Décollement
Consulting
Inc.

Scale 1:240 (5"=100') Imperial
Measured Depth Log

Well Name:	**ECGS # 6-19D WPD003-1**
Location:	**SE/SE Sec.6,T11N,R52W Logan County, Colorado**

License Number:	**05-075-09409**	**Region:**	**West Peetz**
Spud Date:	**10/24/2012**	**Drilling Completed:**	**10/28/2012**

Surface Coordinates: 653' FSL, 716' FEL

Bottom Hole
Coordinates:

Ground Elevation (ft):	**4553'**	**K.B. Elevation (ft):**	**4566'**
Logged Interval (ft):	**50' To: 5285'**	**Total Depth (ft):**	**5285'**
Formation:	**Dakota D Sandstone.**		
Type of Drilling Fluid:	**WBM**		

OPERATOR

Company:	**East Cheyenne Gas Storage LLC.**
Address:	**10901 W. Toller Dr. Suite 200**
	Littleton, CO. 80127

GEOLOGIST

Name:	**Leo Carrasco**
Company:	**Decollement Consulting, Inc**
Address:	**13300 Braun Rd.**
	Golden, CO 80401

ROCK TYPES

Cmt	Congl	Salt	Sh--green
Anhy	Dol	Shale	Sh red-brn
Bent	Gyp	Shcol	Sh gy-red
Brec	Igne	Shgy	Shgy
Cht	Lmst	Sltst	Sltst--gray
Clyst	Meta	Ss	Sltst-gy red
Coal	Mrlst	Till	

ACCESSORIES

MINERAL
- Anhy
- Arggrn
- Arg
- Bent
- Bit
- Brecfrag
- Calc
- Carb
- Chtdk
- Chtlt
- Dol
- Feldspar
- Ferrpel
- Ferr
- Glau
- Gyp
- Hvymin
- Kaol
- Marl

- Minxl
- Nodule
- Phos
- Pyr
- Salt
- Sandy
- Silt
- Sil
- Sulphur
- Tuff

FOSSIL
- Algae
- Amph
- Belm
- Bioclst
- Brach
- Bryozoa
- Cephal
- Coral

- Crin
- Echin
- Fish
- Foram
- Fossil
- Gastro
- Oolite
- Ostra
- Pelec
- Pellet
- Pisolite
- Plant
- Strom

STRINGER
- Anhy
- Arg
- Bent
- Coal
- Dol

- Gyp
- Ls
- Mrst
- Sltstrg
- Ssstrg

TEXTURE
- BS Boundst
- C Chalky
- CX Cryxln
- E Earthy
- FX Finexln
- GS Grainst
- L Lithogr
- MX Microxln
- MS Mudst
- PS Packst
- WS Wackest

OTHER SYMBOLS

POROSITY
- E Earthy
- Fenest
- F Fracture
- X Inter
- Moldic
- Organic
- P Pinpoint
- V Vuggy
- Csg shoe right

- Csg shoe left
- Cmt

SORTING
- W Well
- M Moderate
- P Poor

ROUNDING
- R Rounded

- Subrnd
- a Subang
- A Angular

OIL SHOW
- Even
- Spotted
- Ques
- Dead

INTERVAL
- Core
- Dst

EVENT
- Csg shoe right
- Csg shoe left
- Rft
- Sidewall
- Iso-tube

Curve Track 1		Depth	% Lithology	Porosity Type	Porosity	Lithology	Oil Shows	Geological Descriptions	TG,C1-C5
ROP (min/ft)					24% 18% 12% 6%				TG (units) — red
WOB (units)									C1 (ppm) — green
Gamma (API)									C2 (ppm) — blue
									C3 (ppm) — magenta
									C4 (ppm) — brown
									C5 (ppm) — orange

ROP (min/ft) 0 — 2
WOB (units) 0 — 40
Gamma (API) 0 — 150

Decollement Consulting arrived on location and started rigging up 10/24/2012

TG (units) 10 — 100 — 1000
C1 (ppm) 10 — 100 — 1000
C2 (ppm) 10 — 100 — 1000
C3 (ppm) 10 — 100 — 1000
C4 (ppm) 10 — 100 — 1000
C5 (ppm) 1000 — 10e4 — 10e5

Drilling with Freshwater Mud

SS: pred qtzxl, brn, orng, fria, c(l) -c(u), sbrnd-sbang, sl cal, cly mtx.

Dev @ 151' inc 0.8 deg. Azi 288.1
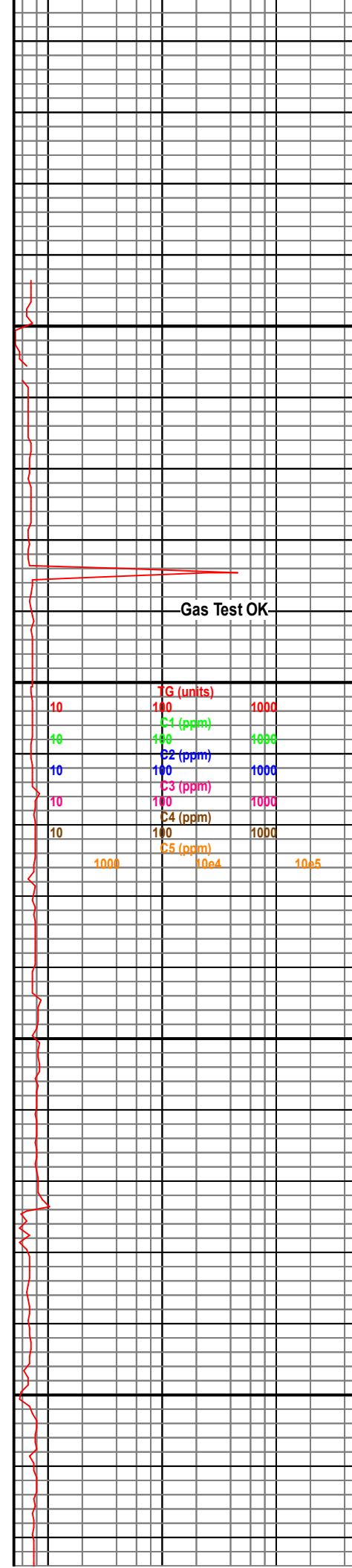
prog. Top White River @ 160'

SS: pred qtzxl, lt brn, orng, fria, c(l) -c(u), sbrnd-sbang, sl cal, cly mtx.

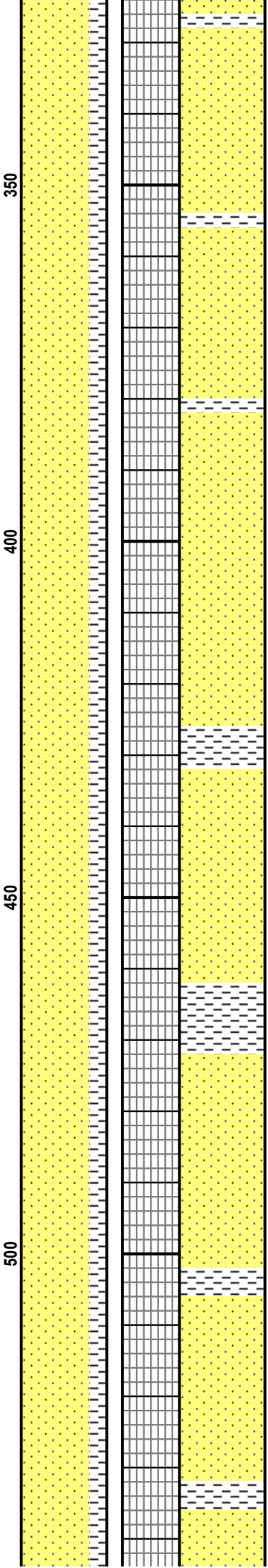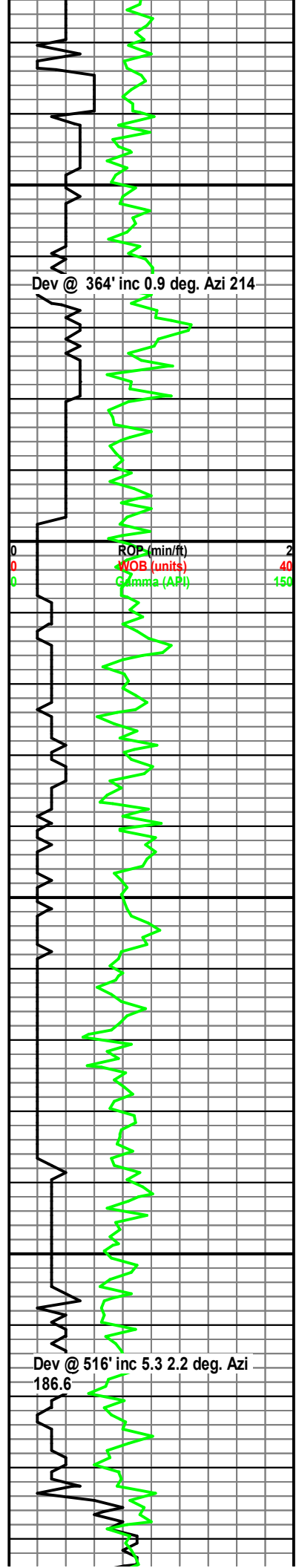SS: pred qtzxl, lt brn, orng, fria, c(l) -c(u), sbrnd-sbang, sl cal, cly mtx.

Gas Test OK

0	ROP (min/ft)	2
0	WOB (units)	40
0	Gamma (API)	150

SS: pred qtzxl, lt brn, orng, fria, c(l) -c(u), sbrnd-sbang, sl cal, cly mtx.

	TG (units)	
10	100	1000
	C1 (ppm)	
10	100	1000
	C2 (ppm)	
10	100	1000
	C3 (ppm)	
10	100	1000
	C4 (ppm)	
10	100	1000
	C5 (ppm)	
1000	10e4	10e5

MND @ 237' 10/25/2012

prog. Top Laramie @ 240'

SS: pred qtzxl, wh, orng, fria, f(u) -m(l), sbrnd-sbang, sl cal, cly mtx.

Dev @ 272' inc 0.8 deg. Azi 256.8

SS: pred qtzxl, wh, orng, fria, f(u) -m(l), sbrnd-sbang, sl cal, cly mtx.

150

200

250

300

Track 1 (curve scale labels)

0	ROP (min/ft)	2
0	WOB (units)	40
0	Gamma (API)	150

Dev @ 364' inc 0.9 deg. Azi 214

Dev @ 516' inc 5.3 2.2 deg. Azi 186.6

Depth column

350
400
450
500

Lithology descriptions

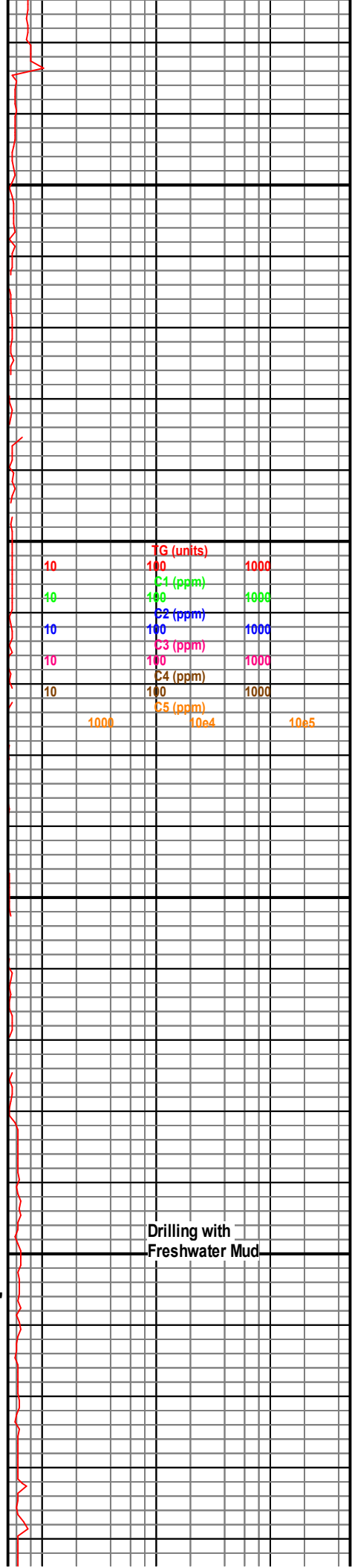SS: pred qtzxl, wh, orng, fria, f(u) -m(l), sbrnd-sbang, sl cal, cly mtx.

CLYST: yel, sl sdy, sl calc, plas, rthy.

SS: pred qtzxl, wh, orng, fria, f(u) -m(l), sbrnd-sbang, sl cal, cly mtx.

CLYST: yel, sl sdy, sl calc, plas, rthy.

prog. Fox Hills Shale @ 510'

SS: pred qtzxl, wh, orng, fria, f(u) -m(l),

Gas track (curve scale labels)

	TG (units)	
10	100	1000
	C1 (ppm)	
10	100	1000
	C2 (ppm)	
10	100	1000
	C3 (ppm)	
10	100	1000
	C4 (ppm)	
10	100	1000
	C5 (ppm)	
1000	10e4	10e5

Drilling with Freshwater Mud

sbrnd-sbang, sl cal, cly mtx.

WOB 20
RPM 0
PP 1033
SPM 120

SH: lt gy, sft , sbblky - plty, sl calc, w/ SLTST, lt-gy, fri, tr vf gr sd, sl calc, lt gy cly mtx, intb w/SS lt gy, mod firm, f(u)gr, sbang -sbrnd, shly mtx, p srt, sl calc cmt, p por, tr pry.

prog. Fox Hills Sandstone @ 595'

SH: lt gy, sft , sbblky - plty, sl calc, w/ SLTST, lt-gy, fri, tr vf gr sd, sl calc, lt gy cly mt
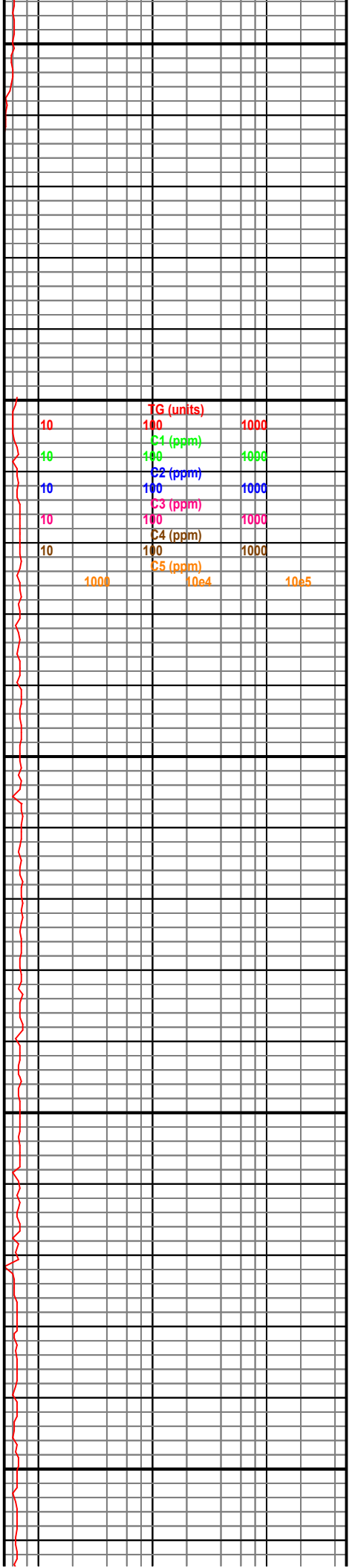
SH: lt gy, sft , sbblky - plty, sl calc, w/ SLTST, lt-gy, fri, tr vf gr sd, sl calc, lt gy cly mtx.

Sliding

Dev @ 758' inc 2.3 deg. Azi 181.6

0	ROP (min/ft)	2
0	WOB (units)	40
0	Gamma (API)	150

10	TG (units) 100	1000
10	C1 (ppm) 100	1000
10	C2 (ppm) 100	1000
10	C3 (ppm) 100	1000
10	C4 (ppm) 100	1000
1000	C5 (ppm) 10e4	10e5

550
600
650
700
750

Track 1 (Drilling Parameters)

0	ROP (min/ft)	2
0	WOB (units)	40
0	Gamma (API)	150

WT 8.3
Vis 42

Dev @ 914' inc 2.6 deg. Azi 187.2

Depth markers: 800, 850, 900, 950

Lithology Descriptions
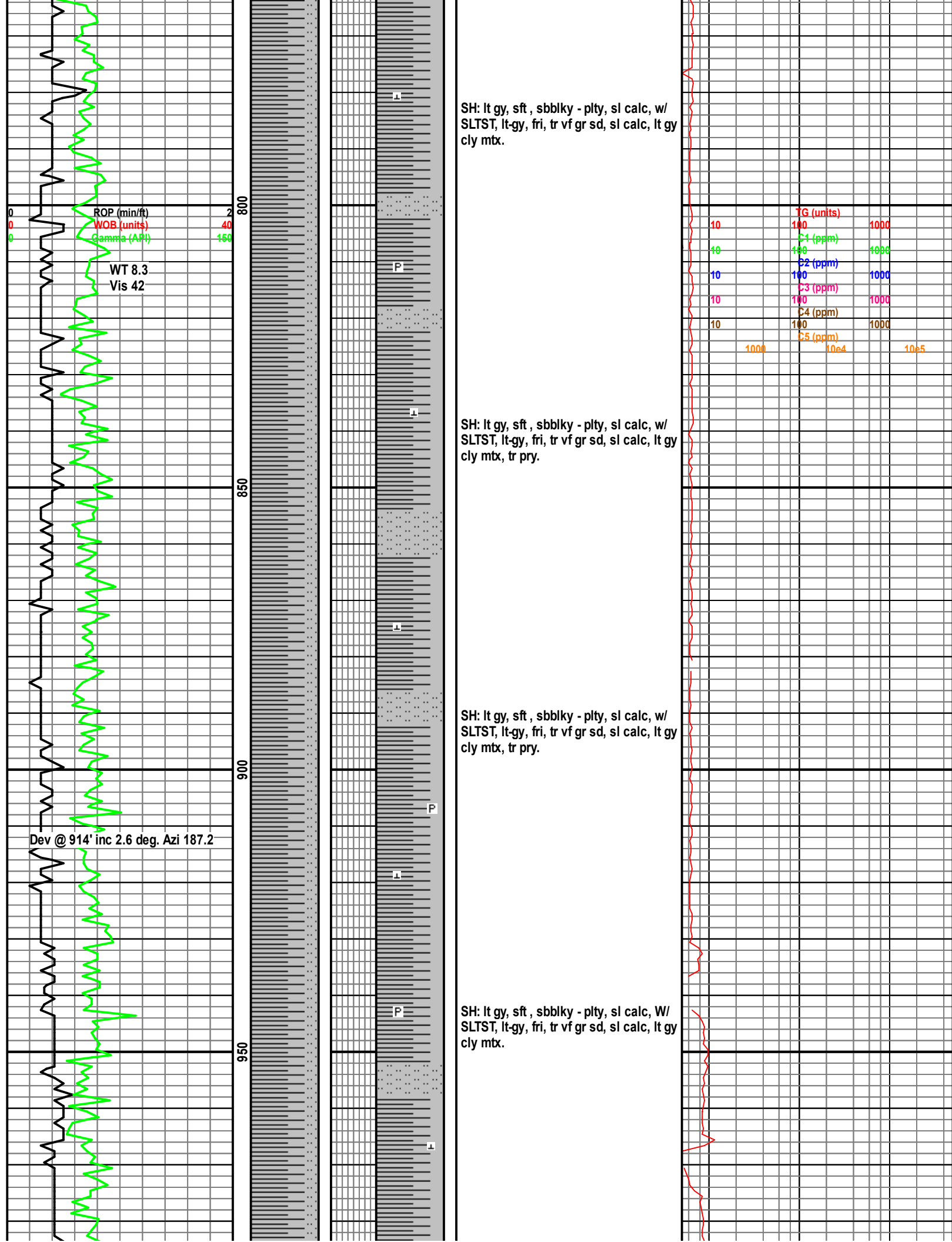
SH: lt gy, sft , sbblky - plty, sl calc, w/ SLTST, lt-gy, fri, tr vf gr sd, sl calc, lt gy cly mtx.

SH: lt gy, sft , sbblky - plty, sl calc, w/ SLTST, lt-gy, fri, tr vf gr sd, sl calc, lt gy cly mtx, tr pry.
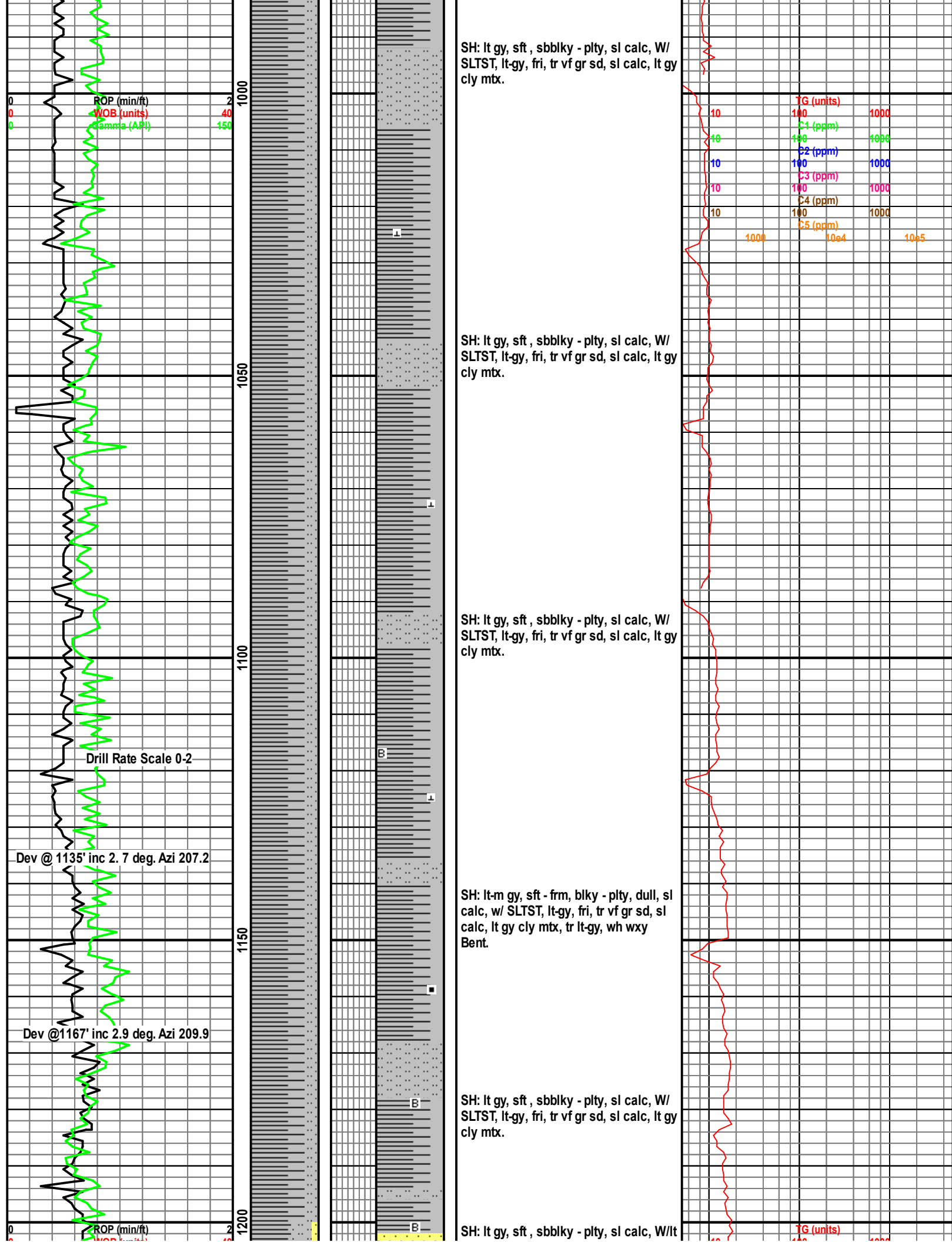
SH: lt gy, sft , sbblky - plty, sl calc, w/ SLTST, lt-gy, fri, tr vf gr sd, sl calc, lt gy cly mtx, tr pry.

SH: lt gy, sft , sbblky - plty, sl calc, W/ SLTST, lt-gy, fri, tr vf gr sd, sl calc, lt gy cly mtx.

Gas Track

10	TG (units)	1000
	100	
10	C1 (ppm)	1000
	100	
10	C2 (ppm)	1000
	100	
10	C3 (ppm)	1000
	100	
10	C4 (ppm)	1000
	100	
	C5 (ppm)	
1000	10e4	10e5

Track 1 (Drilling / Gamma)

Scale header:
- 0 — ROP (min/ft) — 2
- 0 — WOB (units) — 40
- 0 — Gamma (API) — 150

Depth markers: 1000, 1050, 1100, 1150, 1200

Annotations:
- Drill Rate Scale 0-2
- Dev @ 1135' inc 2. 7 deg. Azi 207.2
- Dev @1167' inc 2.9 deg. Azi 209.9

Repeated scale header (near 1200):
- 0 — ROP (min/ft) — 2
- 0 — WOB (units) — 40
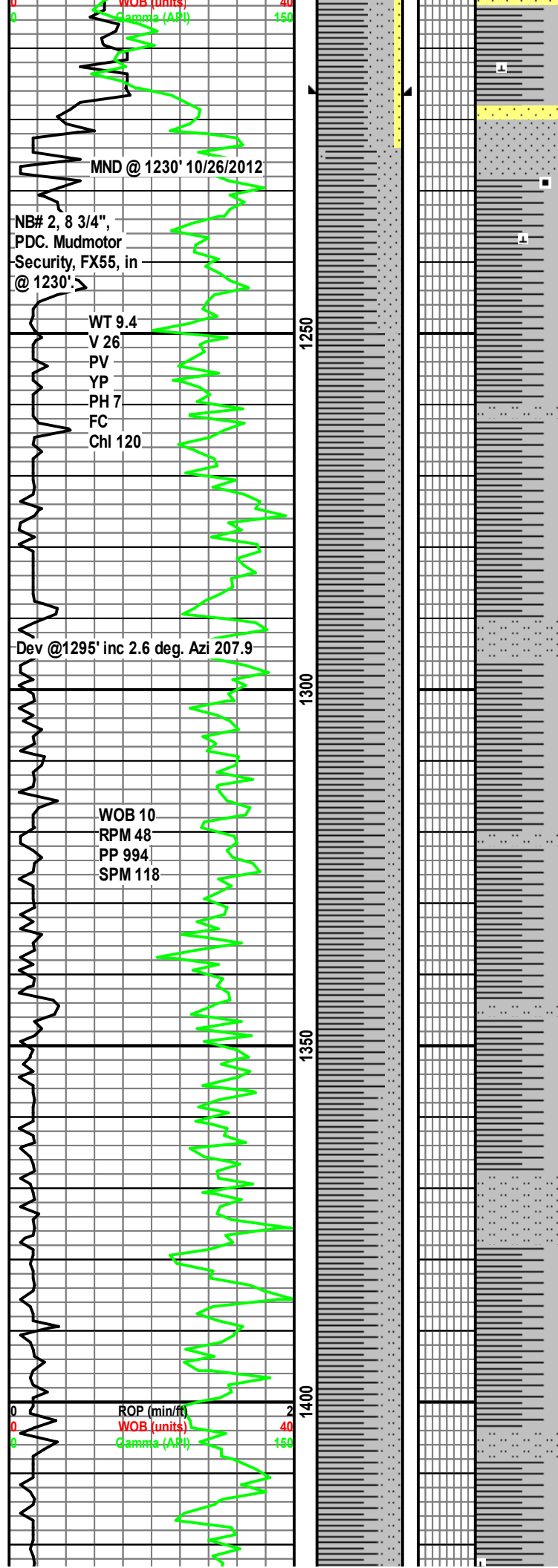- 0 — Gamma (API) — 150

Lithology descriptions

SH: lt gy, sft , sbblky - plty, sl calc, W/ SLTST, lt-gy, fri, tr vf gr sd, sl calc, lt gy cly mtx.

SH: lt gy, sft , sbblky - plty, sl calc, W/ SLTST, lt-gy, fri, tr vf gr sd, sl calc, lt gy cly mtx.

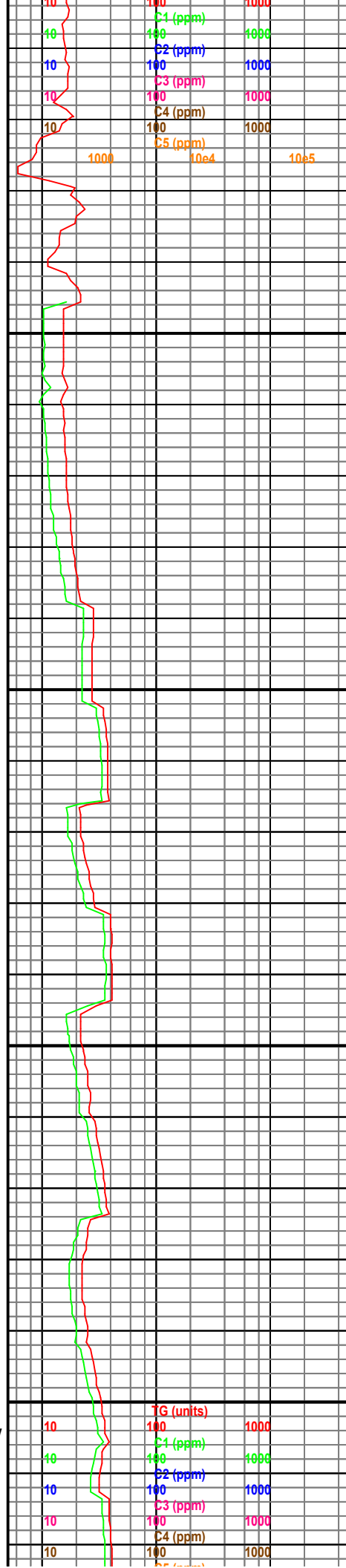SH: lt gy, sft , sbblky - plty, sl calc, W/ SLTST, lt-gy, fri, tr vf gr sd, sl calc, lt gy cly mtx.

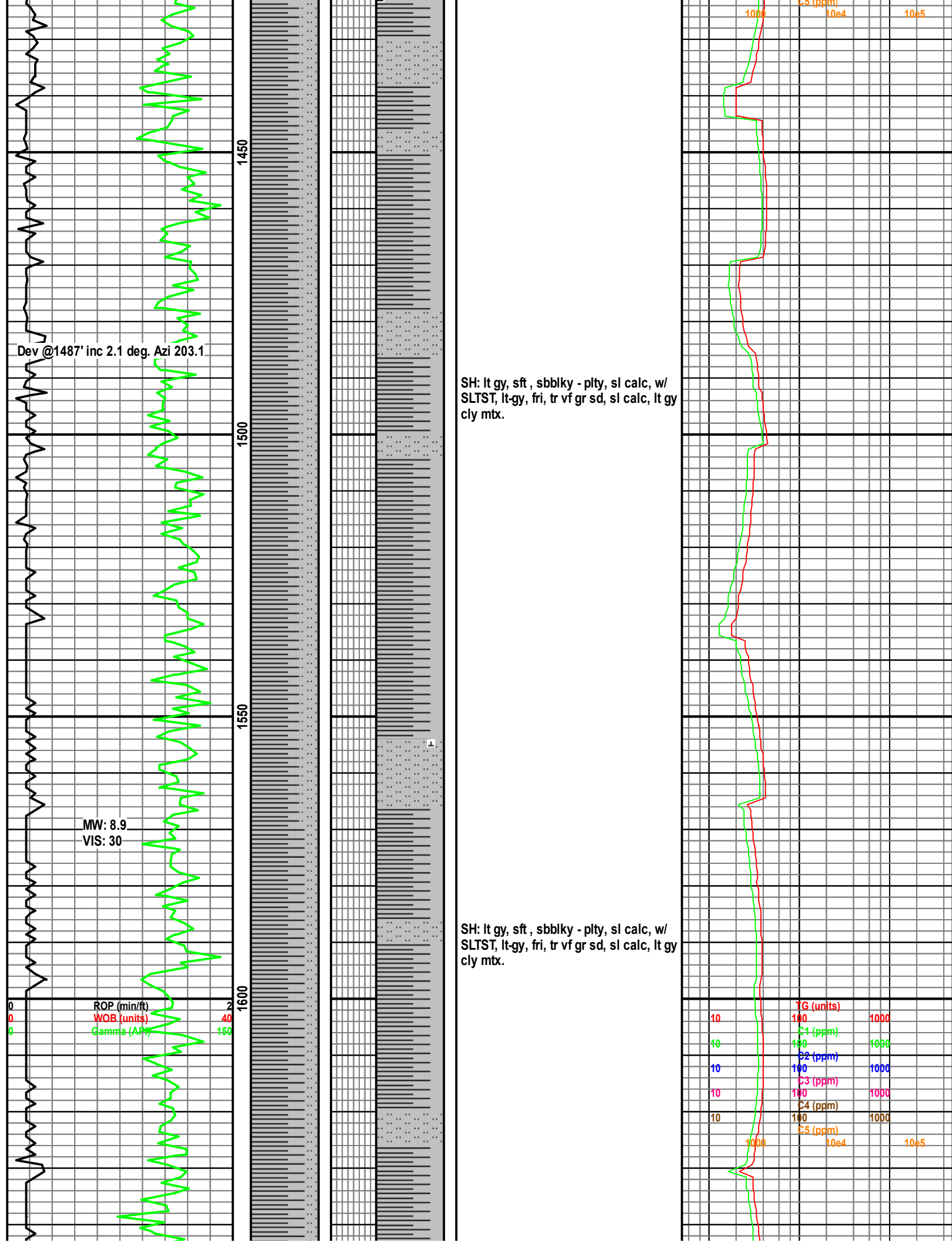SH: lt-m gy, sft - frm, blky - plty, dull, sl calc, w/ SLTST, lt-gy, fri, tr vf gr sd, sl calc, lt gy cly mtx, tr lt-gy, wh wxy Bent.

SH: lt gy, sft , sbblky - plty, sl calc, W/ SLTST, lt-gy, fri, tr vf gr sd, sl calc, lt gy cly mtx.

SH: lt gy, sft , sbblky - plty, sl calc, W/lt

Gas track

Scale header:
- TG (units)
- 10 — 100 — 1000 — C1 (ppm)
- 10 — 100 — 1000 — C2 (ppm)
- 10 — 100 — 1000 — C3 (ppm)
- 10 — 100 — 1000 — C4 (ppm)
- 10 — 100 — 1000 — C5 (ppm)
- 1000 — 10e4 — 10e5

Repeated near 1200:
- TG (units)

This is a mud log / well log with multiple tracks.

Left track (drilling parameters):

- Gamma (API)
- WOB (units) 40 / 150
- MND @ 1230' 10/26/2012
- NB# 2, 8 3/4",
  PDC. Mudmotor
  Security, FX55, in
  @ 1230'.
- WT 9.4
- V 26
- PV
- YP
- PH 7
- FC
- Chl 120
- Dev @1295' inc 2.6 deg. Azi 207.9
- WOB 10
  RPM 48
  PP 994
  SPM 118
- 0   ROP (min/ft)   2
- 0   WOB (units)   40
- Gamma (API)   150

Depth track: 1250, 1300, 1350, 1400

Description / lithology track (top to bottom):

gy, lt brn, mod firm, f(u)-m(l) gr,
sbang-sbrnd, shly mtx, p srt, sl calc
cmt, p por SS.
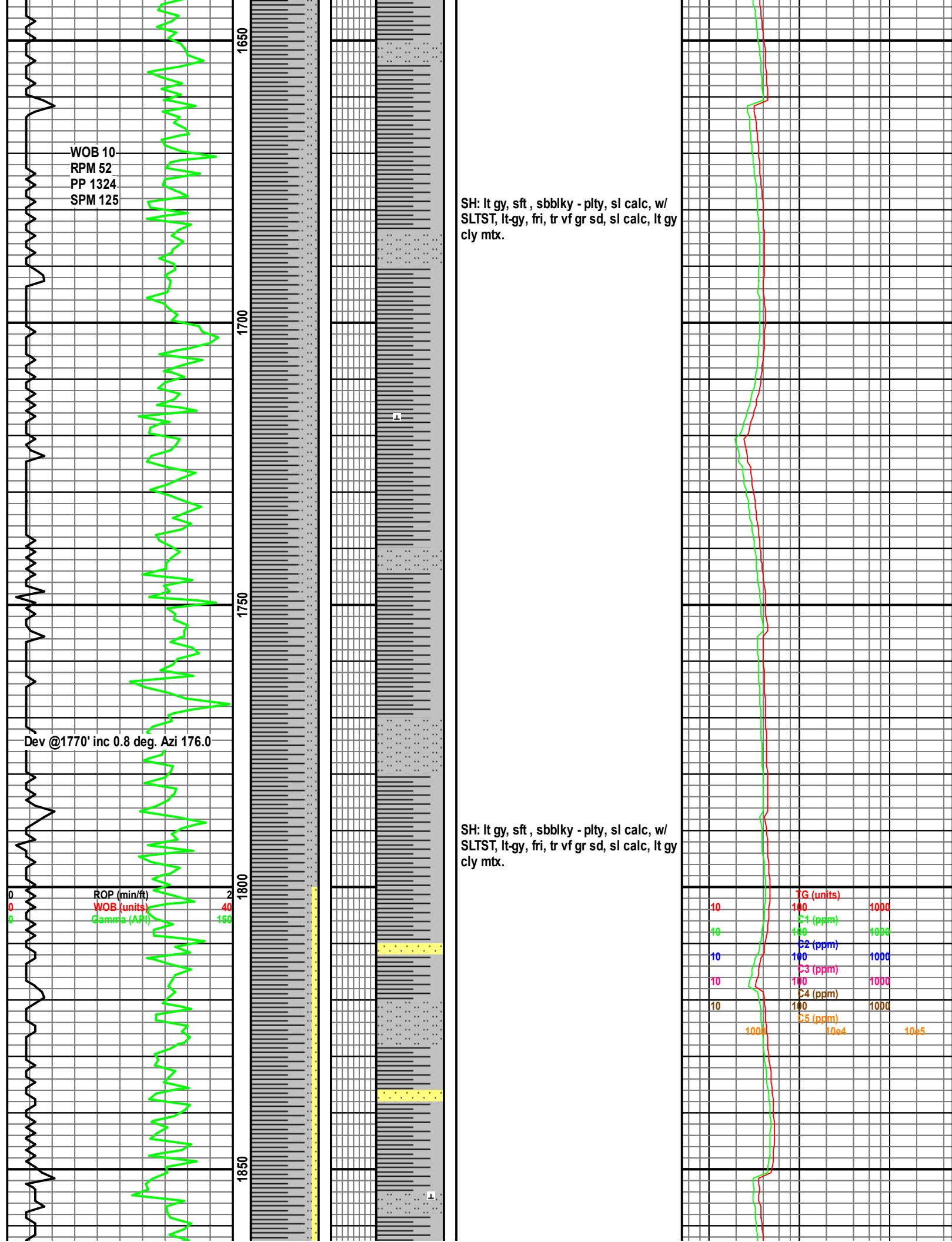
Set 9 5/8" casing at 1216'

Top Pierre @ 1220' MD.

SH: lt-m gy, sft - frm, blky - plty, dull, sl
calc, w/ SLTST, lt-gy, fri, tr vf gr sd, sl
calc, lt gy cly mtx.

SH: lt-m gy, sft - frm, blky - plty, dull, sl
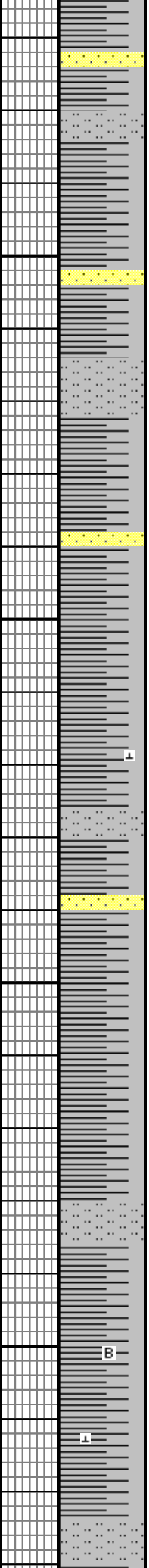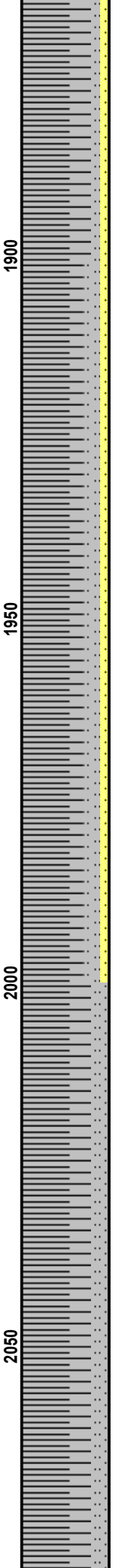calc, w/ SLTST, lt-gy, fri, tr vf gr sd, sl
calc, lt gy cly mtx.

SH: lt-m gy, sft - frm, blky - plty, dull, sl
calc, w/ SLTST, lt-gy, fri, tr vf gr sd, sl
calc, lt gy cly mtx.

SH: lt gy, sft , sbblky - plty, sl calc, w/
SLTST, lt-gy, fri, tr vf gr sd, sl calc, lt gy
cly mtx.

Right track (gas chromatography):

- C1 (ppm) 10 / 100 / 1000
- C2 (ppm) 10 / 100 / 1000
- C3 (ppm) 10 / 100 / 1000
- C4 (ppm) 10 / 100 / 1000
- C5 (ppm) 10 / 100 / 1000
- 1000 / 10e4 / 10e5
- TG (units) 10 / 100 / 1000
- C1 (ppm) 10 / 100 / 1000
- C2 (ppm) 10 / 100 / 1000
- C3 (ppm) 10 / 100 / 1000
- C4 (ppm) 10 / 100 / 1000

Dev @1487' inc 2.1 deg. Azi 203.1

1450

SH: lt gy, sft , sbblky - plty, sl calc, w/
SLTST, lt-gy, fri, tr vf gr sd, sl calc, lt gy
cly mtx.

1500

MW: 8.9
VIS: 30

1550

SH: lt gy, sft , sbblky - plty, sl calc, w/
SLTST, lt-gy, fri, tr vf gr sd, sl calc, lt gy
cly mtx.

1600

	ROP (min/ft)	2
0	WOB (units)	40
0	Gamma (API)	150

	TG (units)	
10	100	1000
	C1 (ppm)	
10	100	1000
	C2 (ppm)	
10	100	1000
	C3 (ppm)	
10	100	1000
	C4 (ppm)	
10	100	1000
	C5 (ppm)	
1000	10e4	10e5

WOB 10
RPM 52
PP 1324
SPM 125

Dev @1770' inc 0.8 deg. Azi 176.0

SH: lt gy, sft , sbblky - plty, sl calc, w/
SLTST, lt-gy, fri, tr vf gr sd, sl calc, lt gy
cly mtx.

SH: lt gy, sft , sbblky - plty, sl calc, w/
SLTST, lt-gy, fri, tr vf gr sd, sl calc, lt gy
cly mtx.

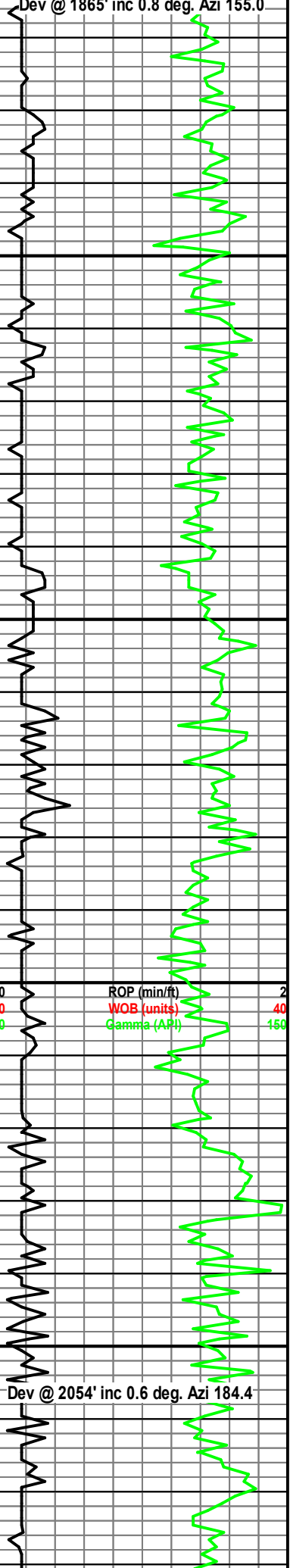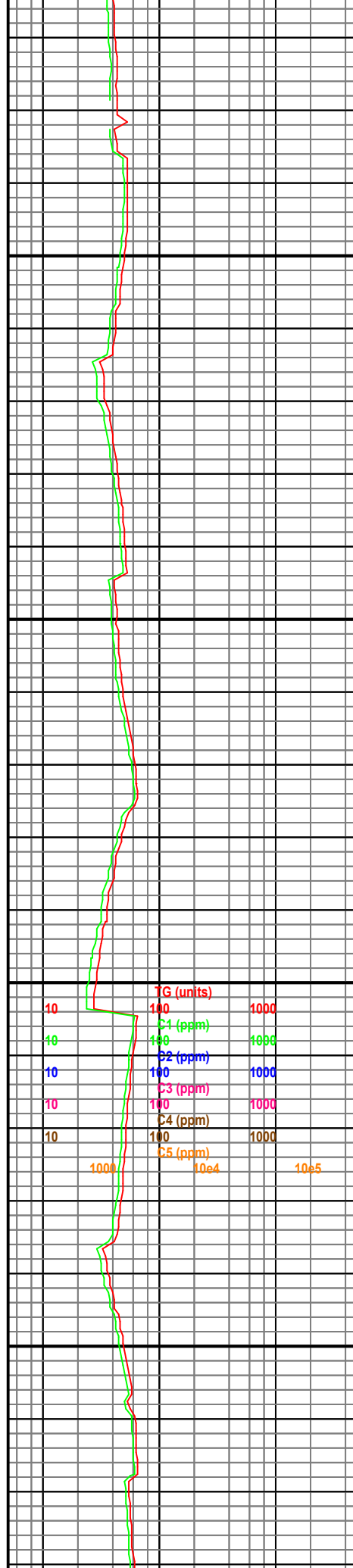Depth scale: 1650, 1700, 1750, 1800, 1850

0	ROP (min/ft)	2
0	WOB (units)	40
0	Gamma (API)	150

	TG (units)	
10	100	1000
	C1 (ppm)	
10	100	1000
	C2 (ppm)	
10	100	1000
	C3 (ppm)	
10	100	1000
	C4 (ppm)	
10	100	1000
	C5 (ppm)	
1000	10e4	10e5

Dev @ 1865' inc 0.8 deg. Azi 155.0

1900

1950

2000

2050

Dev @ 2054' inc 0.6 deg. Azi 184.4

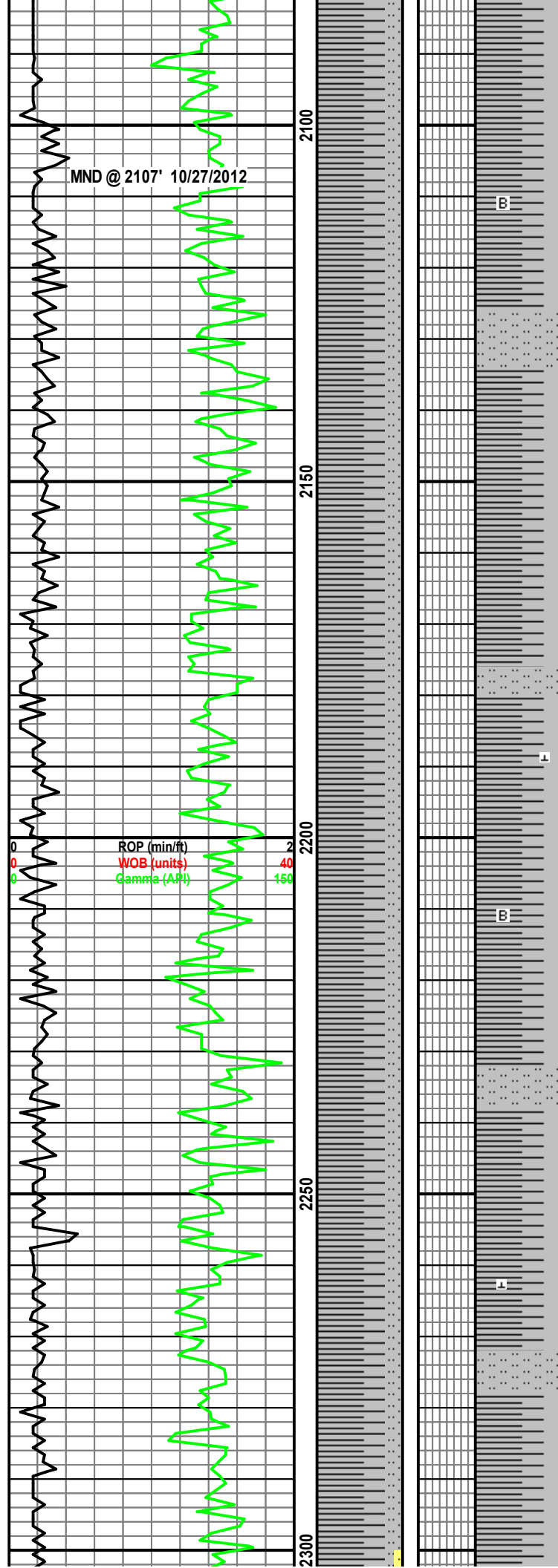0 | ROP (min/ft) | 2
0 | WOB (units) | 40
0 | Gamma (API) | 150

SH: lt gy, sft-frm, blky - plty, dull, sl calc. SS: lt gy, lt brn, mod firm, fri ip, vf(u)- f(l) gr, sbang- sbrnd, shly mtx, p srt, sl calc cmt, p por.

SH: lt gy, sft-frm, blky - plty, dull, sl calc. SS: lt gy, lt brn, mod firm, fri ip, vf(u)- f(l) gr, sbang- sbrnd, shly mtx, p srt, sl calc cmt, p por.

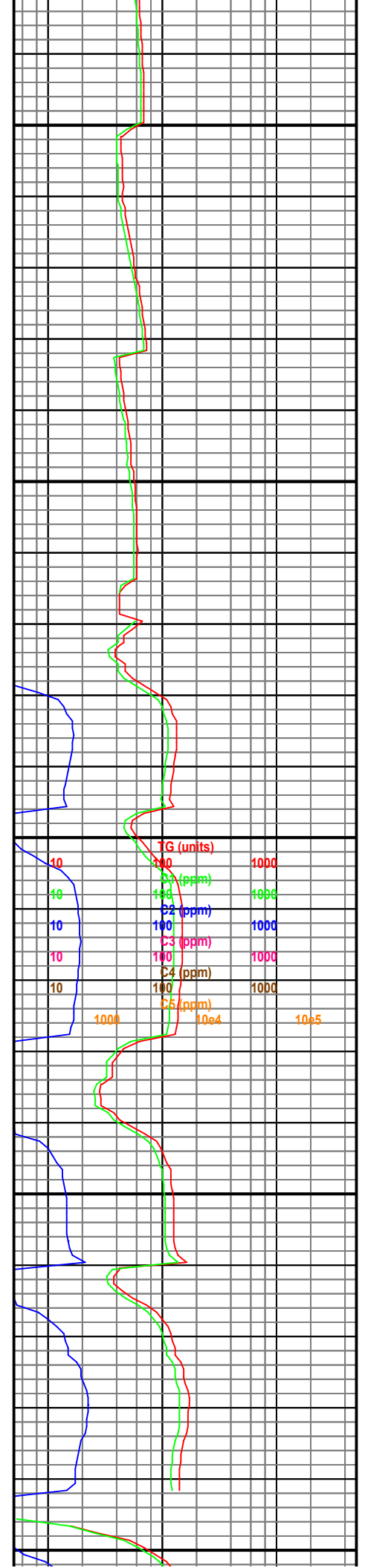| | | TG (units) | |
10	100		1000
		C1 (ppm)	
10	100		1000
		C2 (ppm)	
10	100		1000
		C3 (ppm)	
10	100		1000
		C4 (ppm)	
10	100		1000
		C5 (ppm)	
1000	10e4		10e5

MND @ 2107' 10/27/2012

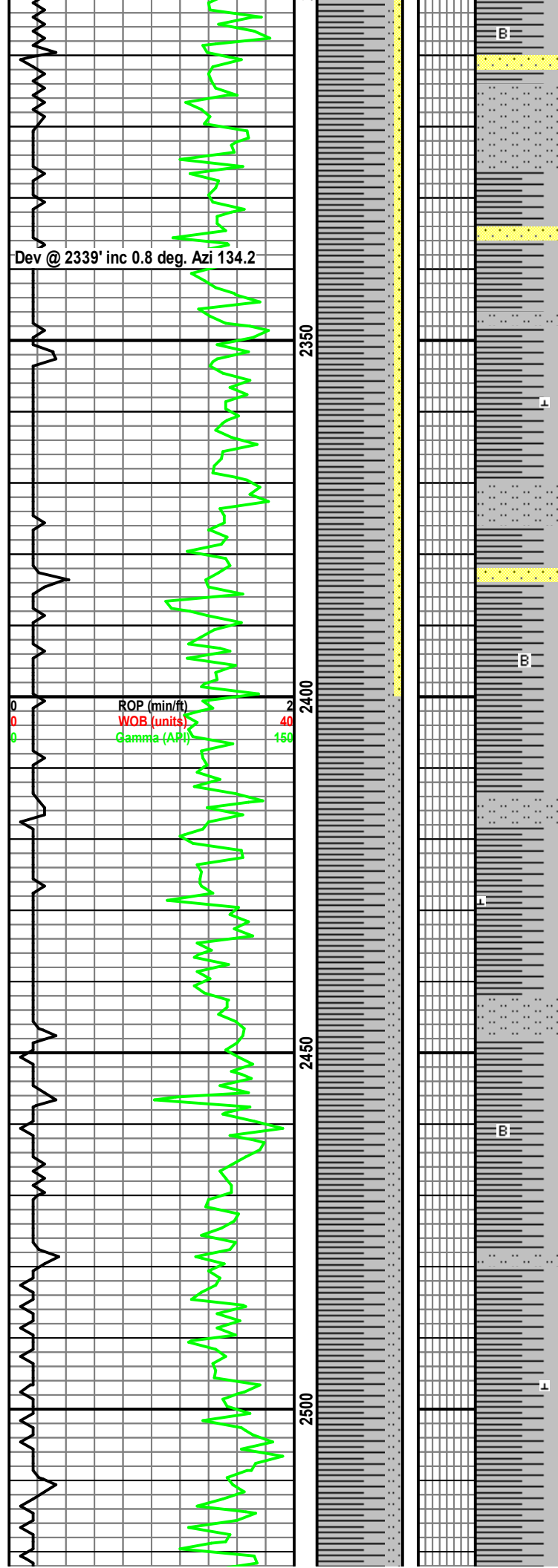| 0	ROP (min/ft)	2
0	WOB (units)	40
0	Gamma (API)	150

SH: m gy, sft - frm, blky - plty, dull, sl
calc, w/ SLTST, lt-gy, fri, tr vf gr sd, sl
calc, lt gy cly mtx, tr lt-gy, wh wxy
Bent.

SH: m gy, sft - frm, blky - plty, dull, sl
calc, w/ SLTST, lt-gy, fri, tr vf gr sd, sl
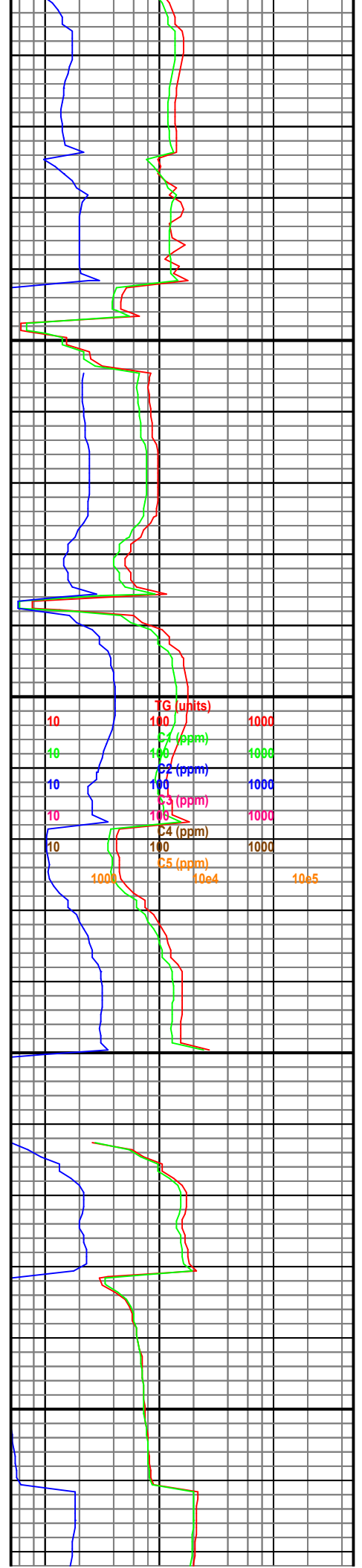calc, lt gy cly mtx, tr lt-gy, wh wxy
Bent.

SH: m gy, sft - frm, blky - plty, dull, sl
calc, w/ SLTST, lt-gy, fri, tr vf gr sd, sl
calc, lt gy cly mtx, tr lt-gy, wh wxy
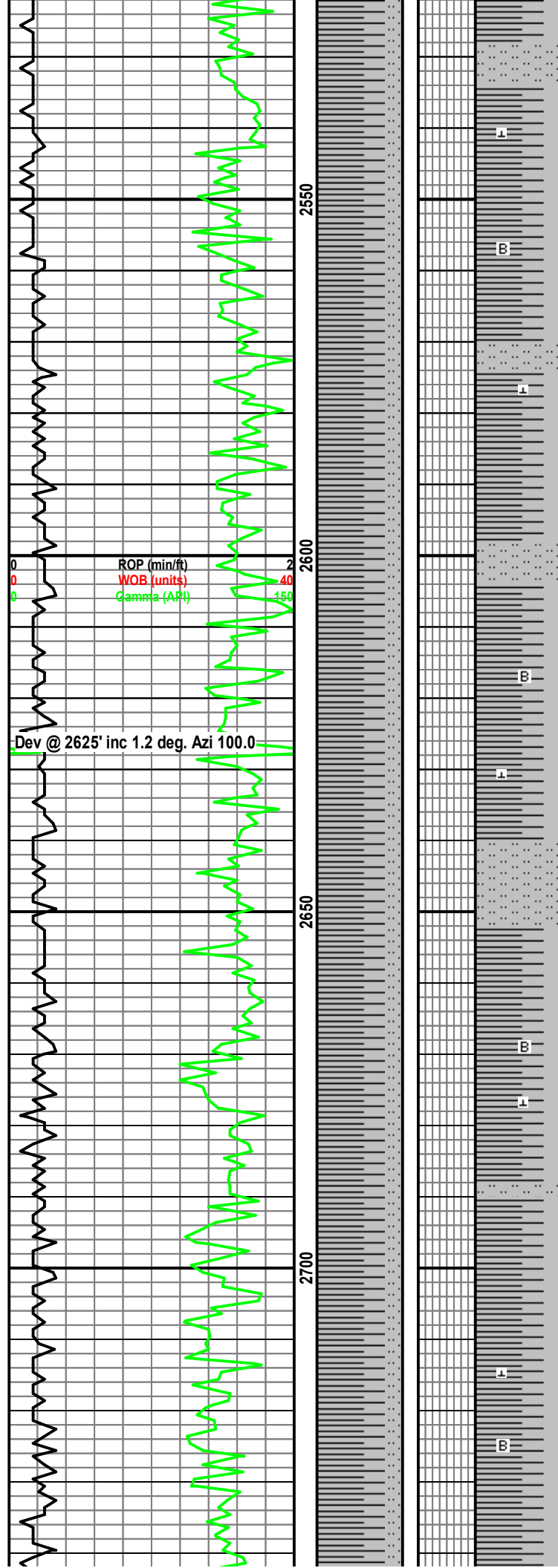Bent.

10	TG (units) 100	1000
10	C1 (ppm) 100	1000
10	C2 (ppm) 100	1000
10	C3 (ppm) 100	1000
10	C4 (ppm) 100	1000
1000	C5 (ppm) 10e4	10e5

2100

2150

2200

2250

2300

Dev @ 2339' inc 0.8 deg. Azi 134.2

2350

2400

2450

2500

0   ROP (min/ft)   2
0   WOB (units)   40
0   Gamma (API)   150

B

B

B

B

SH: lt gy, sft-frm, blky - plty, dull, sl
calc. SS: lt gy, lt brn, mod firm, fri ip,
vf(u)- f(l) gr, sbang- sbrnd, shly mtx, p
srt, sl calc cmt, p por.

SH: m gy, sft - frm, blky - plty, dull, sl
calc, w/ SLTST, lt-gy, fri, tr vf gr sd, sl
calc, lt gy cly mtx, tr lt-gy, wh wxy
Bent.

10   TG (units)
                100   1000
10   C1 (ppm)
                100   1000
10   C2 (ppm)
                100   1000
10   C3 (ppm)
                100   1000
10   C4 (ppm)
                100   1000
          C5 (ppm)
1000   10e4   10e5

ROP (min/ft)
0 2
WOB (units)
0 40
Gamma (API)
0 150

Dev @ 2625' inc 1.2 deg. Azi 100.0

2550

2600

2650

2700

SH: m gy, sft - frm, blky - plty, dull, sl
calc, w/ SLTST, lt-gy, fri, tr vf gr sd, sl
calc, lt gy cly mtx, tr lt-gy, wh wxy
Bent.

SH: m gy, sft - frm, blky - plty, dull, sl
calc, w/ SLTST, lt-gy, fri, tr vf gr sd, sl
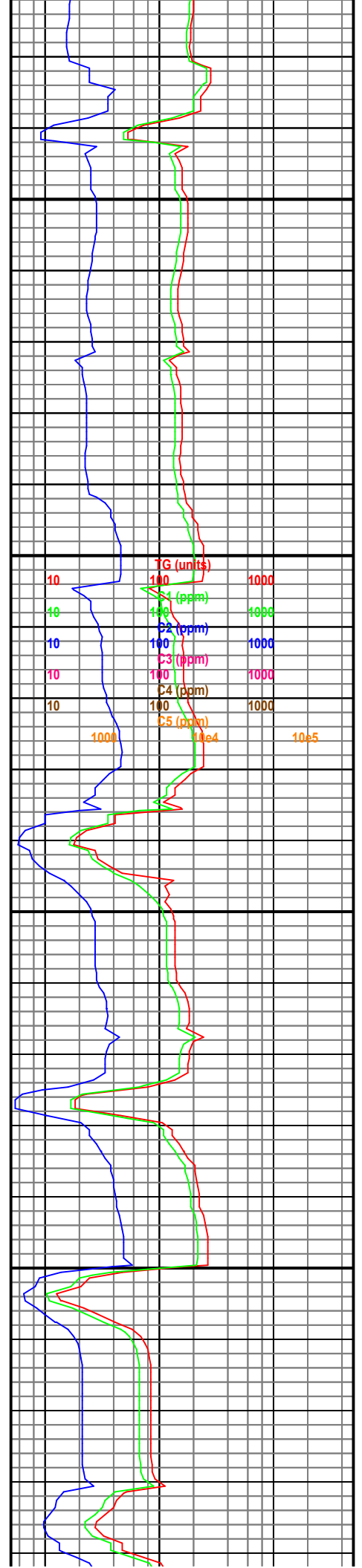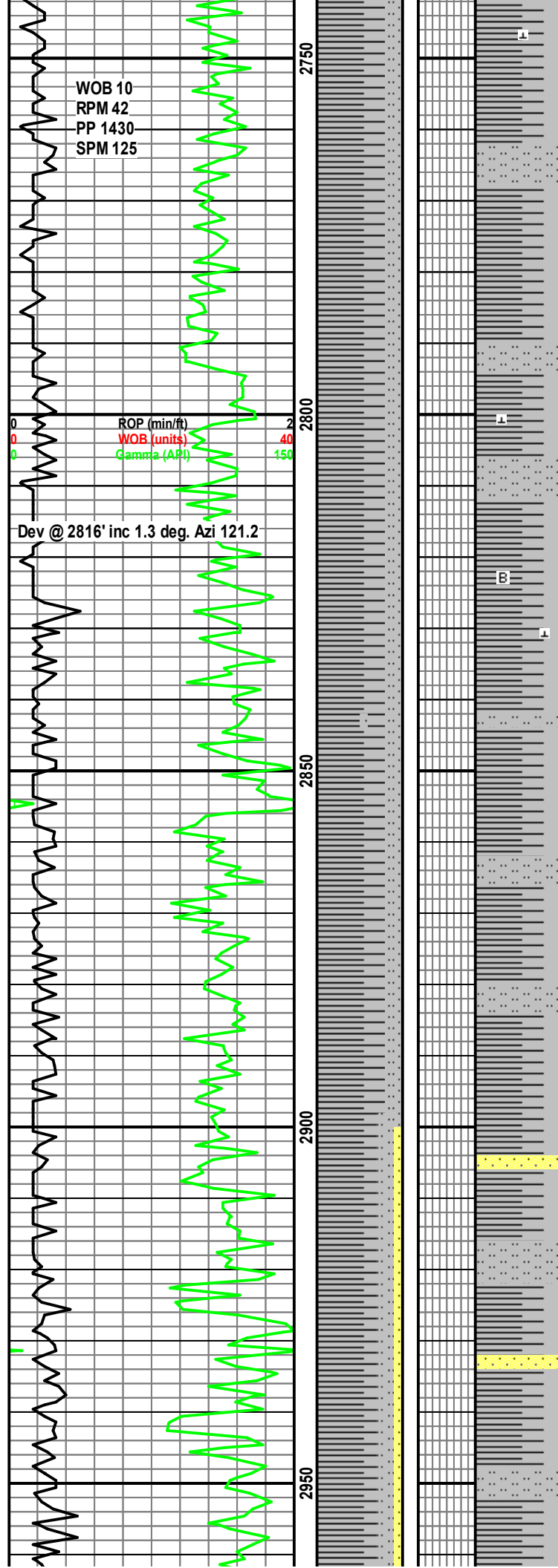calc, lt gy cly mtx, tr lt-gy, wh wxy
Bent.

TG (units)
10 .... 100 1000
C1 (ppm)
10 .... 100 1000
C2 (ppm)
10 .... 100 1000
C3 (ppm)
10 .... 100 1000
C4 (ppm)
10 .... 100 1000
C5 (ppm)
1000 .... 10e4 .... 10e5

WOB 10
RPM 42
PP 1430
SPM 125

0	ROP (min/ft)	2
0	WOB (units)	40
0	Gamma (API)	150

Dev @ 2816' inc 1.3 deg. Azi 121.2

2750

2800

2850

2900

2950

Cleand Gas Line

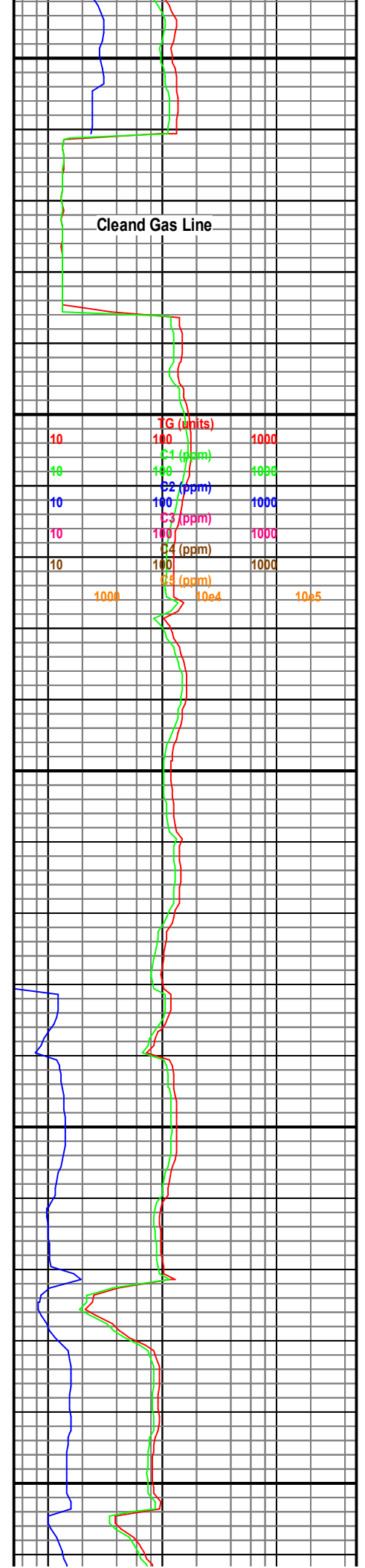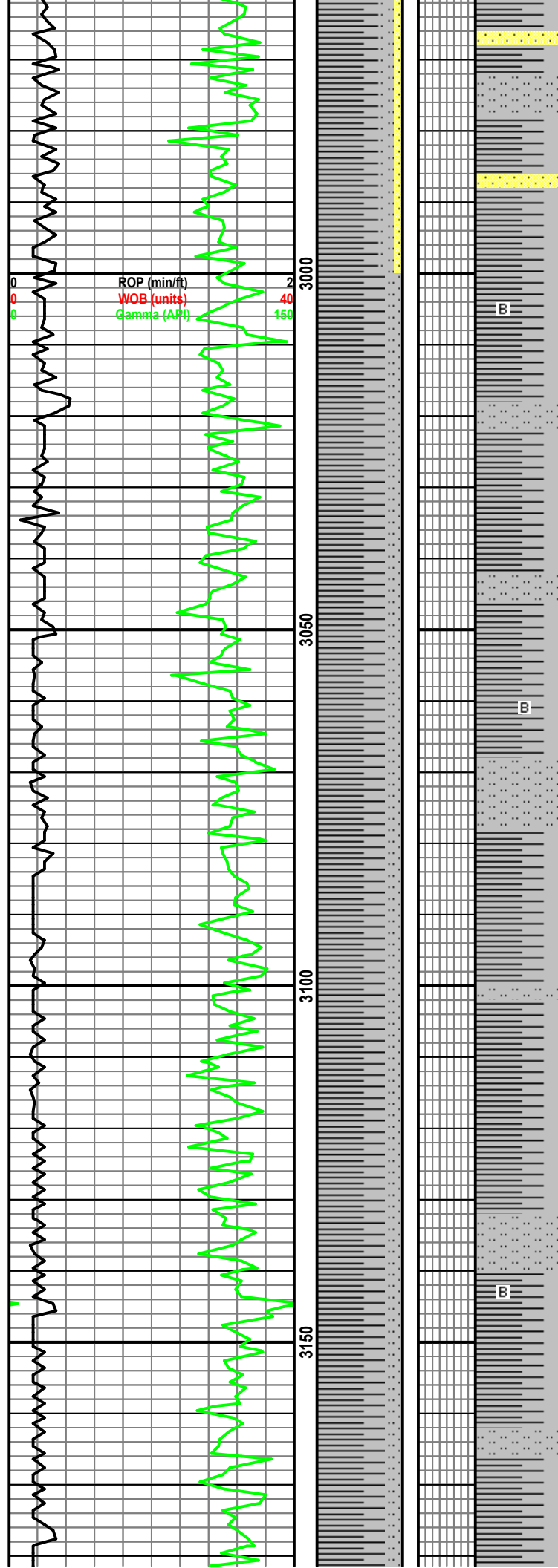| 10 | TG (units) | 1000 |
	C1 (ppm)	
10	100	1000
	C2 (ppm)	
10	100	1000
	C3 (ppm)	
10	100	1000
	C4 (ppm)	
10	100	1000
	C5 (ppm)	
1000	10e4	10e5

SH: m gy, sft - frm, blky - plty, dull, sl
calc, w/ SLTST, lt-gy, fri, tr vf gr sd, sl
calc, lt gy cly mtx, tr lt-gy, wh wxy
Bent.

SH: m gy, sft - frm, blky - plty, dull, sl
calc, w/ SLTST, lt-gy, fri, tr vf gr sd, sl
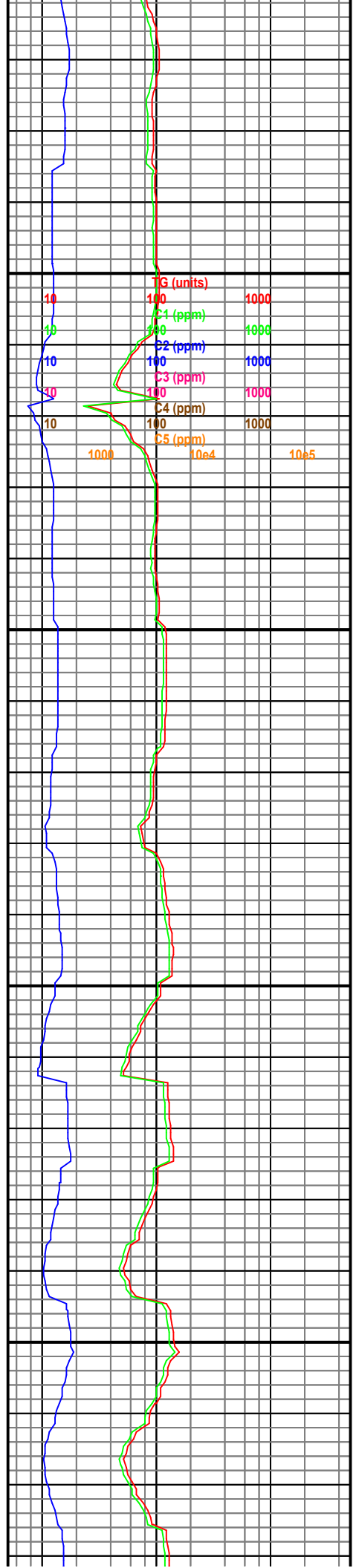calc, lt gy cly mtx, tr lt-gy, wh wxy
Bent.

0	ROP (min/ft)	2
0	WOB (units)	40
0	Gamma (API)	150

3000

3050

3100

3150

B

B

B

SH: lt gy, sft-frm, blky - plty, dull, sl calc. SS: lt gy, lt brn, mod firm, fri ip, vf(u)- f(l) gr, sbang- sbrnd, shly mtx, p srt, sl calc cmt, p por.

SH: m gy, sft - frm, blky - plty, dull, sl calc, w/ SLTST, lt-gy, fri, tr vf gr sd, sl calc, lt gy cly mtx.

10	TG (units)	1000
10	C1 (ppm)	1000
10	C2 (ppm)	1000
10	C3 (ppm)	1000
10	C4 (ppm)	1000
1000	C5 (ppm)	10e5
	10e4	

Dev @ 3193' inc 0.2 deg. Azi 105.8

ROP (min/ft)		2
WOB (units)		40
Gamma (API)		150

3200

3250

3300

3350

400

SH: m gy, sft - frm, blky - plty, dull, sl calc, w/ SLTST, lt-gy, fri, tr vf gr sd, sl calc, lt gy cly mtx.

SH: m gy, sft - frm, blky - plty, dull, sl calc, w/ SLTST, lt-gy, fri, tr vf gr sd, sl calc, lt gy cly mtx.

SH: m gy, sft - frm, blky - plty, dull, sl calc, w/ SLTST, lt-gy, fri, tr vf gr sd, sl calc, lt gy cly mtx.

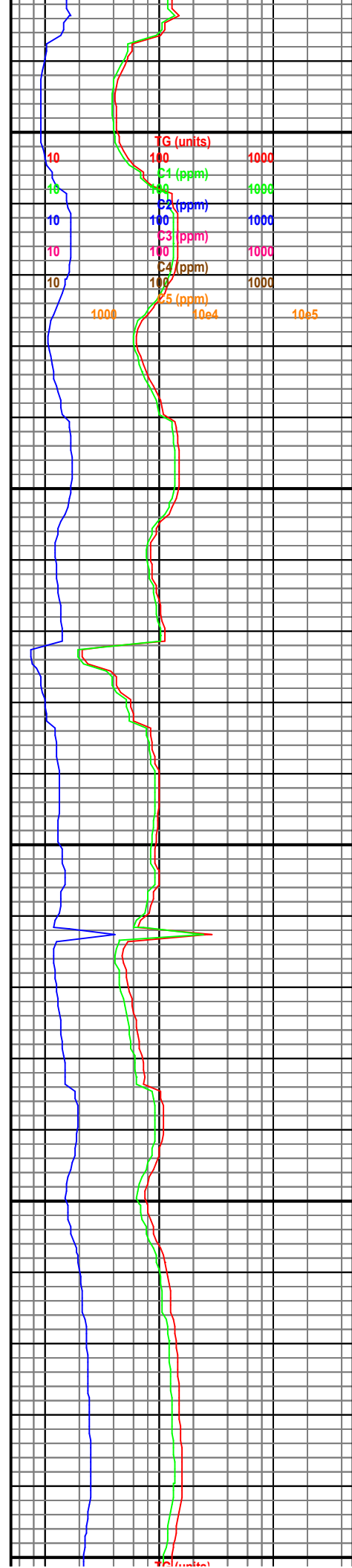|	TG (units)	
10	100	1000
	C1 (ppm)	
10	100	1000
	C2 (ppm)	
10	100	1000
	C3 (ppm)	
10	100	1000
	C4 (ppm)	
10	100	1000
	C5 (ppm)	
1000	10e4	10e5

TG (units)

Track 1 (top header)

ROP (min/ft)

WOB (units)   40

Gamma (API)   150

Track 3 (gas header, top)

10	TG (units)	1000
10	C1 (ppm) 100	1000
10	C2 (ppm) 100	1000
10	C3 (ppm) 100	1000
10	C4 (ppm) 100	1000
	C5 (ppm)	
1000	10e4	10e5

Depth track

3450

3500

3550

3600

Annotations

Dev @ 3479' inc 1.1 deg. Azi 315.3

B

B
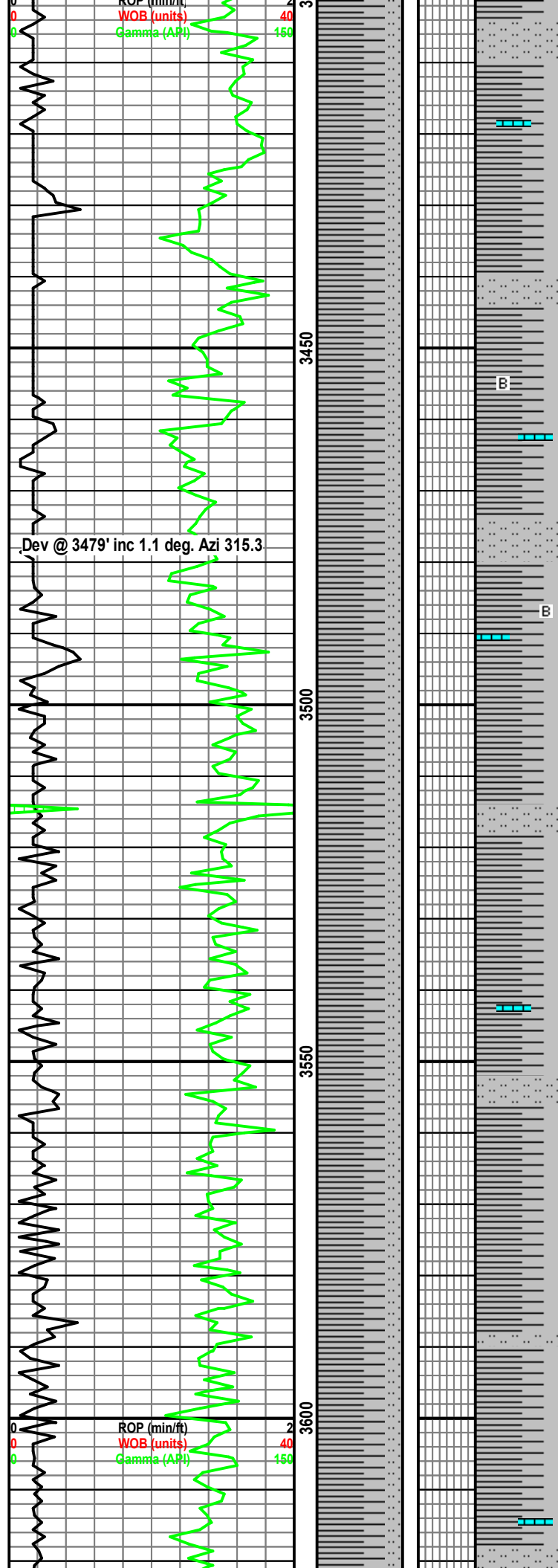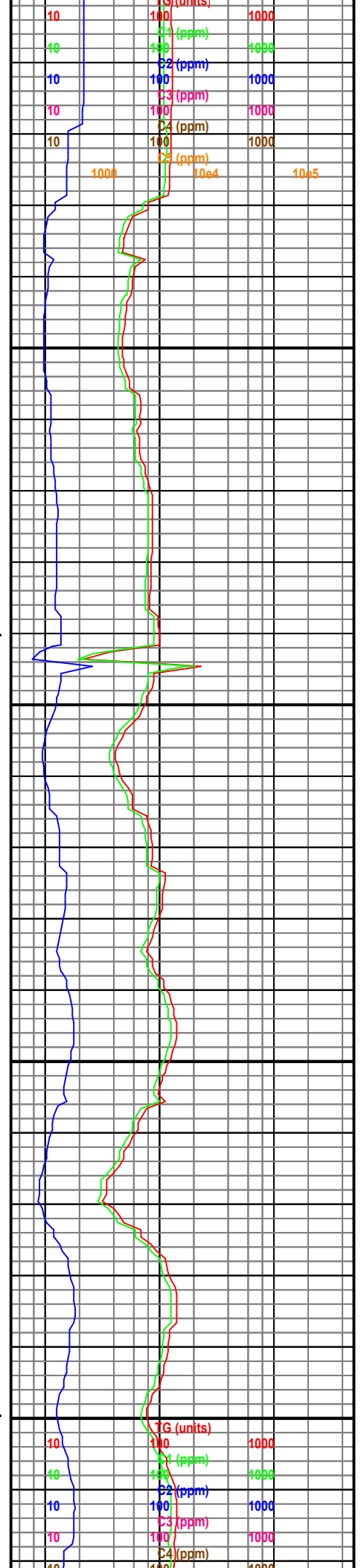
SH: m gy, sft - frm, blky - plty, dull, sl calc, w/ SLTST, lt-gy, fri, tr vf gr sd, sl calc, lt gy cly mtx, tr lt-gy, wh wxy Bent, tr pry, lt brn, frm, micx, String LS.

SH: m gy, sft - frm, blky - plty, dull, sl calc, w/ SLTST, lt-gy, fri, tr vf gr sd, sl calc, lt gy cly mtx, tr lt-gy, wh wxy Bent, tr pry, lt brn, frm, micx, String LS.

Track 1 (bottom header)

0   ROP (min/ft)   2

0   WOB (units)   40

0   Gamma (API)   150

Track 3 (gas header, bottom)

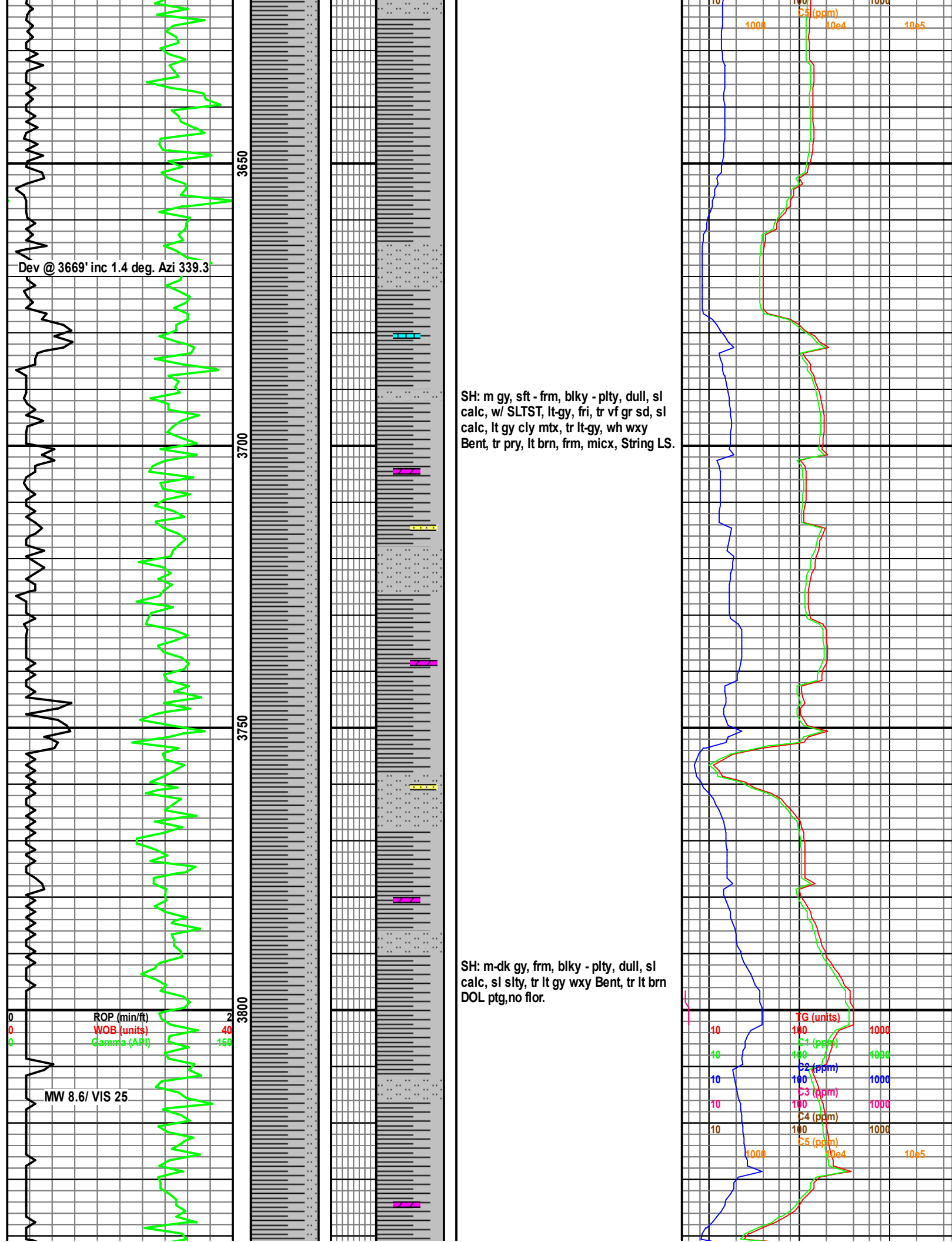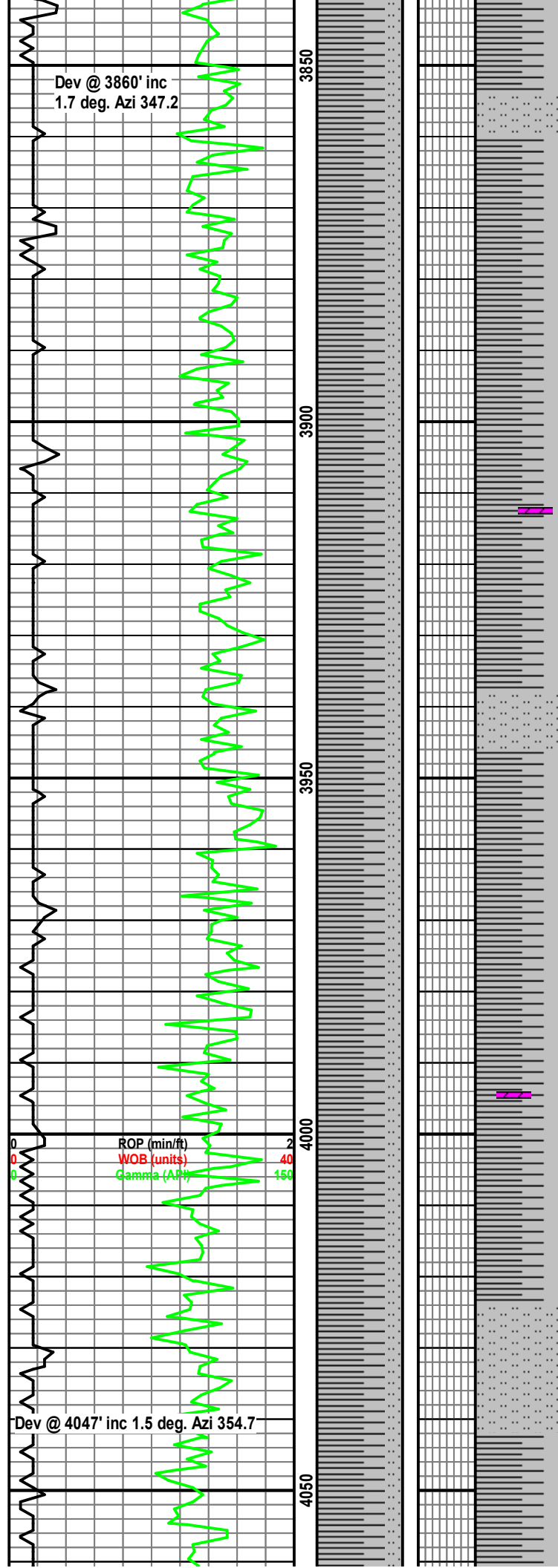|		
10	TG (units) 100	1000
10	C1 (ppm) 100	1000
10	C2 (ppm) 100	1000
10	C3 (ppm) 100	1000
	C4 (ppm)	

Dev @ 3669' inc 1.4 deg. Azi 339.3

3650

3700

SH: m gy, sft - frm, blky - plty, dull, sl
calc, w/ SLTST, lt-gy, fri, tr vf gr sd, sl
calc, lt gy cly mtx, tr lt-gy, wh wxy
Bent, tr pry, lt brn, frm, micx, String LS.

3750

SH: m-dk gy, frm, blky - plty, dull, sl
calc, sl slty, tr lt gy wxy Bent, tr lt brn
DOL ptg,no flor.

3800

ROP (min/ft)	2
WOB (units)	40
Gamma (API)	150

MW 8.6/ VIS 25

TG (units)		
10	100	1000
C1 (ppm)		
10	100	1000
C2 (ppm)		
10	100	1000
C3 (ppm)		
10	100	1000
C4 (ppm)		
10	100	1000
C5 (ppm)		
1000	10e4	10e5

Dev @ 3860' inc
1.7 deg. Azi 347.2

3850

3900

SH: m-dk gy, frm, blky - plty, dull, sl
calc, sl slty, tr lt gy wxy Bent, tr lt brn
DOL ptg,no flor.

3950

SH: m-dk gy, frm, blky - plty, dull, sl
calc, sl slty, tr lt gy wxy Bent, tr lt brn
DOL ptg,no flor.

4000

0	ROP (min/ft)	2
0	WOB (units)	40
0	Gamma (API)	150

10	TG (units) 100	1000
10	C1 (ppm) 100	1000
10	C2 (ppm) 100	1000
10	C3 (ppm) 100	1000
10	C4 (ppm) 100	1000
1000	C5 (ppm) 10e4	10e5

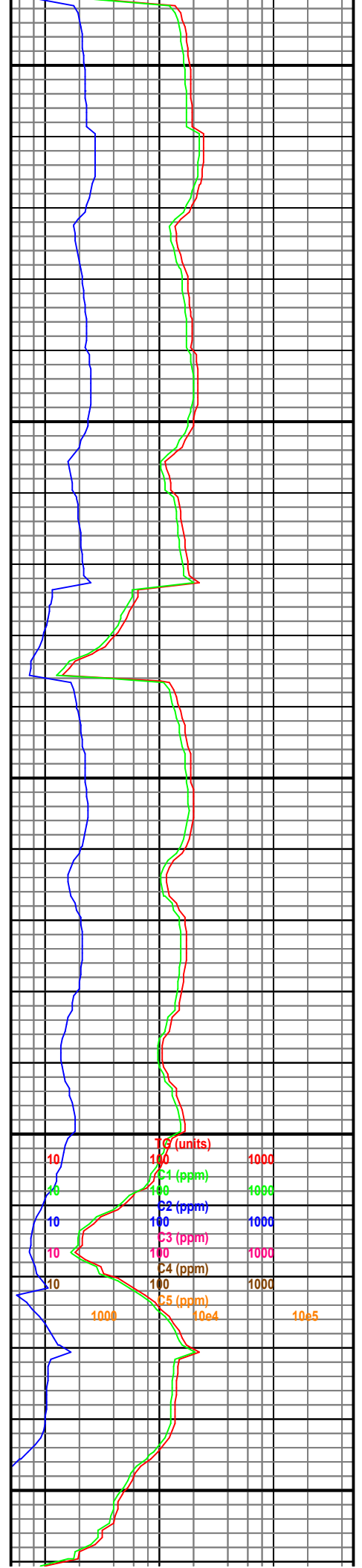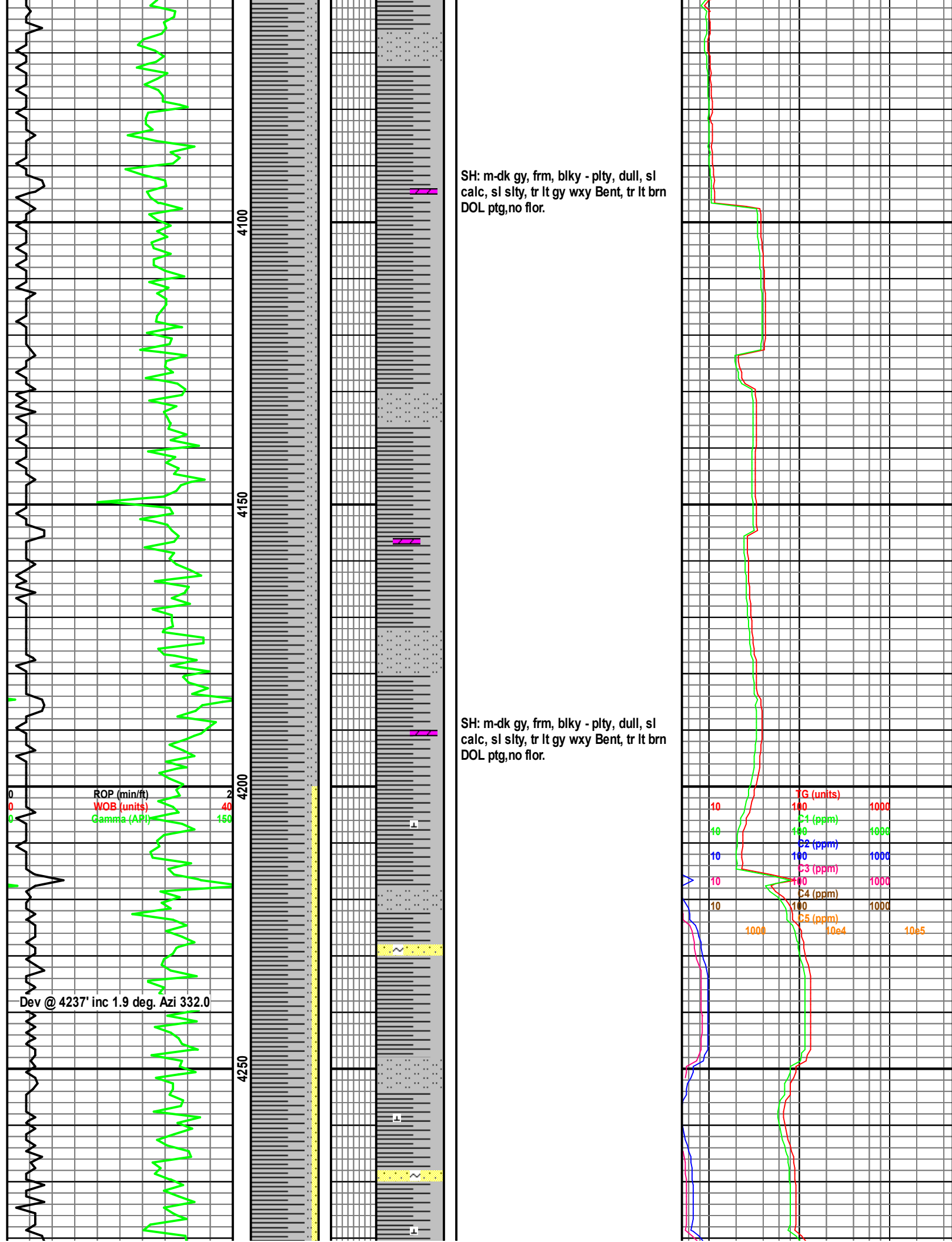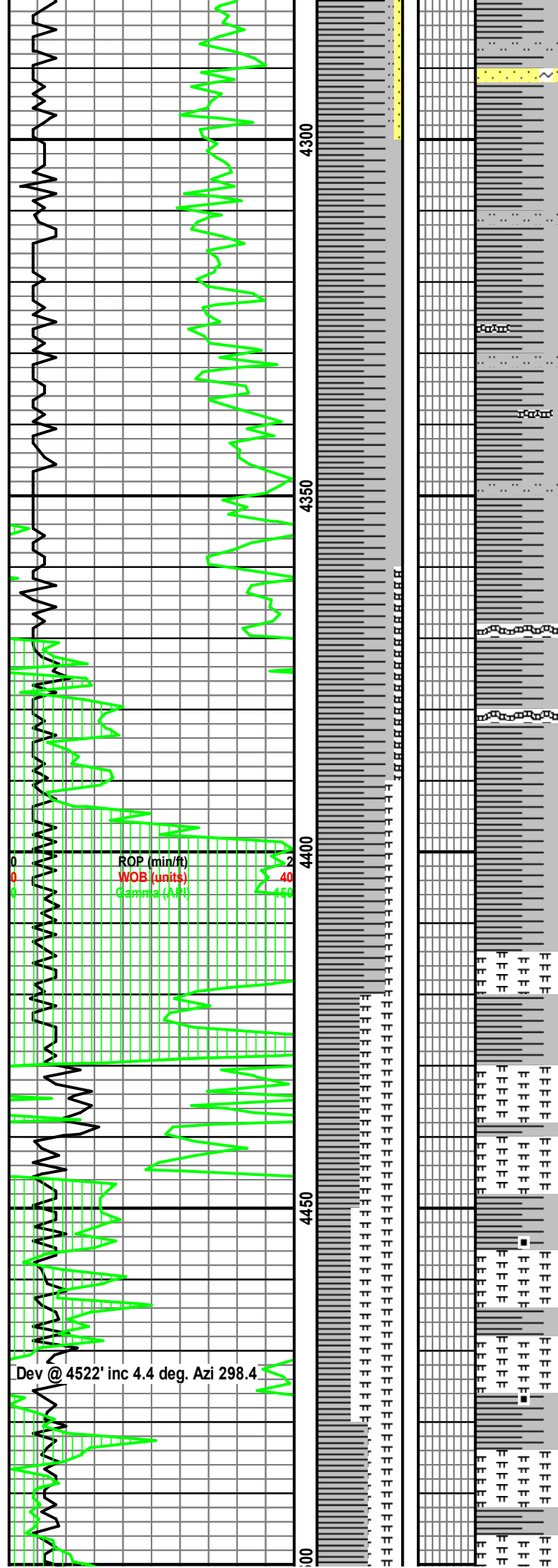Dev @ 4047' inc 1.5 deg. Azi 354.7

4050

SH: m-dk gy, frm, blky - plty, dull, sl calc, sl slty, tr lt gy wxy Bent, tr lt brn DOL ptg,no flor.

4100

4150

SH: m-dk gy, frm, blky - plty, dull, sl calc, sl slty, tr lt gy wxy Bent, tr lt brn DOL ptg,no flor.

4200

0	ROP (min/ft)	2
0	WOB (units)	40
0	Gamma (API)	150

Dev @ 4237' inc 1.9 deg. Azi 332.0

4250

	TG (units)	
10	100	1000
	C1 (ppm)	
10	100	1000
	C2 (ppm)	
10	100	1000
	C3 (ppm)	
10	100	1000
	C4 (ppm)	
10	100	1000
	C5 (ppm)	
	1000	10e4	10e5

SH: m gy, frm, blky, dull, sl calc, sl slty, tr lt gy wxy Bent, intb w/SS: wh, clr, fri- mod firm, vf(u)-f(l) gr, sbang-sbrnd, mod srt , cly mtx , p vis por,sl calc, glau.

SH: lt-m gy, sft - frm, blky - plty, dull, sl calc, w/ SLTST, lt-gy, fri, tr vf gr sd, sl calc, lt gy cly mtx, tr lt-gy, wh wxy Bent, tr pry.
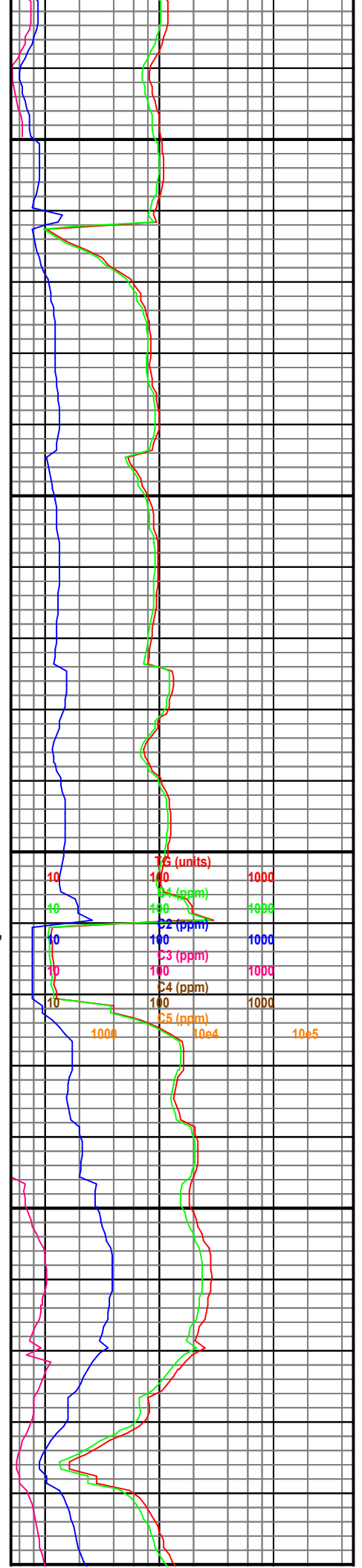
BENT: ltgy-off wh, sft, plty, wxy, yel mnrl flor.

Chalky Marlst: lt gy/brn, wh specs, frm, sb blky, calc, chlky tex, carb mat, pyr, no vis por, no flor, slow pale wh cut.

Top Niobrara @ 4430' MD.

MARLST: lt gy, specs & mot specs, frm, chlky, calc, whispy carb mat, pyr, no vis por, no flor, mod wh cut.

MARLST: lt gy, specs & mot specs, frm, chlky, calc, whispy carb mat, pyr, no vis por, no flor, mod wh cut.

ROP (min/ft)
WOB (units)
Gamma (API)

Dev @ 4522' inc 4.4 deg. Azi 298.4

4,300
4,350
4,400
4,450

TG (units)
10   100   1000
C1 (ppm)
10   100   1000
C2 (ppm)
10   100   1000
C3 (ppm)
10   100   1000
C4 (ppm)
10   100   1000
C5 (ppm)
1000   10e4   10e5

SH: dk gy, blk, blky-plty, mod calc, carb specs, tr pyr, tr Bent, no flor, occ slow wh cut.

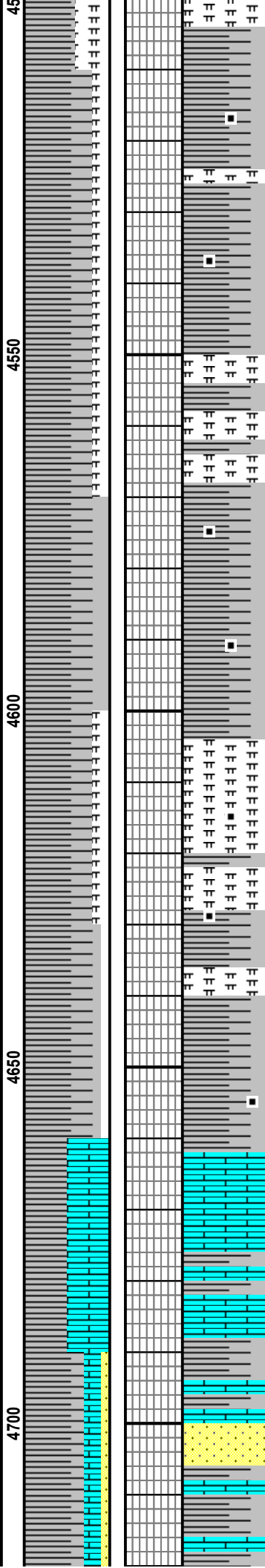SH: dk gy, blk, blky-plty, mod calc, carb specs, tr pyr, tr Bent, no flor, occ slow wh cut.

Chalky Marlst: lt gy/brn, wh specs, frm, sb blky, calc, chlky tex, carb mat, pyr, no vis por, no flor, slow pale wh cut.

SH: gy-dkgy, frm, blky-plty, n-sl calc, Inoc frag, tr pyr, Bent, carb.

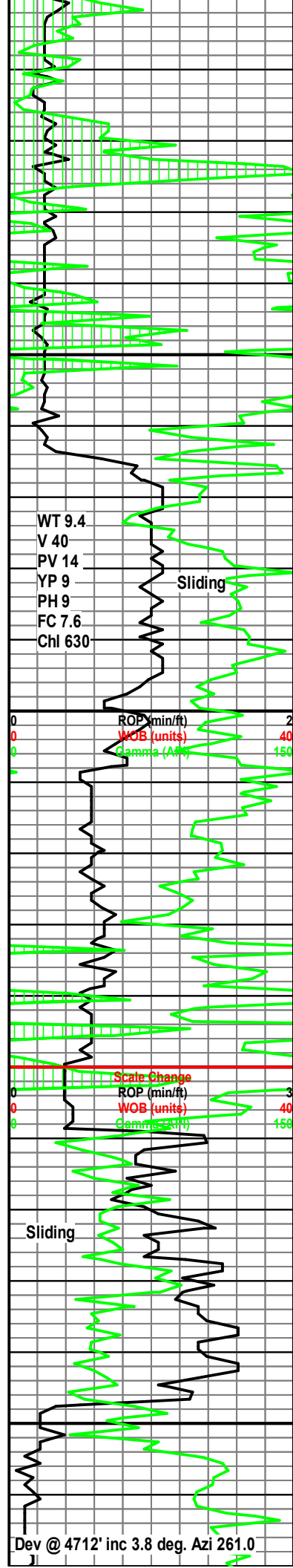SH: gy-dkgy, frm, blky-plty, n-sl calc, Inoc frag, tr pyr, Bent, carb.

Chalky Marlst: lt gybrn, wh specs, frm, sb blky, calc, chlky tex, carb mat, pyr, no vis por, no flor, slow wh cut.

Top Fort Hays @ 4660'MD.

LS: wh, occ lt gy specs, crpxln, Inoc frag, tt.

Top Carlile 4704' MD.

SS: lt gy ,wh, S &P ip, fri -frm, f(l) -vf(u) gr, sbrnd, w srt, calc cmt, p vis por, even pale yel flor, slow wh cut.

WT 9.4
V 40
PV 14
YP 9
PH 9
FC 7.6
Chl 630

Sliding

4550

4600

4650

4700

0   ROP (min/ft)   2
0   WOB (units)   40
0   Gamma (API)   150

Scale Change

0   ROP (min/ft)   3
0   WOB (units)   40
0   Gamma (API)   150

Sliding

Dev @ 4712' inc 3.8 deg. Azi 261.0

TG (units)		
10	100	1000
C1 (ppm)		
10	100	1000
C2 (ppm)		
10	100	1000
C3 (ppm)		
10	100	1000
C4 (ppm)		
10	100	1000
C5 (ppm)		
1000	10e4	10e5

ROP (min/ft) 0 – 3
WOB (units) 0 – 40
Gamma (API) 0 – 150

Dev @ 4808' inc 1.7 deg. Azi 206.8

4750

4800

4850

4900

SH: dkgy, firm, blky - plty, dull, sl-v calc, tr carb mat, occ sndy, w/ SLTST, lt-gy, fri, tr vf gr sd, sl calc, offwh Bent.

SH: dkgy, firm, blky - plty, dull, sl-v calc, tr carb mat, occ sndy, w/ SLTST, lt-gy, fri, tr vf gr sd, sl calc, offwh Bent.

SH: dkgy, firm, blky - plty, dull, sl-v calc, tr carb mat, occ sndy, w/ SLTST, lt-gy, fri, tr vf gr sd, sl calc, offwh Ben

SS: lt gy , lt brn, s&p ip, fri -frm, f(l)-vf(u) gr, sb rnd, w srt, calc cmt, p vis por.

SH: dkgy, firm, blky - plty, dull, sl-v calc, tr carb mat, occ sndy, offwh Bent.

Top Greenhorn-Bridge Creek Mbr. @ 4916' MD.

TG (units) 10 – 100 – 1000
C1 (ppm) 10 – 100 – 1000
C2 (ppm) 10 – 100 – 1000
C3 (ppm) 10 – 100 – 1000
C4 (ppm) 10 – 100 – 1000
C5 (ppm) 1000 – 10e4 – 10e5

MND @ 4951' 10/28/2012

Dev @ 4998' inc 2.1 deg. Azi 277.8

0	ROP (min/ft)	3
0	WOB (units)	40
0	Gamma (API)	150

Dev @ 5124' inc 2.3 deg. Azi 293.7

SS: lt gy , lt brn, s&p ip, fri -frm, f(l)-vf(u) gr, sb rnd, w srt, calc cmt, p vis por.

Top Greenhorn-Harland Mbr. @ 4966' MD.

SH: dkgy, firm, blky - plty, dull, sl-v calc, tr carb mat, occ sndy, offwh Bent.

LS: ltbrn/brn, gybrn, occ lt gy specs, crpxln, lnoc frag, tt.

Top Greenhorn-Lincoln Mbr. @ 5003' MD.

SH: dkgy, firm, blky - plty, dull, sl calc, tr carb mat, occ sndy, abnt offwh Bent.

BENT: ltgy-off wh, sft, plty, wxy, yel mnrl flor

Top Graneros Shale X-Bentonite 5079' MD.

SH: dkgy, firm, blky - plty, dull, sl calc, tr carb mat, occ sndy, abnt offwh Bent.

SH: dkgy, firm, blky - plty, dull, sl calc, tr carb mat, occ sndy, abnt offwh Bent.

SS: wh, lt brn ip, frm, f(l) gr, sbrnd, w srt, sil cmt, wh clay fill, sl calc, mod

	TG (units)	
10	100	1000
	C1 (ppm)	
10	100	1000
	C2 (ppm)	
10	100	1000
	C3 (ppm)	
10	100	1000
	C4 (ppm)	
10	100	1000
	C5 (ppm)	
1000	10e4	10e5

TOOH Circulate & Conditione Mud

Top Dakota D1 @ 5174'MD

SS: wh, lt brn ip, frm, f(l) gr, sbrnd, w srt, sil cmt, wh clay fill, sl calc, mod vis por, tr Bentonite, tr pry, ptchy pale yel flor,slow strmg yelwh cuts from lt brn .

Top Dakota D2 @ 5192'MD

Top Dakota D3 @ 5207'MD

SS: wh, lt brn ip, frm, f(l) gr, sbrnd, w srt, sil cmt, wh clay fill, sl calc, mod vis por, tr Bentonite, tr pry, ptchy pale yel flor,slow strmg yelwh cuts from lt brn .

Top Huntsman @ 5228'MD

SH: dkgy, firm, blky - plty, dull, sl calc, tr carb mat, tr offwh Bent.

SH: dkgy, firm, blky - plty, dull, sl calc, tr carb mat, tr offwh Bent.

TD @ 5285' 10/28/2012 11:00 am.

ROP (min/ft)
WOB (units)
Gamma (API)

5200

5250

TG (units)
C1 (ppm)
C2 (ppm)
C3 (ppm)
C4 (ppm)
C5 (ppm)