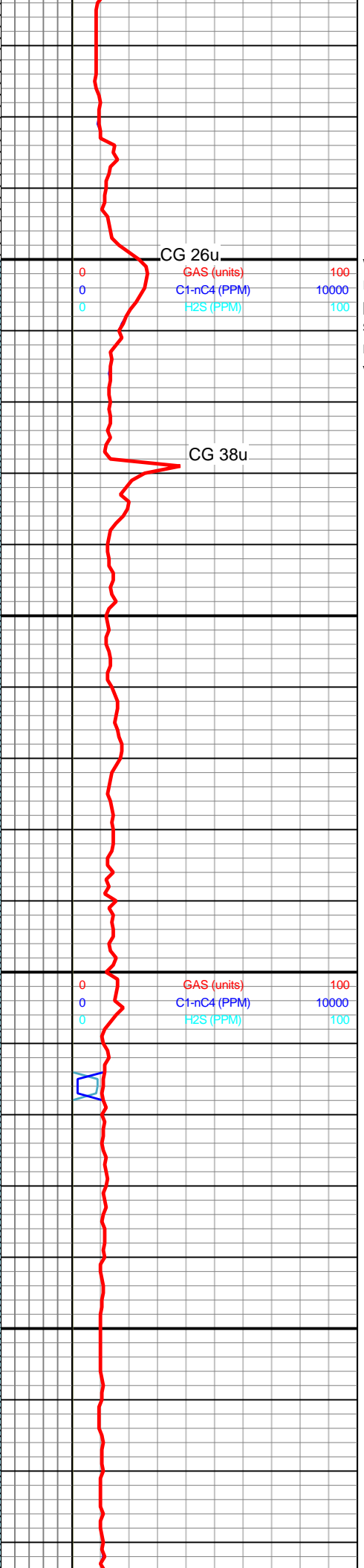
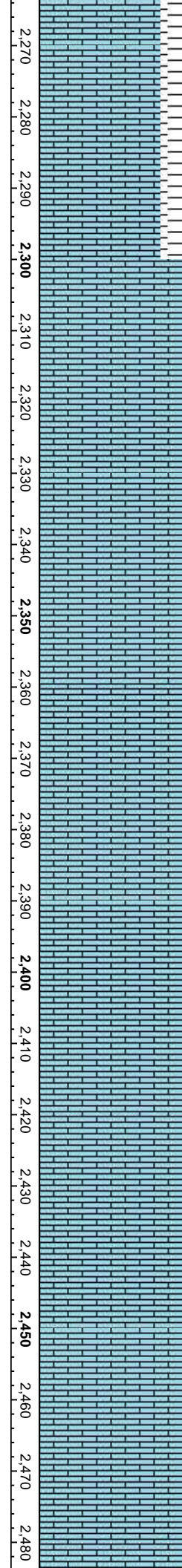
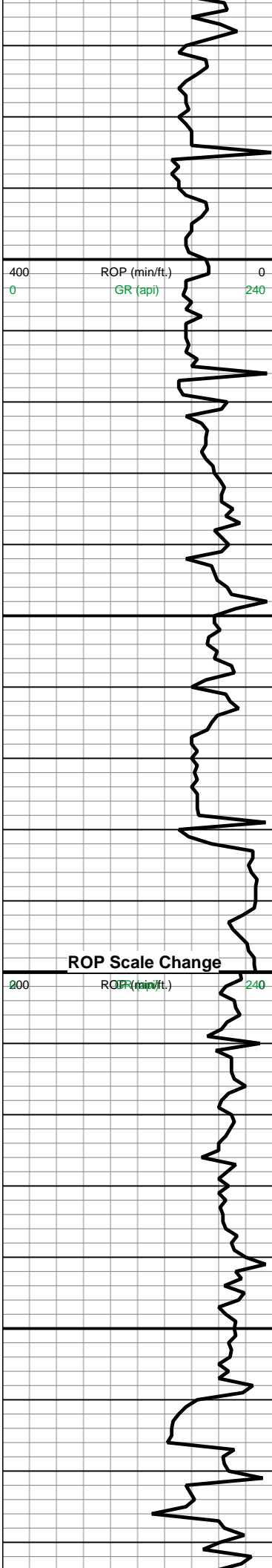
LS: Wh - medltGy, subblky, micxln to fxln, hd to frm, vugy - intragr por.

LS: Wh - medltGy, subblky, micxln to fxln, hd to frm, imbd QTZ, vugy - intragr por.

wob 12k
rpm 120
pp 1000
spm 68
mw 9.8
vis 31

LS: Wh - medltGy - modRdOr, subblky, micxln to v/fxln, hd to frm, intragr por.

LS: Wh - medltGy, subblky, v/fxln to fxln, hd to frm, imbd



wob 12k
rpm 120
pp 1000
spm 68
mw 9.8
vis 31

wob 12k
rpm 130
pp 1000
spm 68
mw 9.8
vis 31

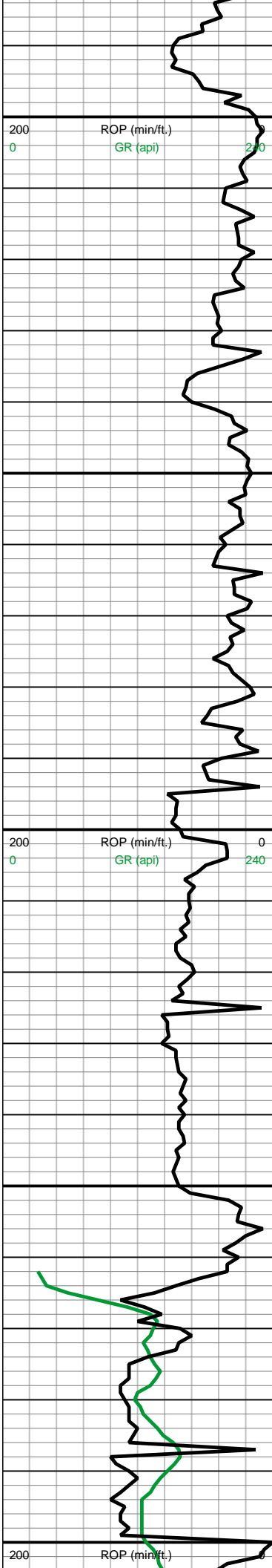
DOL, vugy - intragr por.

LS: Wh - medltGy, subblky, v/fxln to fxln, hd to frm, imbd DOL

LS: Wh - v/lGy, subblky, v/fxln to fxln, hd to frm.

LS: Wh - v/lGy, subblky, v/fxln to fxln, hd to frm, intragr por.

LS: meddrkGy - v/lGy, subblky, v/crsxln to fxln, hd to frm.



2490
2500
2510
2520
2530
2540
2550
2560
2570
2580
2590
2600
2610
2620
2630
2640
2650
2660
2670
2680
2690
2700

0 GAS (units) 100
0 C1-nC4 (PPM) 10000
0 H2S (PPM) 100

CG 31u

CG 33u

0 GAS (units) 100
0 C1-nC4 (PPM) 10000
0 H2S (PPM) 100

CG 22u

9/29/15
wob 12k
rpm 130
pp 1000
spm 68
mw 9.9
vis 27

wob 10k
rpm 90
pp 600
spm 69
mw 10.0
vis 28

2700'
Trip for

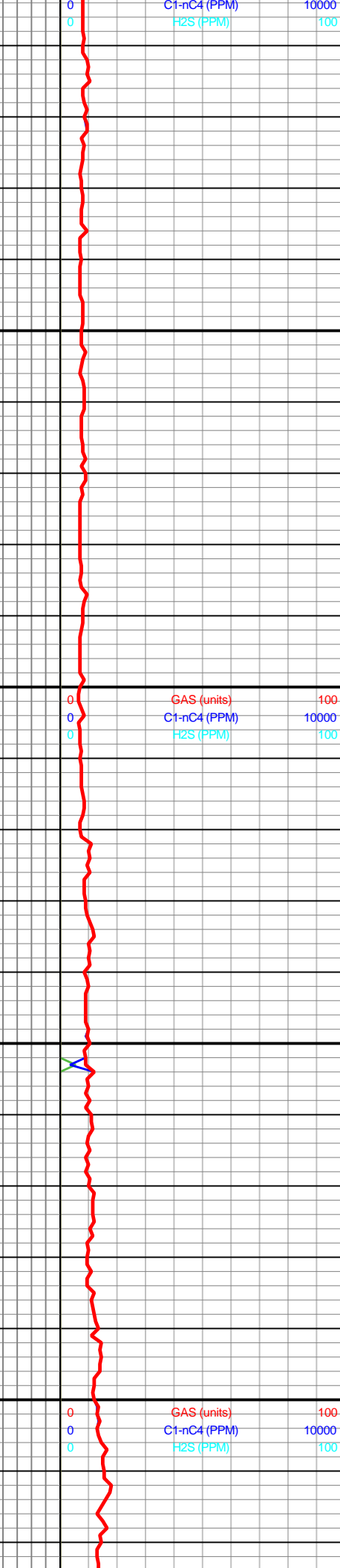
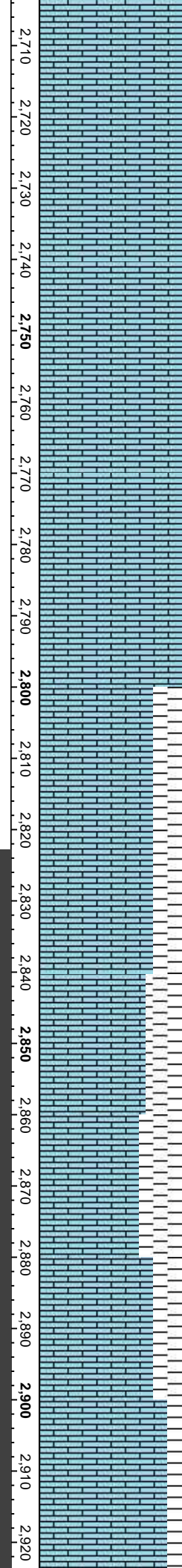
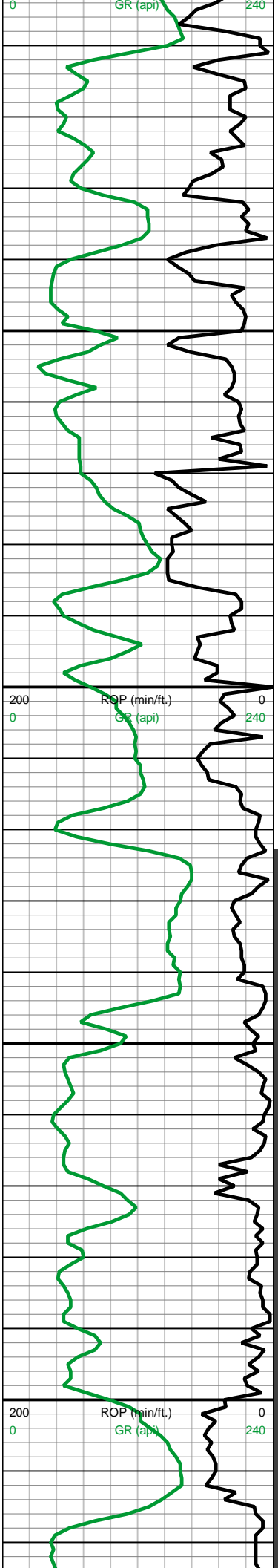
LS: meddrkGy - v/lTgy, subblky, v/crsxln to fxln, hd to frm.

LS: drkGy - medltGy - occ Wh, subblky, fxln to occ crsxn, hd to frm, imbd PYR xls.

LS: drkGy - medltGy - occ Wh, subblky, fxln to occ crsxn, hd to frm

LS: drkGy - medltGy - occ Wh, subblky, fxln to occ crsxn, hd to frm

LS: Wh - medGv. blkly to



dd tools
9/30/15
 wob 6k
 rpm 75
 pp 1250
 spm 69
 mw 8.7
 vis 62

wob 6k
 rpm 75
 pp 1250
 spm 69
 mw 8.9
 vis 50

wob 11k
 rpm 0
 pp 1450
 spm 58
 mw 9.1
 vis 51

MD: 2,711'
 TVD: 2,710.9'
 Inclination: 0.2°
 Azimuth: 339.8°
 VS: -8.43'

MD: 2,742'
 TVD: 2,741.9'
 Inclination: 0.1°
 Azimuth: 335.5°
 VS: -8.35'

MD: 2,772'
 TVD: 2,771.9'
 Inclination: 0.4°
 Azimuth: 351.4°
 VS: -8.22'

MD: 2,803'
 TVD: 2,802.9'
 Inclination: 0.4°
 Azimuth: 346.2°
 VS: -8.01'

MD: 2,834'
 TVD: 2,833.9'
 Inclination: 2.2°
 Azimuth: 351.9°
 VS: -7.32'

MD: 2,865'
 TVD: 2,864.8'
 Inclination: 5.5°
 Azimuth: 353.9°
 VS: -5.25'

MD: 2,896'
 TVD: 2,895.35'
 Inclination: 9.8°
 Azimuth: 355.2°
 VS: -1.14'

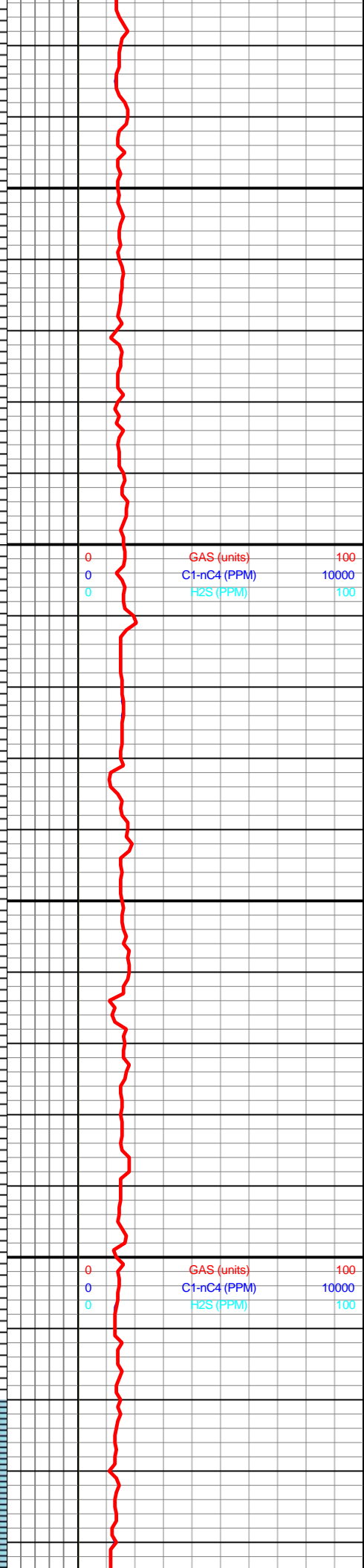
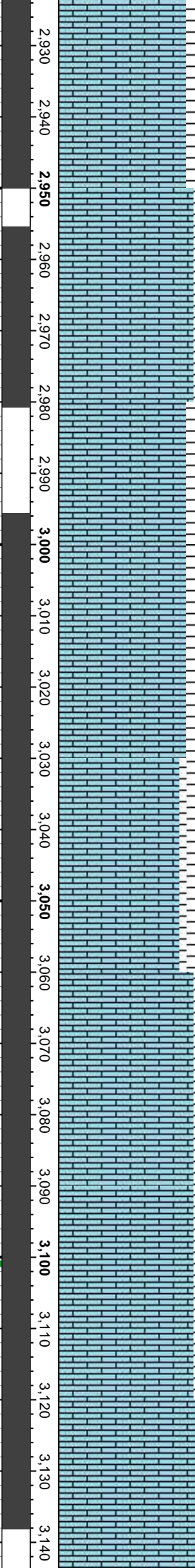
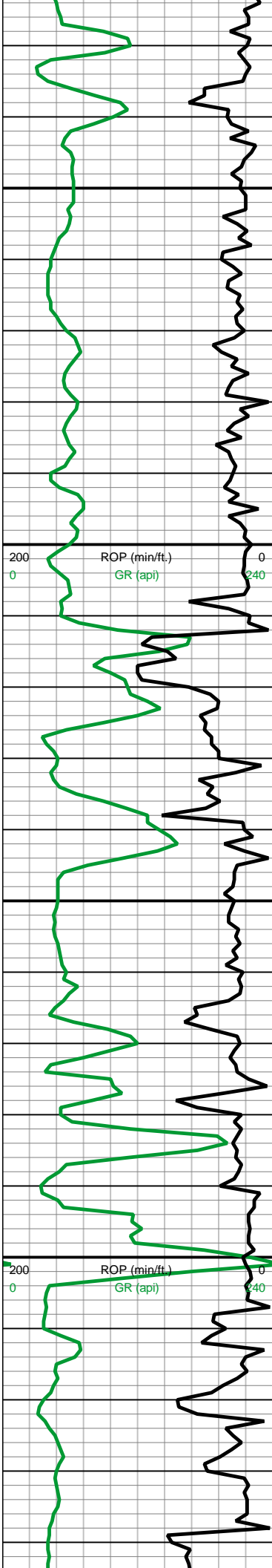
subblky, fxln to v/fxln, hd to frm, free QTZ.

LS: Wh - medGy, blkly to subblky, fxln to v/fxln, hd to frm

LS: Wh - medGy, blkly to subblky, fxln to v/fxln, hd to frm.

LS: Wh - medGy, blkly to subblky, fxln to v/fxln, hd to frm.

LS: Wh - ltGy, blkly to subblky, fxln to v/fxln, hd to frm.



MD (ft)	TVD (ft)	Inclination (°)	Azimuth (°)	VS (ft)
2,927'	2,925.8'	14°	357.5°	5.23'
2,958'	2,955.6'	18.2°	358.1°	13.8'
2,990'	2,985.7'	21.8°	358.1°	24.7'
3,021'	3,014.1'	25.1°	357.9°	37.1'
3,052'	3,042.1'	26°	357.6°	50.4'
3,083'	3,069.85'	27°	357.5°	64.27'
3,114'	3,097.17'	29.4°	357.4°	78.9'

LS: Wh - medGy, blkly to subblkly, fxln to v/fxln, hd to frm.

LS: Wh - medltGy, blkly to subblkly, fxln to v/fxln, hd to frm.

LS: Wh - ltGy, blkly to subblkly, fxln to v/fxln, hd to frm.

LS: Wh - medGy, subblkly, fxln to v/fxln, hd to frm.

ROP (min/ft.) 0
GR (api) 240

GAS (units) 100
C1-nC4 (PPM) 10000
H2S (PPM) 100

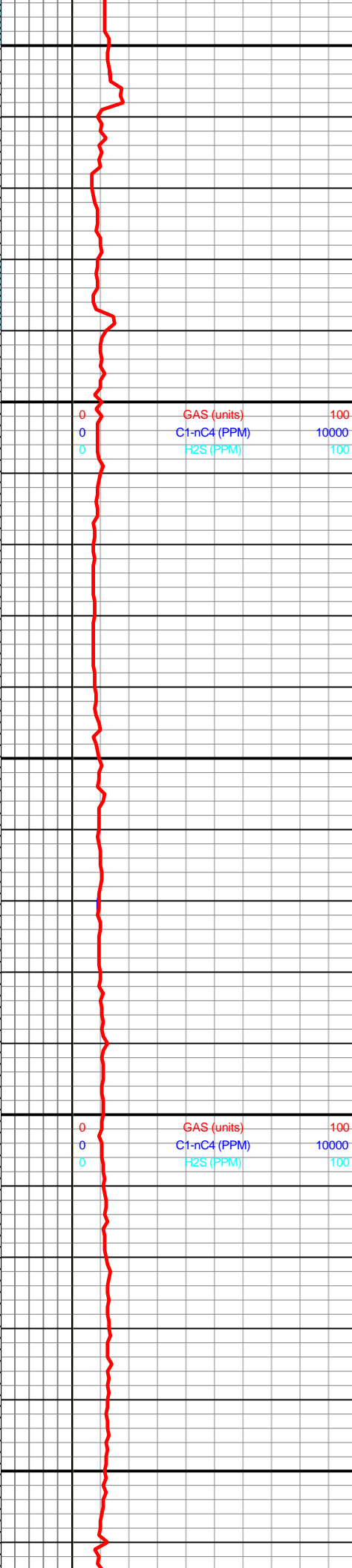
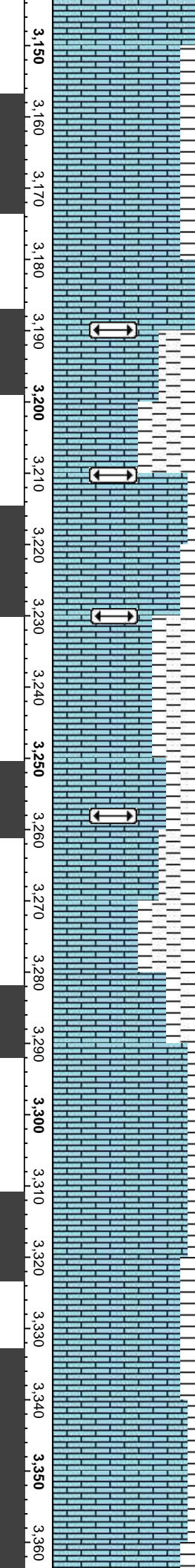
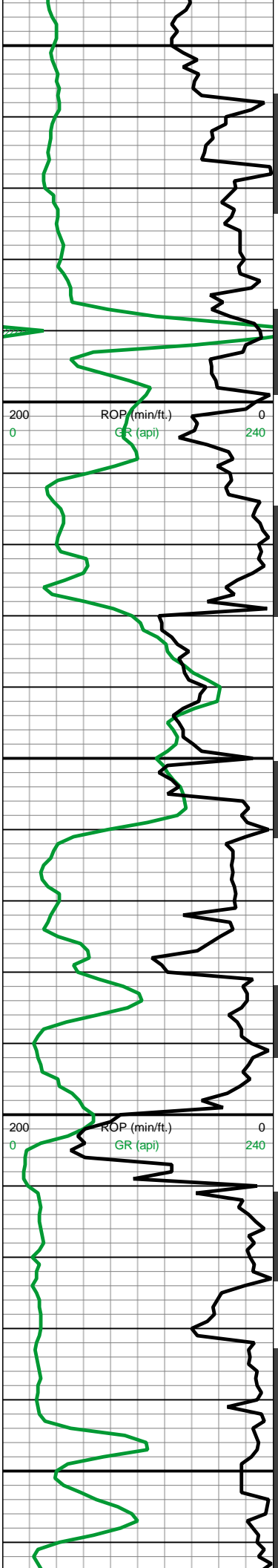
wob 12k
rpm 75
pp 1450
spm 56
mw 9.0
vis 51

10/1/15

ROP (min/ft.) 0
GR (api) 240

GAS (units) 100
C1-nC4 (PPM) 10000
H2S (PPM) 100

wob 10k
rpm 0
pp 1325
spm 56
mw 9.0
vis 49



wob 3k
rpm 55
pp 1300
spm 55
mw 9.2
vis 50

wob 8k
rpm 55
pp 1400
spm 52
mw 9.1
vis 50

MD: 3,145'
TVD: 3,123.88'
Inclination: 31.6°
Azimuth: 357.5°
VS: 94.62'

MD: 3,176'
TVD: 3,150.01'
Inclination: 33.5°
Azimuth: 357.6°
VS: 111.18'

MD: 3,207'
TVD: 3,175.52'
Inclination: 35.7°
Azimuth: 358.2°
VS: 128.77'

MD: 3,239'
TVD: 3,201.26'
Inclination: 37.2°
Azimuth: 358.9°
VS: 147.78'

MD: 3,270'
TVD: 3,225.74'
Inclination: 38.5°
Azimuth: 359.3°
VS: 166.8'

MD: 3,302'
TVD: 3,260.6'
Inclination: 39.5°
Azimuth: 0.1°
VS: 186.9'

MD: 3,333'
TVD: 3,274.1'
Inclination: 41.7°
Azimuth: 0.5°
VS: 207.1'

LS: Wh - medGy, subblky, fxln to v/fxln, hd to frm.

Top Heebner Shale
3190' MD
3162' TVD

Top Toronto Limestone
3210' MD
3179' TVD

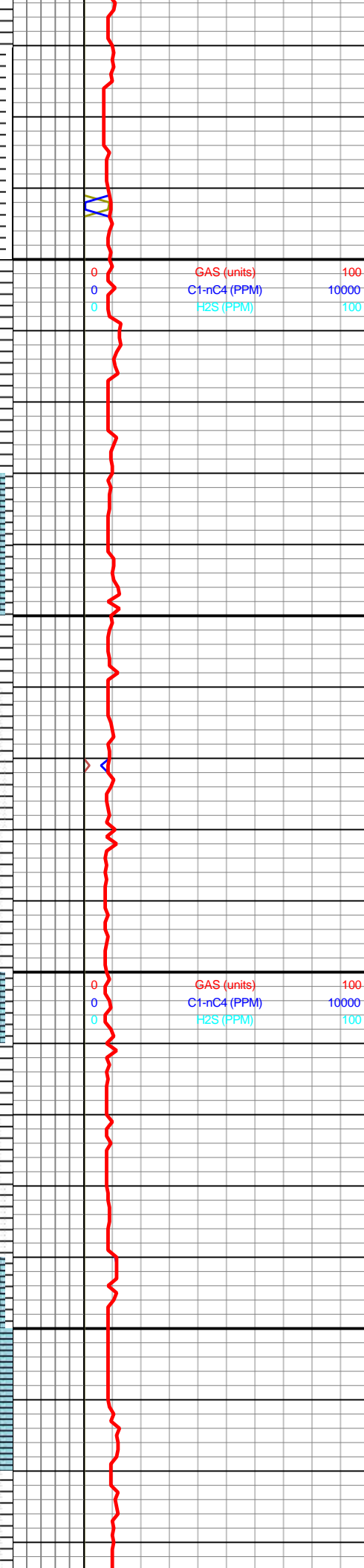
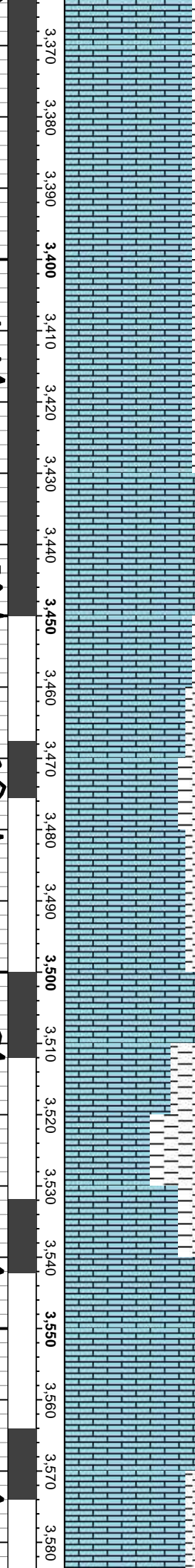
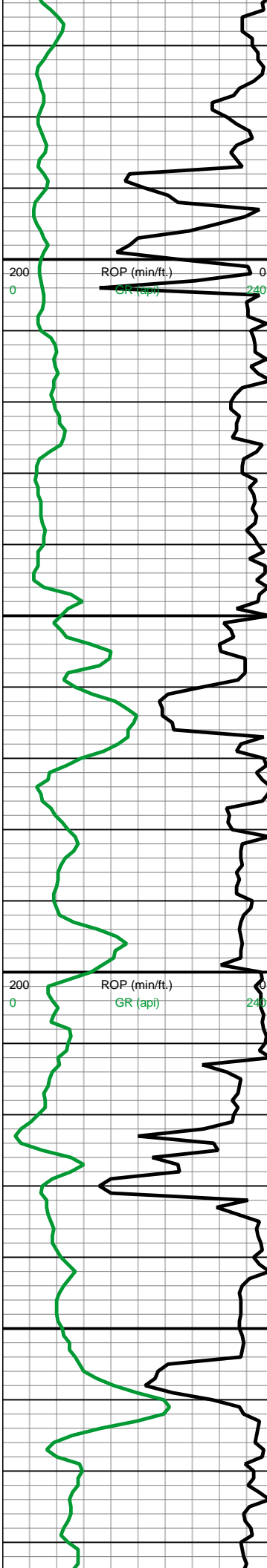
Top Douglas Shale
3230' MD
3193' TVD

Top Lansing-Kansas City
3258' MD
3217' TVD

LS: Wh - medGy, subblky, fxln to v/fxln, hd to frm.

LS: Wh - medGy, subblky, fxln to v/fxln, hd to frm.

LS: Wh - medGy, subblky, fxln to v/fxln, hd to frm.



10/2/15
 wob 20k
 rpm 0
 pp 1310
 spm 55
 mw 9.1
 vis 59

MD: 3,364'
 TVD: 3,296.7'
 Inclination: 44.7°
 Azimuth: 1.4°
 VS: 228.32'

MD: 3,396'
 TVD: 3,318.91'
 Inclination: 47.6°
 Azimuth: 2.8°
 VS: 251.38'

MD: 3,427'
 TVD: 3,339.12'
 Inclination: 51°
 Azimuth: 3.9°
 VS: 274.84'

MD: 3,457'
 TVD: 3,357.47'
 Inclination: 53.4°
 Azimuth: 4.6°
 VS: 298.47'

MD: 3,488'
 TVD: 3,375.68'
 Inclination: 54.8°
 Azimuth: 4.6°
 VS: 323.5'

MD: 3,519'
 TVD: 3,393.4'
 Inclination: 55.5°
 Azimuth: 4.3°
 VS: 348.87'

MD: 3,551'
 TVD: 3,411.13'
 Inclination: 57.2°
 Azimuth: 4.1°
 VS: 375.43'

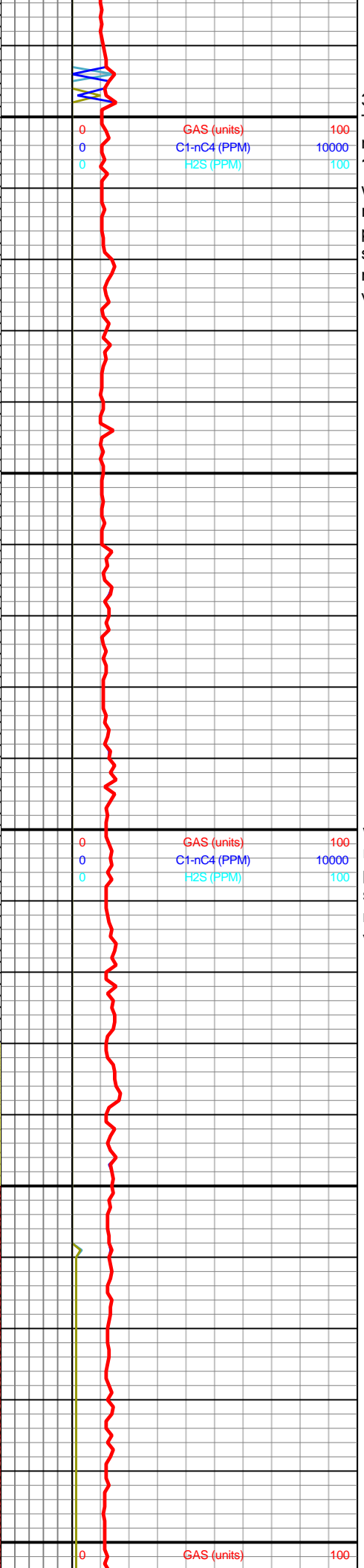
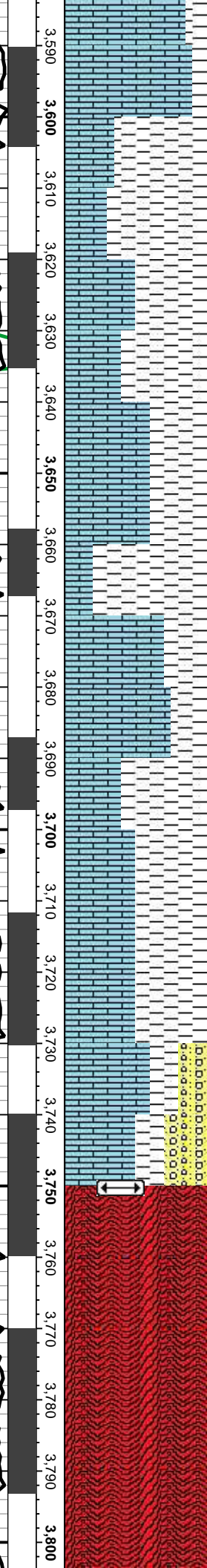
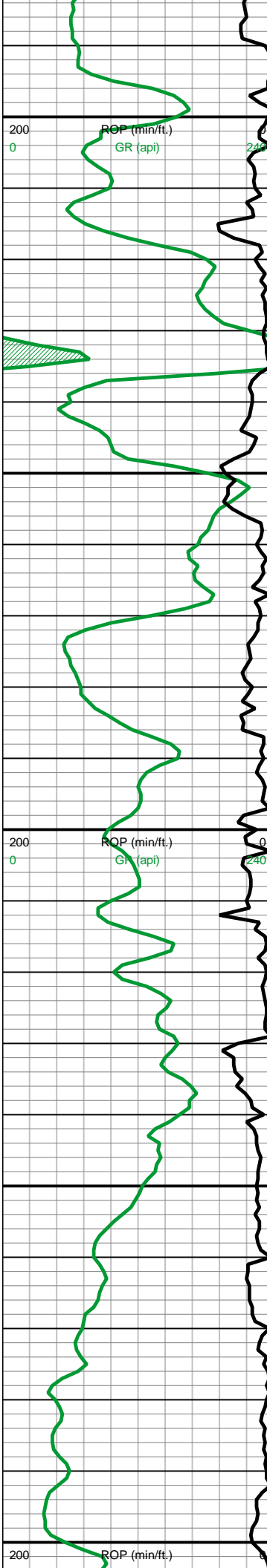
MD: 3,581'
 TVD: 3,427.05'

LS: meddrkGy - medltGy, subblky, fxln to crsxn, hd to frm, vugy por.

LS: meddrkGy - medltGy, subblky, fxln to crsxn, hd to frm, vugy por.

LS: Wh - medltGy, subblky, micxn to fxln, frm to hd, pp por.

LS: Wh - paYlshOr - v/lGy, subblky, micxn to fxln, frm to hd, occ pp - occ vugy por.



3599'
 Trip for nb#3
10/3/15
 wob 17k
 rpm 0
 pp 1500
 spm 52
 mw 9.4
 vis 52

wob 5.4k
 rpm 65
 pp 1434
 spm 53
 mw 9.6
 vis 51

10/4/15
 wob 5.4k
 rpm 65
 pp 1415
 spm 54
 mw 9.4
 vis 47

Inclination: 58.7°
 Azimuth: 3.9°
 VS: 400.8'

MD: 3,612'
 TVD: 3,442.76'
 Inclination: 60.4°
 Azimuth: 3.9°
 VS: 427.46'

MD: 3,640'
 TVD: 3,457.6'
 Inclination: 62.2°
 Azimuth: 3.6°
 VS: 454.6'

MD: 3,675'
 TVD: 3,472.25'
 Inclination: 63.5°
 Azimuth: 3.2°
 VS: 483'

MD: 3,706'
 TVD: 3,485.6'
 Inclination: 65.2°
 Azimuth: 2.4°
 VS: 510.9'

MD: 3,737'
 TVD: 3,497.98'
 Inclination: 68°
 Azimuth: 2.2°
 VS: 539.35'

LS: Wh - paYlshOr - v/litGy, subblky, micxln to fxln, frm to hd, occ pp - occ vugy por.

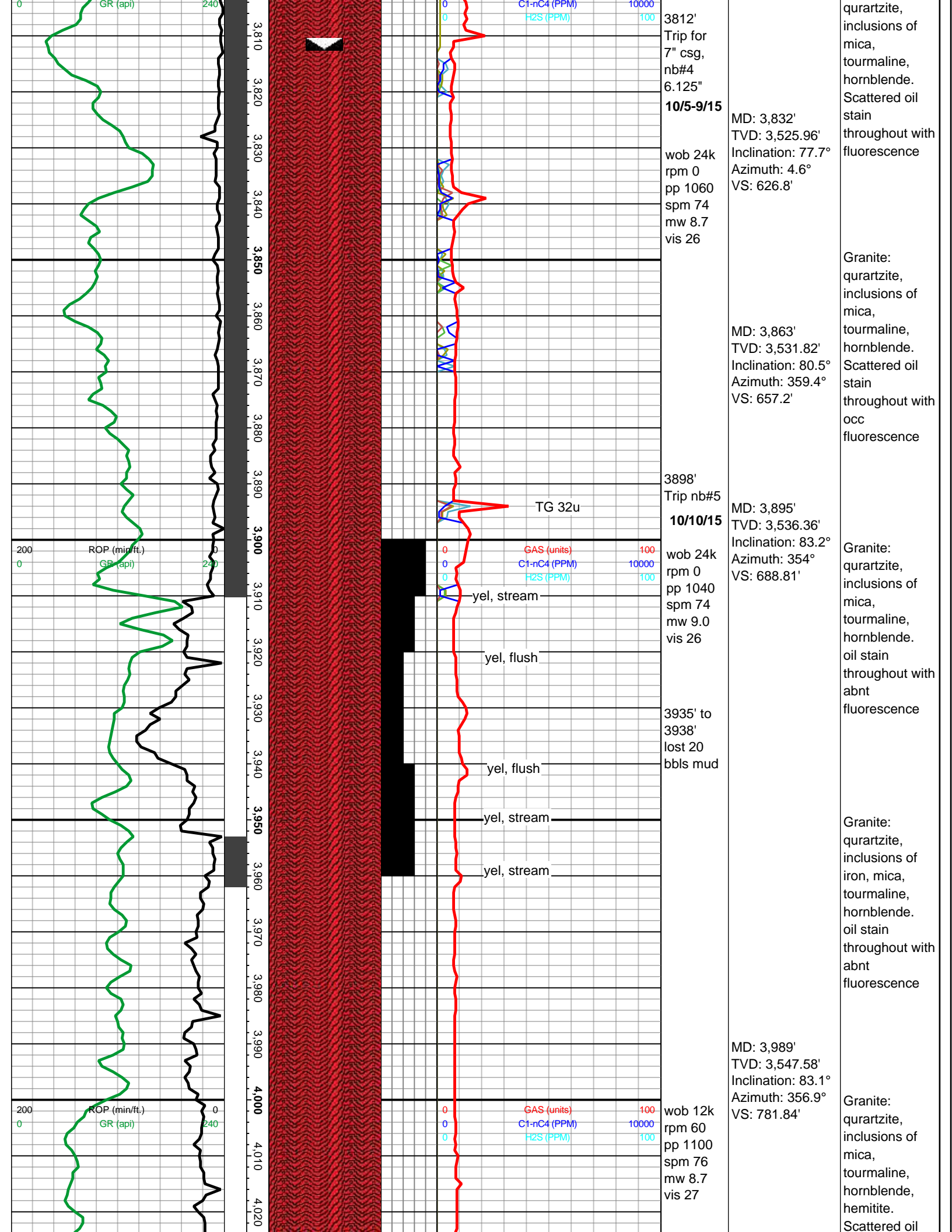
LS: Wh, subblky, micxln to fxln, fri to frm, vugy por.

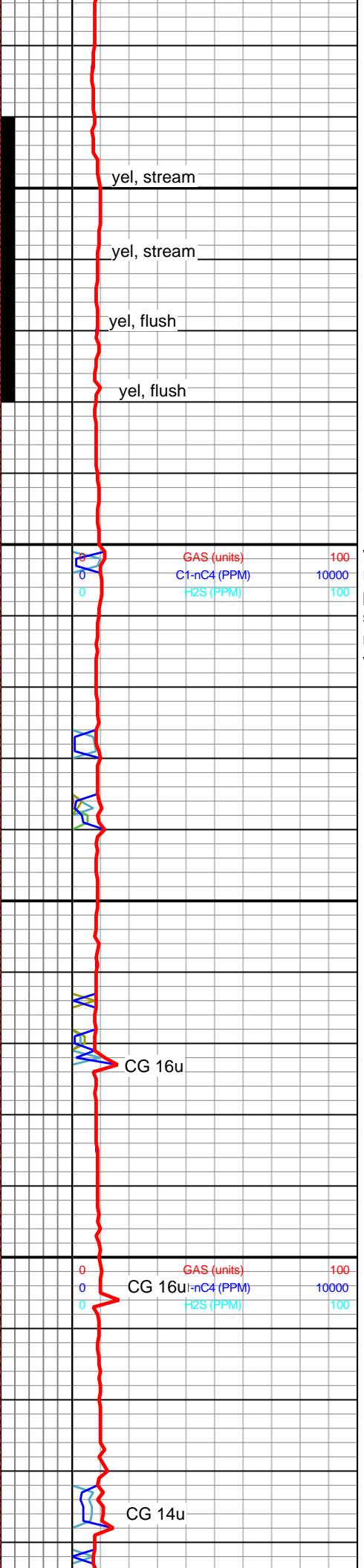
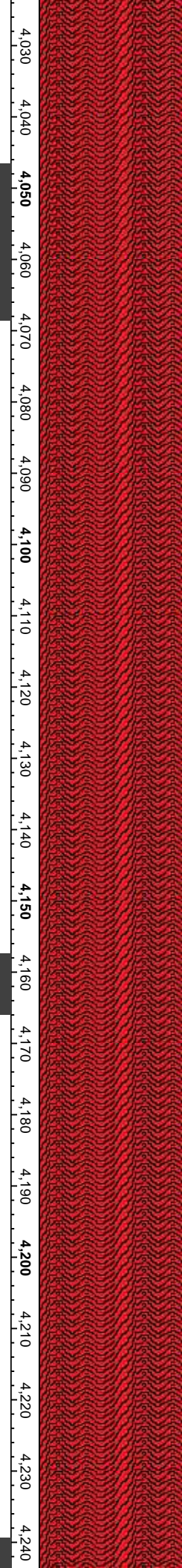
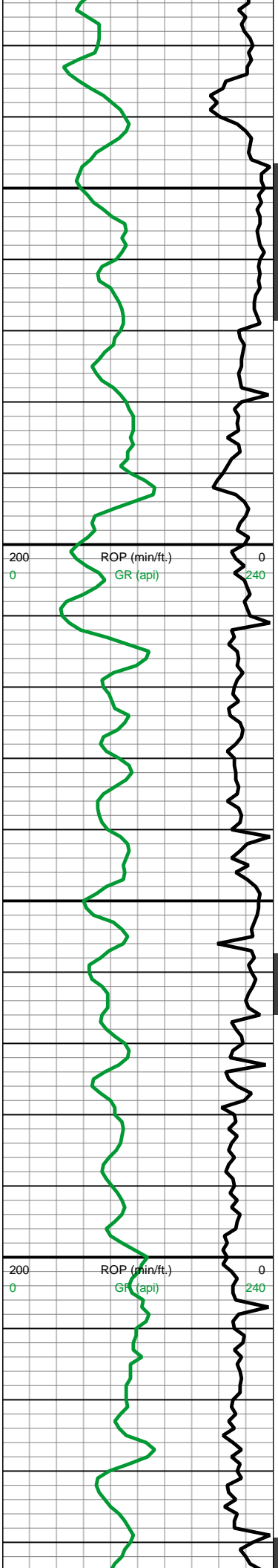
SH: medGy - v/paGn - modRdBn, subblky, grty to smth txt, frm to hd.

Top Granite 3758' MD

Granite: quartzite, inclusions of mica, tourmaline, hornblende. Scattered oil stain throughout with fluorescence

Granite:





MD: 4,084'
 TVD: 3,560.4'
 Inclination: 81.4°
 Azimuth: 359.6°
 VS: 875.9'

wob 3k
 rpm 55
 pp 1100
 spm 76
 mw 8.6
 vis 28

wob 25k
 rpm 60
 pp 1120
 spm 74
 mw 8.2
 vis 27

10/11/15

MD: 4,179'
 TVD: 3,574.8'
 Inclination: 81.1°
 Azimuth: 0.8°
 VS: 969.8'

yel, stream

yel, stream

yel, flush

yel, flush

0
0
0

GAS (units)
 C1-nC4 (PPM)
 H2S (PPM)

100
10000
100

CG 16u

CG 16u

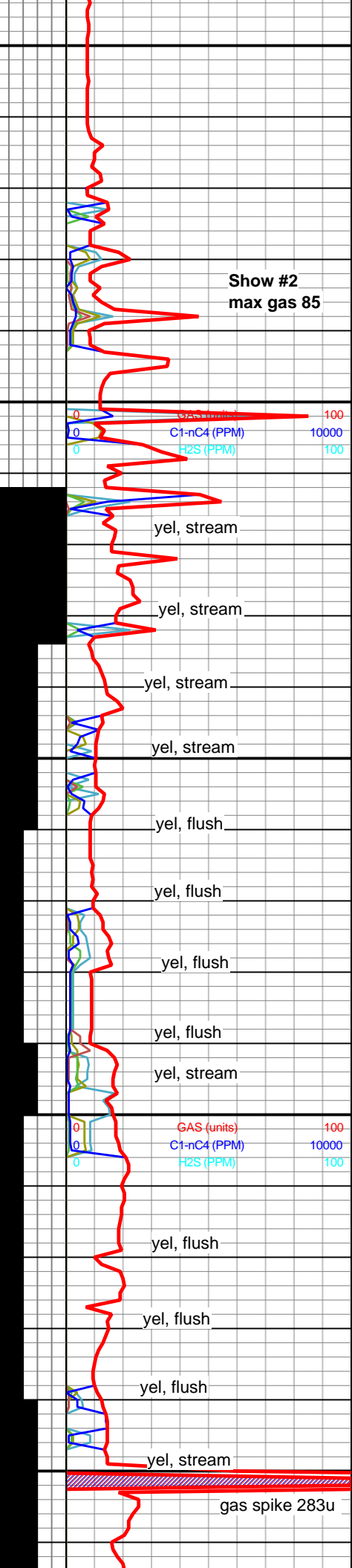
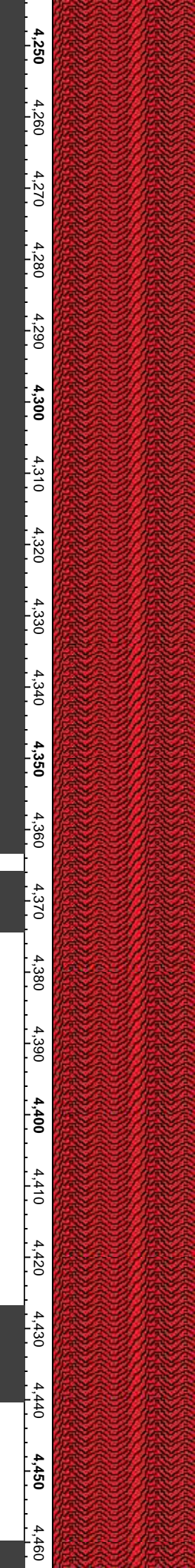
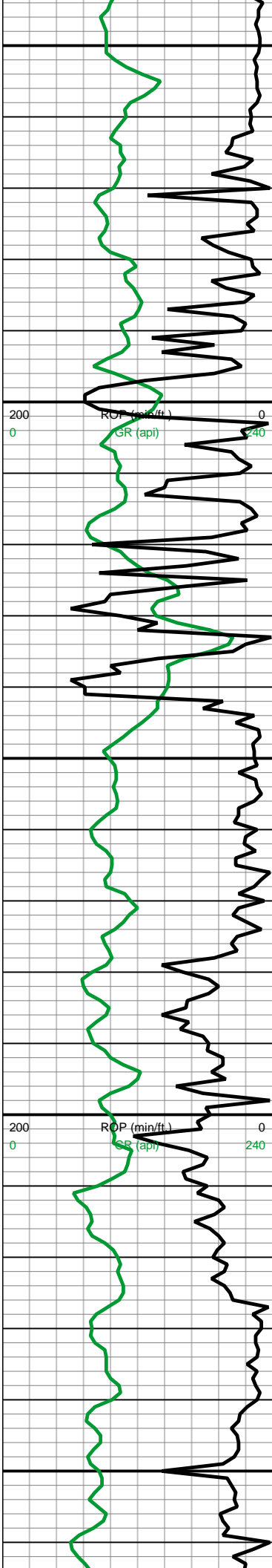
CG 14u

stain
 throughout with
 occ
 fluorescence

Granite:
 quartzite,
 inclusions of
 biotites,
 tourmaline,
 hornblende,
 hemitite.
 Scattered oil
 stain
 throughout with
 fluorescence

Granite:
 quartzite,
 inclusions of
 mica,
 tourmaline,
 hornblende,
 hemitite.
 Scattered oil
 stain
 throughout with
 occ
 fluorescence

Granite:
 quartzite,
 inclusions of
 iron, mica,
 tourmaline,
 hornblende,
 beryl.



Show #2
max gas 85

wob 39k
rpm 0
pp 1125
spm 79
mw 8.6
vis 27

wob 12k
rpm 65
pp 1200
spm 82
mw 8.7
vis 28

gas spike 283u

MD: 4,274'
TVD: 3,589.6'
Inclination: 81°
Azimuth: 1.2°
VS: 1,063.6'

MD: 4,306'
TVD: 3,594.82'
Inclination: 80.3°
Azimuth: 359.9°
VS: 1,095.21'

MD: 4,338'
TVD: 3,600.54'
Inclination: 79.1°
Azimuth: 357.1°
VS: 1,126.68'

MD: 4,369'
TVD: 3,606.83'
Inclination: 77.5°
Azimuth: 356°
VS: 1,156.98'

MD: 4,401'
TVD: 3,613.57'
Inclination: 78.2°
Azimuth: 357°
VS: 1,188.2'

MD: 4,433'
TVD: 3,619.89'
Inclination: 79°
Azimuth: 357.6°
VS: 1,219.53'

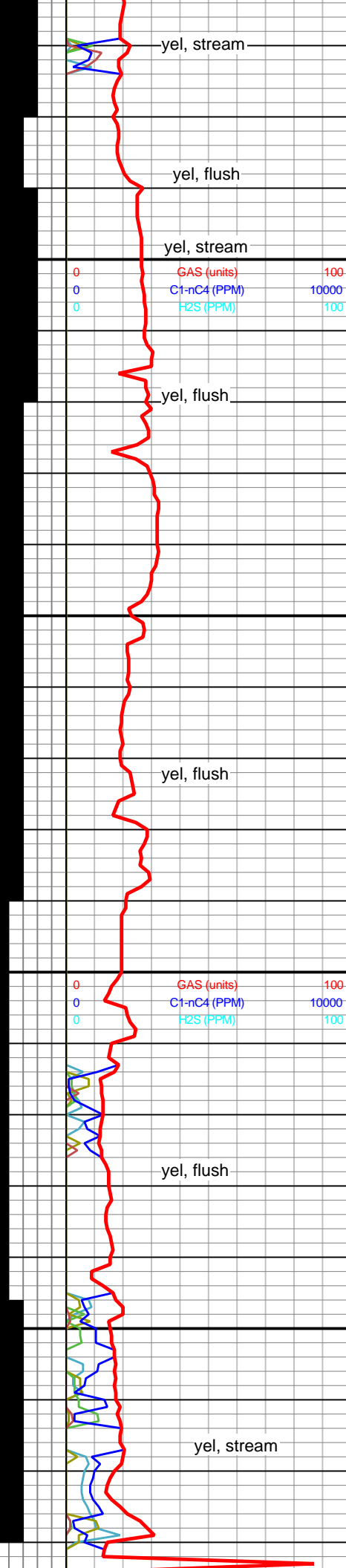
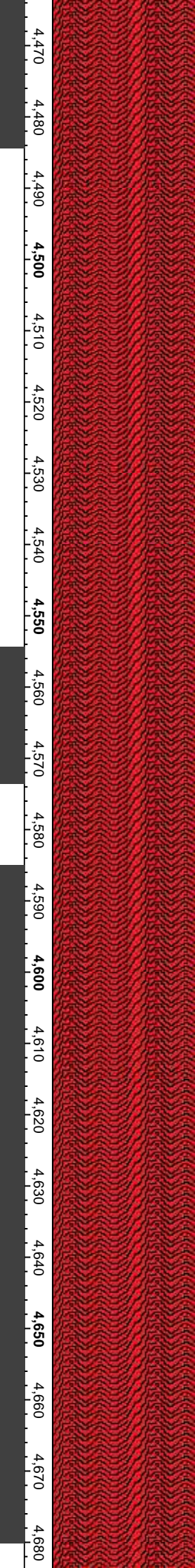
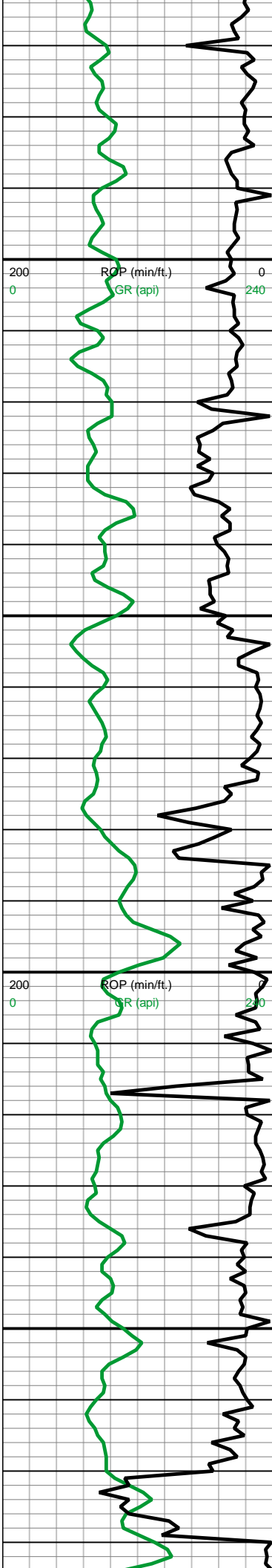
Granite:
quartzite,
inclusions of
iron, mica,
tourmaline,
hornblende,
beryl.
Scattered oil
stain
throughout with
occ
fluorescence

Granite:
quartzite.
Scattered oil
stain
throughout with
occ
fluorescence

Granite:
quartzite.
Scattered oil
stain
throughout with
abt
fluorescence

Granite:
quartzite.
Scattered oil
stain
throughout with
fluorescence

Granite:
quartzite.
Scattered oil
stain
throughout with



MD: 4,464'
 TVD: 3,625.73'
 Inclination: 79.3°
 Azimuth: 356.7°
 VS: 1,249.94'

 MD: 4,496'
 TVD: 3,631.58'
 Inclination: 79.6°
 Azimuth: 357.2°
 VS: 1,281.35'

 MD: 4,528'
 TVD: 3,637.14'
 Inclination: 80.4°
 Azimuth: 358.3°
 VS: 1,312.8'

 MD: 4,559'
 TVD: 3,642.3'
 Inclination: 80.4°
 Azimuth: 358.7°
 VS: 1,343.4'

 MD: 4,591'
 TVD: 3,648.1'
 Inclination: 78.8°
 Azimuth: 357.8°
 VS: 1,374.86'

 MD: 4,623'
 TVD: 3,655'
 Inclination: 76°
 Azimuth: 355.5°
 VS: 1,406.03'

 MD: 4,654'
 TVD: 3,662.57'
 Inclination: 76°
 Azimuth: 355.6°
 VS: 1,436.02'

 4684'
 Trip for

throughout with
 fluorescence

 Granite:
 quartzite.
 Scattered oil
 stain
 throughout with
 fluorescence

 Granite:
 quartzite.
 Scattered oil
 stain
 throughout with
 fluorescence

 Granite:
 quartzite.
 Scattered oil
 stain
 throughout with
 fluorescence

 Granite:
 quartzite.
 Scattered oil
 stain
 throughout with
 fluorescence

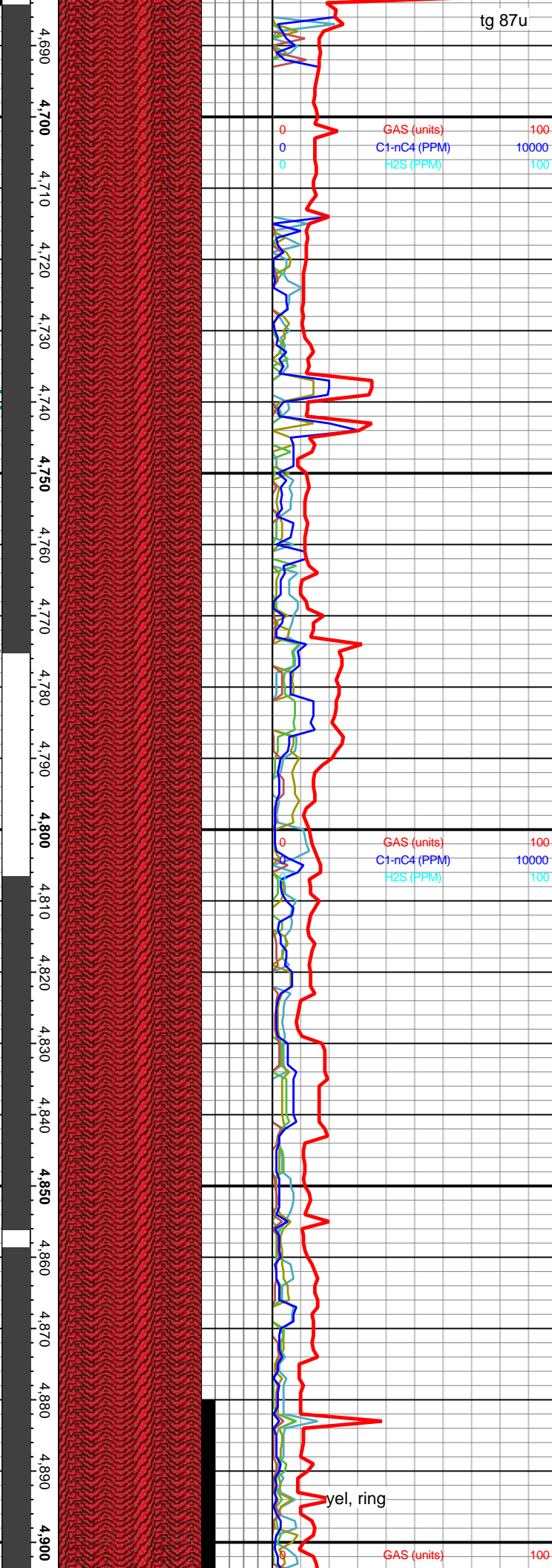
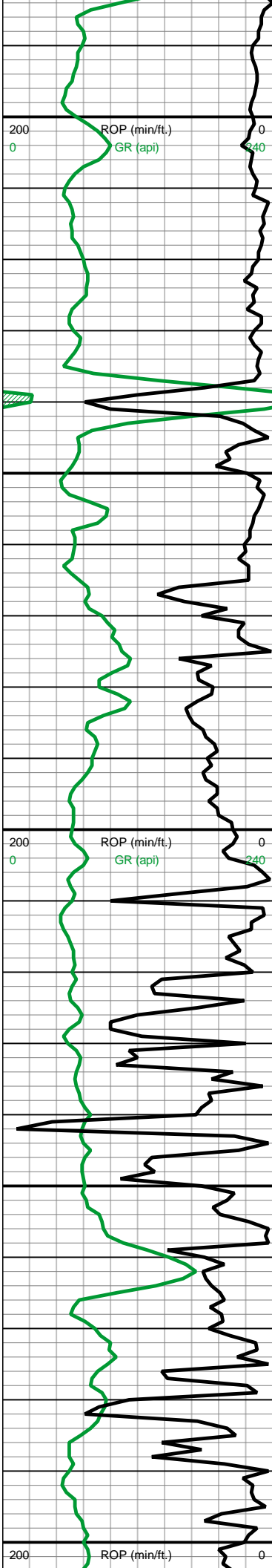
 Granite:
 quartzite.
 Scattered oil
 stain
 throughout with
 fluorescence

 Granite:
 quartzite.
 Scattered oil
 stain
 throughout with
 fluorescence

wob 12k
 rpm 70
 pp 1150
 spm 45
 mw 8.7
 vis 27

wob 25k
 rpm 0
 pp 1275
 spm 46
 mw 8.8
 vis 27

10/12/15



tg 87u
nb#6
wob 32k
rpm 0
pp 1125
spm 82
mw 8.6
vis 28
10/13/15
wob 2.8k
rpm 60
pp 765
spm 46
mw 8.6
vis 27

MD: 4,686'
TVD: 3,669'
Inclination: 77.3°
Azimuth: 365.3°
VS: 1,467.07'

MD: 4,718'
TVD: 3,675.65'
Inclination: 82.2°
Azimuth: 357°
VS: 1,498.5'

MD: 4,749'
TVD: 3,638.75'
Inclination: 86.3°
Azimuth: 358.7°
VS: 1,529.31'

MD: 4,781'
TVD: 3,680.23'
Inclination: 88.4°
Azimuth: 358.9°
VS: 1,561.27'

MD: 4,813'
TVD: 3,681.3'
Inclination: 87.8°
Azimuth: 357.3°
VS: 1,593.23'

MD: 4,844'
TVD: 3,682.19'
Inclination: 88.9°
Azimuth: 356.7°
VS: 1,624.18'

MD: 4,875'
TVD: 3,681.97'
Inclination: 91.9°
Azimuth: 357°
VS: 1,655.13'

Granite:
quartzite.

Granite:
quartzite.

Granite:
quartzite.

Granite:
quartzite.

Granite:
quartzite.

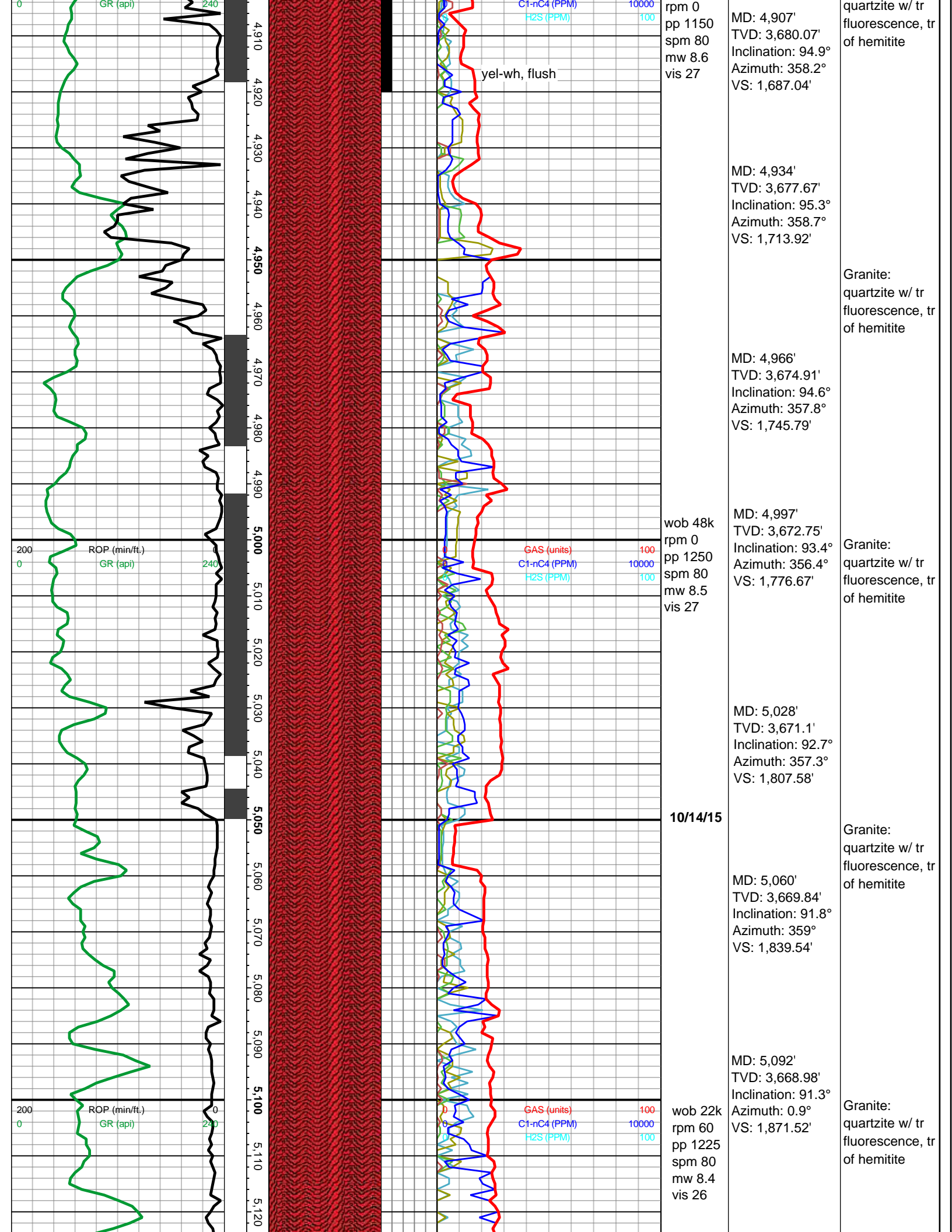
Granite:
quartzite.

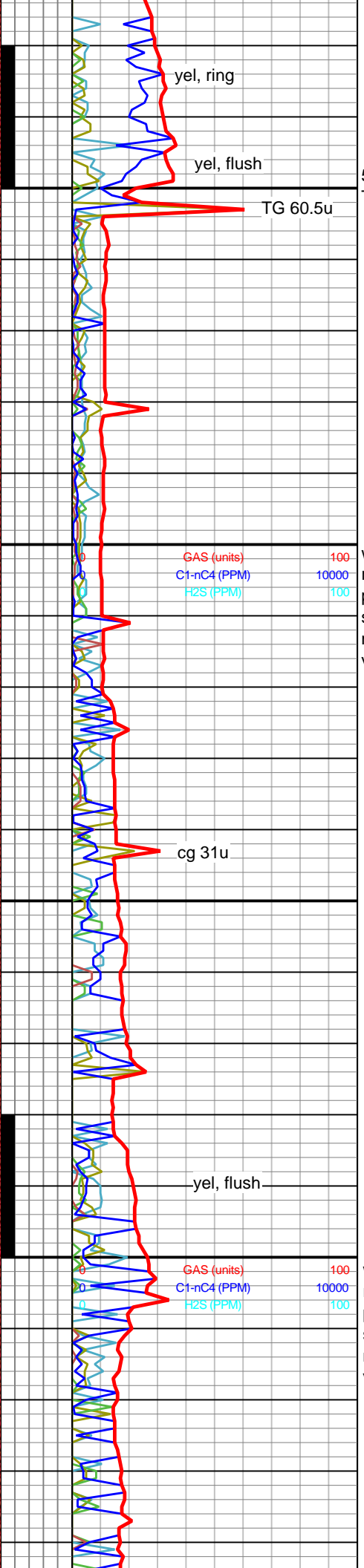
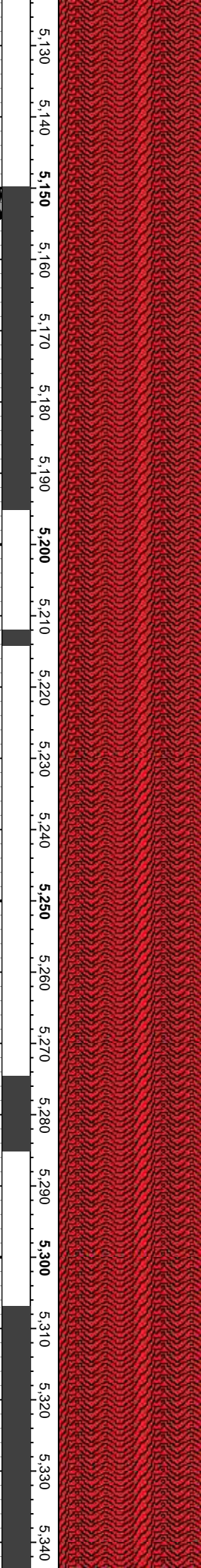
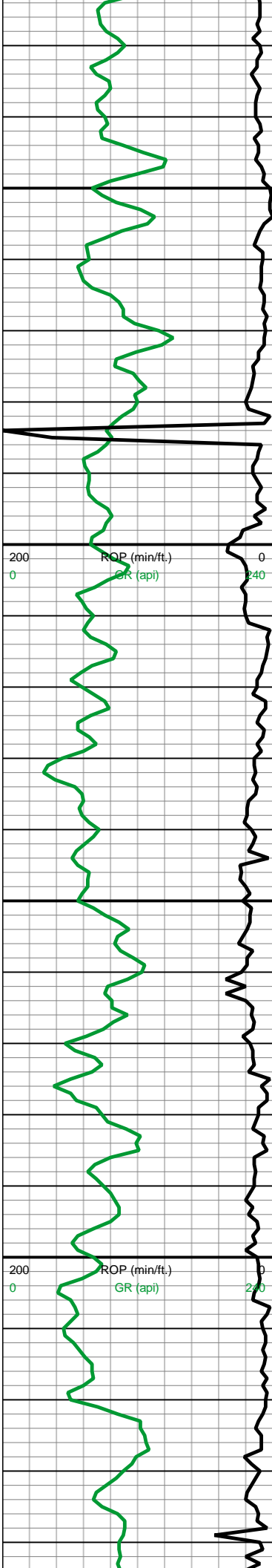
Granite:
quartzite.

GAS (units) 100
C1-nC4 (PPM) 10000
H2S (PPM) 100

GAS (units) 100

yel, ring





5154'
Trip nb#7

10/15/15

wob 54k
rpm 0
pp 1230
spm 80
mw 8.5
vis 26

wob 14k
rpm 60
pp 1200
spm 80
mw 8.4
vis 28

MD: 5,123'
TVD: 3,668.3'
Inclination: 91.1°
Azimuth: 3.3°
VS: 1,902.5'

MD: 5,155'
TVD: 3,667.49'
Inclination: 91.9°
Azimuth: 4.4°
VS: 1,934.4'

MD: 5,186'
TVD: 3,666.17'
Inclination: 93°
Azimuth: 3.6°
VS: 1,965.3'

MD: 5,218'
TVD: 3,664.41'
Inclination: 93.3°
Azimuth: 2.9°
VS: 1,997.2'

MD: 5,249'
TVD: 3,662.62'
Inclination: 93.3°
Azimuth: 3.6°
VS: 2,028.1'

MD: 5,281'
TVD: 3,660.84'
Inclination: 93.1°
Azimuth: 4.6°
VS: 2,059.97'

MD: 5,313'
TVD: 3,658.9'
Inclination: 93.7°
Azimuth: 4.5°
VS: 2,091.8'

MD: 5,344'

yel, ring

yel, flush

TG 60.5u

Granite:
quartzite w/ tr
fluorescence, tr
of hemitite

Granite:
quartzite w/ tr
fluorescence, tr
of hemitite

Granite:
quartzite w/ tr
hornblende

Granite:
quartzite w/ tr
oilstains, tr
fluorescence

yel, ring

yel, flush

TG 60.5u

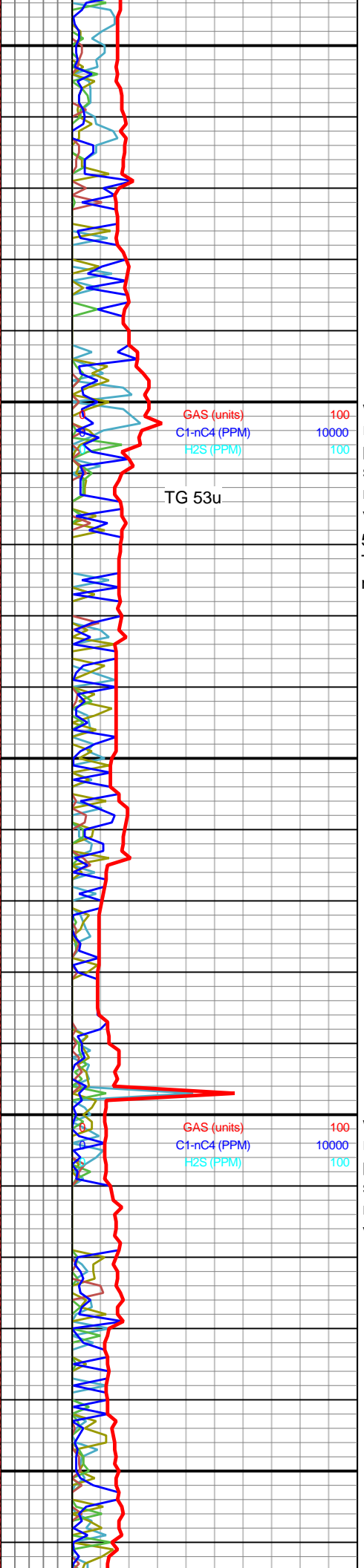
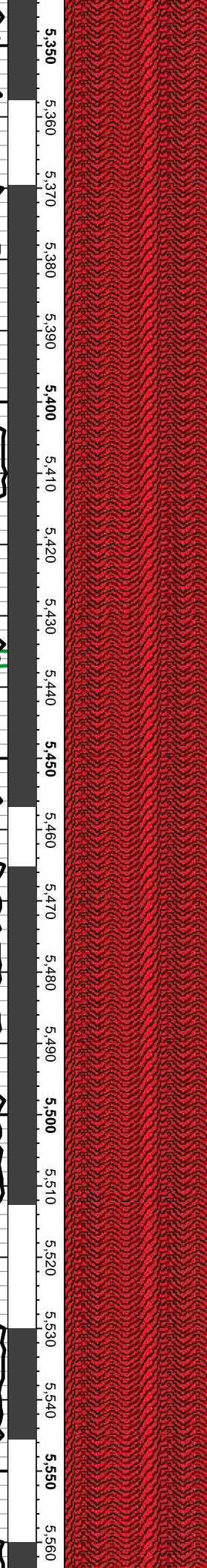
cg 31u

yel, flush

GAS (units)
C1-nC4 (PPM)
H2S (PPM)

100
10000
100

100
10000
100



10/16/15

wob 13k
rpm 0
pp 1140
spm 80
mw 8.4
vis 28
5413'
Trip for nb#8

MD: 5,344'
TVD: 3,656.7'
Inclination: 94.7°
Azimuth: 4.3°
VS: 2,122.6'

MD: 5,376'
TVD: 3,653.8'
Inclination: 95.6°
Azimuth: 4.8°
VS: 2,154.41'

MD: 5,408'
TVD: 3,650.8'
Inclination: 95.1°
Azimuth: 5.4°
VS: 2,186.1'

MD: 5,439'
TVD: 3,648.22'
Inclination: 94.5°
Azimuth: 2.1°
VS: 2,216.9'

MD: 5,471'
TVD: 3,645.62'
Inclination: 94.8°
Azimuth: 0°
VS: 2,248.8'

10/17/15

wob 25k
rpm 0
pp 1190
spm 80
mw 8.5
vis 28

MD: 5,502'
TVD: 3,643.06'
Inclination: 94.7°
Azimuth: 359.2°
VS: 2,279.74'

MD: 5,525'
TVD: 3,641.21'
Inclination: 94.5°
Azimuth: 359°
VS: 2,302.67'

MD: 5,557'
TVD: 3,638.95'
Inclination: 93.6°

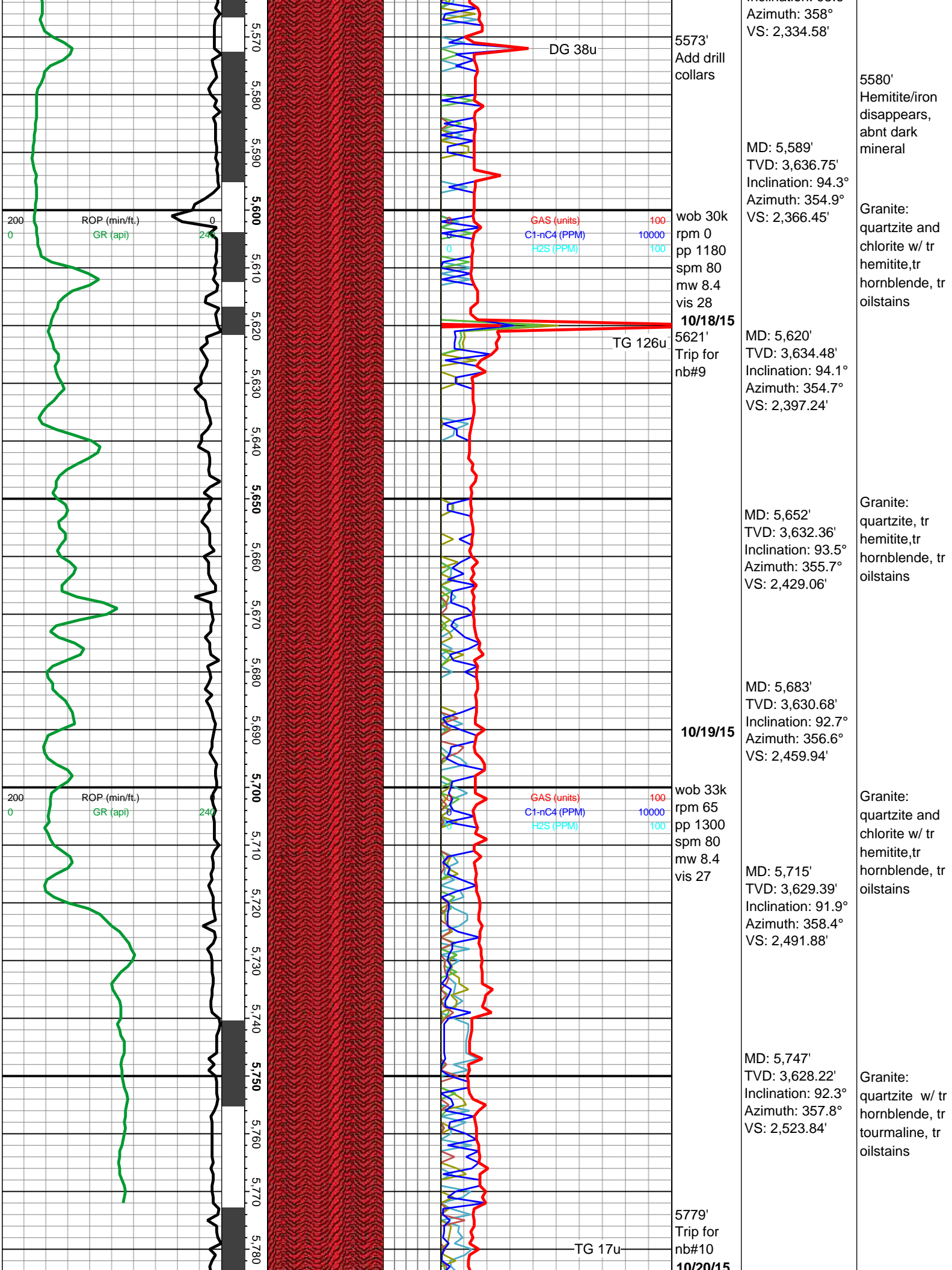
Granite:
quartzite and
chlorite w/ tr
oilstains, tr
fluorescence

Granite:
quartzite and
chlorite w/ tr
oilstains, tr
fluorescence

Granite:
quartzite and
chlorite w/ tr
hemitite, tr
hornblende, tr
oilstains

Granite:
quartzite and
w/ tr hemitite, tr
hornblende, tr
oilstains

Granite:
quartzite wi
hemitite/iron, tr
hornblende, tr
oilstains



Inclination: 358°
Azimuth: 358°
VS: 2,334.58'

DG 38u
5573'
Add drill collars

5580'
Hemitite/iron disappears,
abnt dark mineral

MD: 5,589'
TVD: 3,636.75'
Inclination: 94.3°
Azimuth: 354.9°
VS: 2,366.45'

Granite:
quartzite and
chlorite w/ tr
hemitite, tr
hornblende, tr
oilstains

200 ROP (min/ft)
0 GR (api)

GAS (units) 100
C1-nC4 (PPM) 10000
H2S (PPM) 100

wob 30k
rpm 0
pp 1180
spm 80
mw 8.4
vis 28

10/18/15

TG 126u

5621'
Trip for
nb#9

MD: 5,620'
TVD: 3,634.48'
Inclination: 94.1°
Azimuth: 354.7°
VS: 2,397.24'

Granite:
quartzite, tr
hemitite, tr
hornblende, tr
oilstains

MD: 5,652'
TVD: 3,632.36'
Inclination: 93.5°
Azimuth: 355.7°
VS: 2,429.06'

200 ROP (min/ft)
0 GR (api)

GAS (units) 100
C1-nC4 (PPM) 10000
H2S (PPM) 100

wob 33k
rpm 65
pp 1300
spm 80
mw 8.4
vis 27

10/19/15

MD: 5,683'
TVD: 3,630.68'
Inclination: 92.7°
Azimuth: 356.6°
VS: 2,459.94'

Granite:
quartzite and
chlorite w/ tr
hemitite, tr
hornblende, tr
oilstains

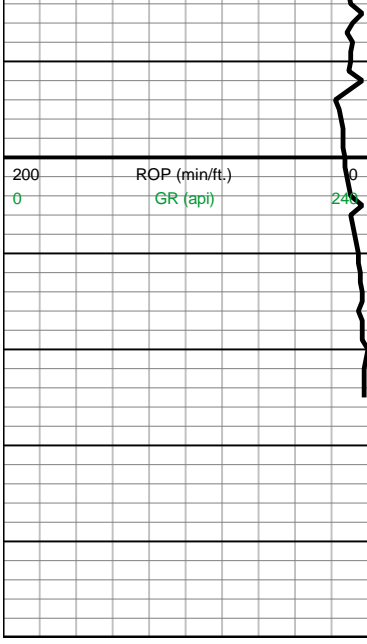
MD: 5,715'
TVD: 3,629.39'
Inclination: 91.9°
Azimuth: 358.4°
VS: 2,491.88'

MD: 5,747'
TVD: 3,628.22'
Inclination: 92.3°
Azimuth: 357.8°
VS: 2,523.84'

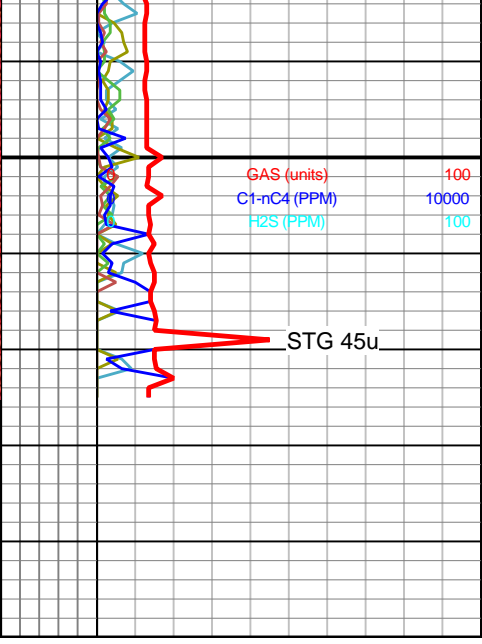
Granite:
quartzite w/ tr
hornblende, tr
tourmaline, tr
oilstains

5779'
Trip for
nb#10
10/20/15

TG 17u



5,790
5,800
5,810
5,820
5,830
5,840
5,8



10/21/15
wob 14k
rpm 60
pp 1500
spm 82
mw 8.5
vis 28
10/21/15
TD @
5825'
Thank
You
TGS

MD: 5,825'
TVD: 3,624.14'
Inclination: 93.7°
Azimuth: 356°
VS: 2,601.74'

Granite:
quartzite w/ tr
hornblende, tr
hemite, tr
oilstains