

ROP (Ft/Hr) Gamma (API) Drill Depth v. Time			Survey Data		Depth		Lithology		Lithology Percentages		Sample Photographs		Porosity		Geological Description		TG (1-8) C1 (units) C2 (units) C3 (units) C4 (units) Total Gas, C1-C4		
0	ROP (Ft/Hr)	3000	<div>SLIDE=RED ROTATE=WHITE</div> <div>ROP SCALE: 0 TO 3000</div> <div>GAMMA SCALE: 0 TO 350</div> <div>(GAMMA DATA AS RECEIVED)</div>		24											NOBLE ENERGY WELLS RANCH AE20-68-1HN 20-T6N-R62W 1173' FNL, 215' FWL WELD COUNTY, CO H&P 321 LOGGERS: HANNAH BLATCHFORD ROBERT GULLIKSEN CALLED OUT BY COMPANY MAN ON 10/16/2013 COMMENCED LOGGING @ 12:30 AM	-50	TG, C1-C4	450
0	Gamma (API)	350																	

(GAMMA DATA AS RECEIVED)

RG

12:01 AM
10/17/13
1517 FT/24
HRS
DAY 02
WOB 21K
SP 2928
RPM 60
SPM 67/67

MD 2504 TVD 2499.08
INC 10.02 AZ 312.12
VS -28.34

Pierre (2500' MD - 2600' MD)



@ 2500' MD ON 10/17/13 W/BIT # 1
8.75 HUGHES DP604SX S/N 7030812
IN @ 983' MD

PIERRE
BEFORE LOGGING DEPTH

MD 983'
WT 8.75
VIS 31.0
PH 10.8
FIL 23.8
CL 1400
CAL 20.0
H2O 97.5
OIL 0.0
SOL 2.2
CAKE 1/0
GELS 2/6/8
PV 6.0
YP 4.0

CG 147u

2500'- 2600': SLTST: 90% LTGY -
MEDLTGY, FRI, FN TO MED GRN, W
SRTD, CALC CMT, SANDY, IMBD
GLAU, IMBD SS LAMN, INTGR POR,
NO STN, NO FLOR, NO O FLOR, NO
CUT, NO RNG

-50 TG, C1-C4 450

CG 185u

2600'- 2700': SLTST: 80% LTGY -
MEDLTGY, FRI, FN TO MED GRN, W
SRTD, CALC CMT, SANDY, IMBD
GLAU, IMBD SS LAMN, INTGR POR,
NO STN, NO FLOR, NO O FLOR, NO
CUT, NO RNG

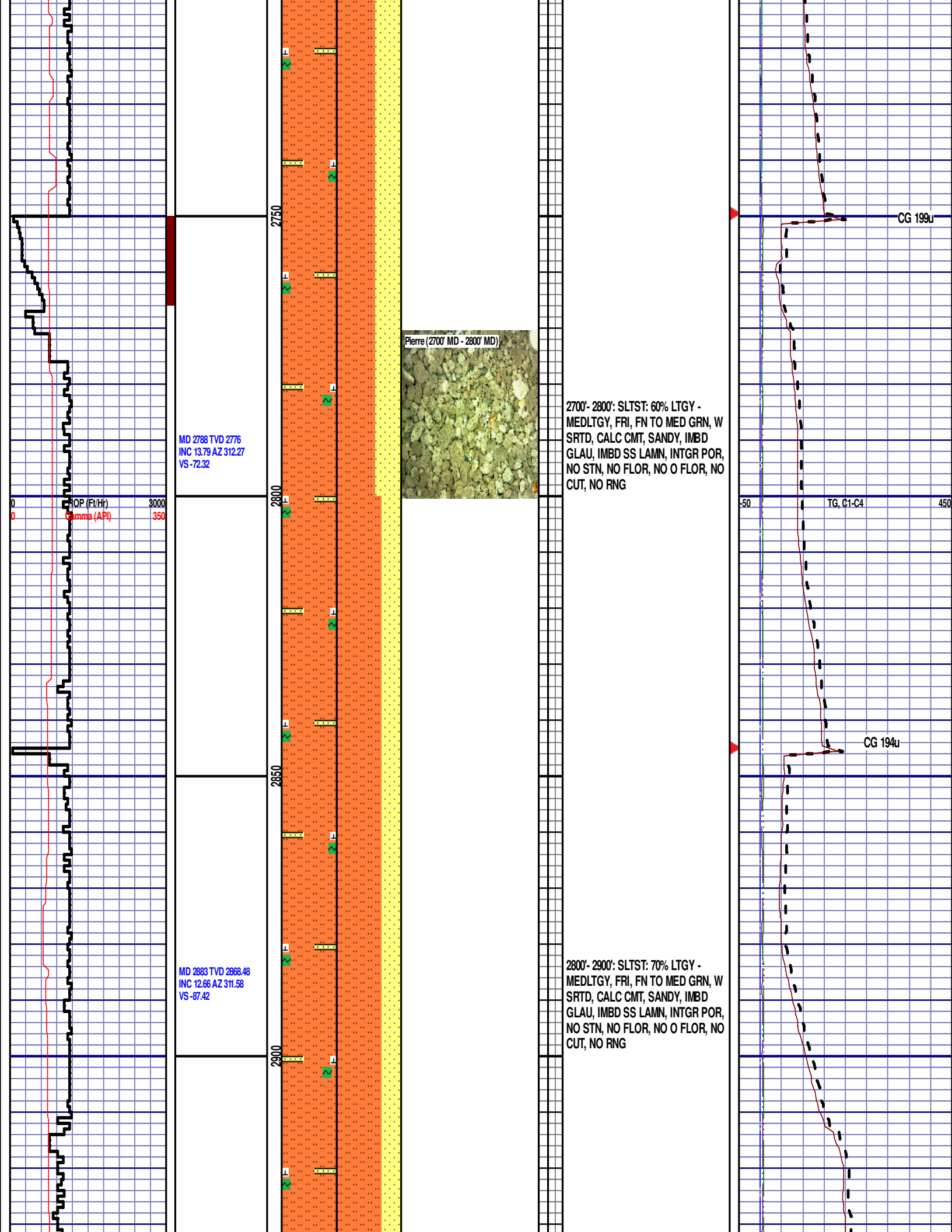
MD 2693 TVD 2683.68
INC 13.51 AZ 310.75
VS -56.63

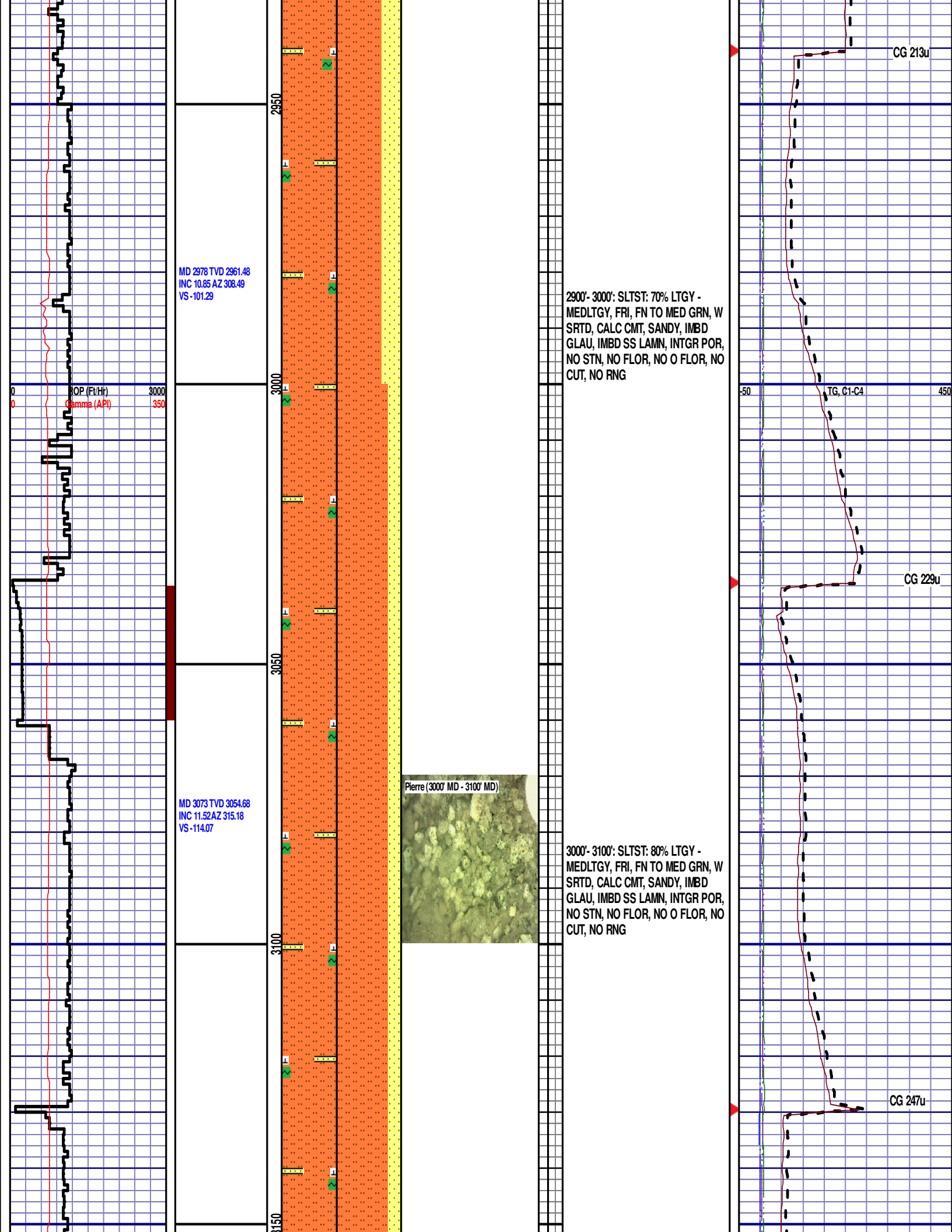
ROP (Ft/Hr)
Gamma (API)

3000
350

MD 2599 TVD 2592.17
INC 12.94 AZ 311.68
VS -41.49

2500
2550
2600
2650
2700





MD 3168 TVD 3148.06
INC 9.65 AZ 311.44
VS -125.85

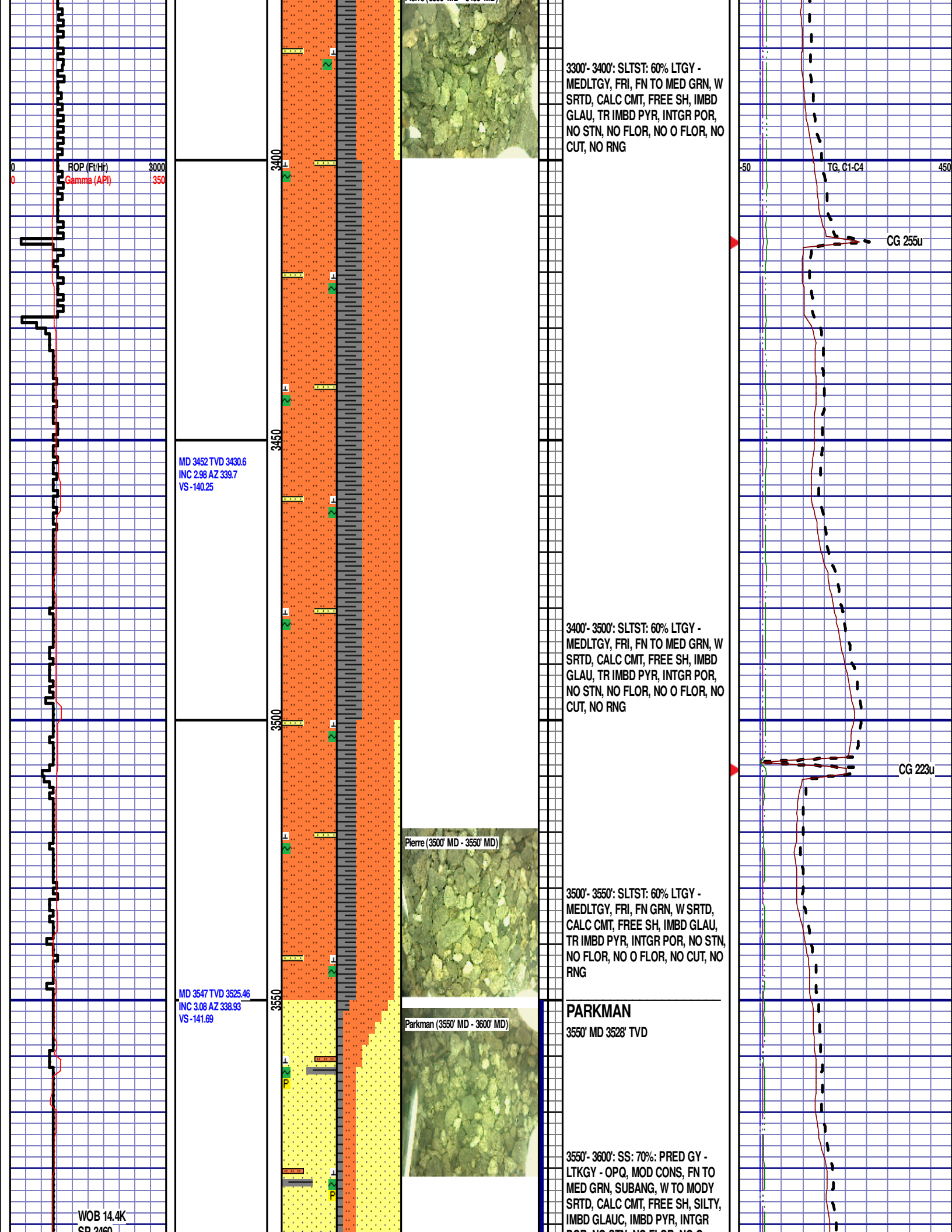
MD 3263 TVD 3242.09
INC 6.67 AZ 322.21
VS -134.5

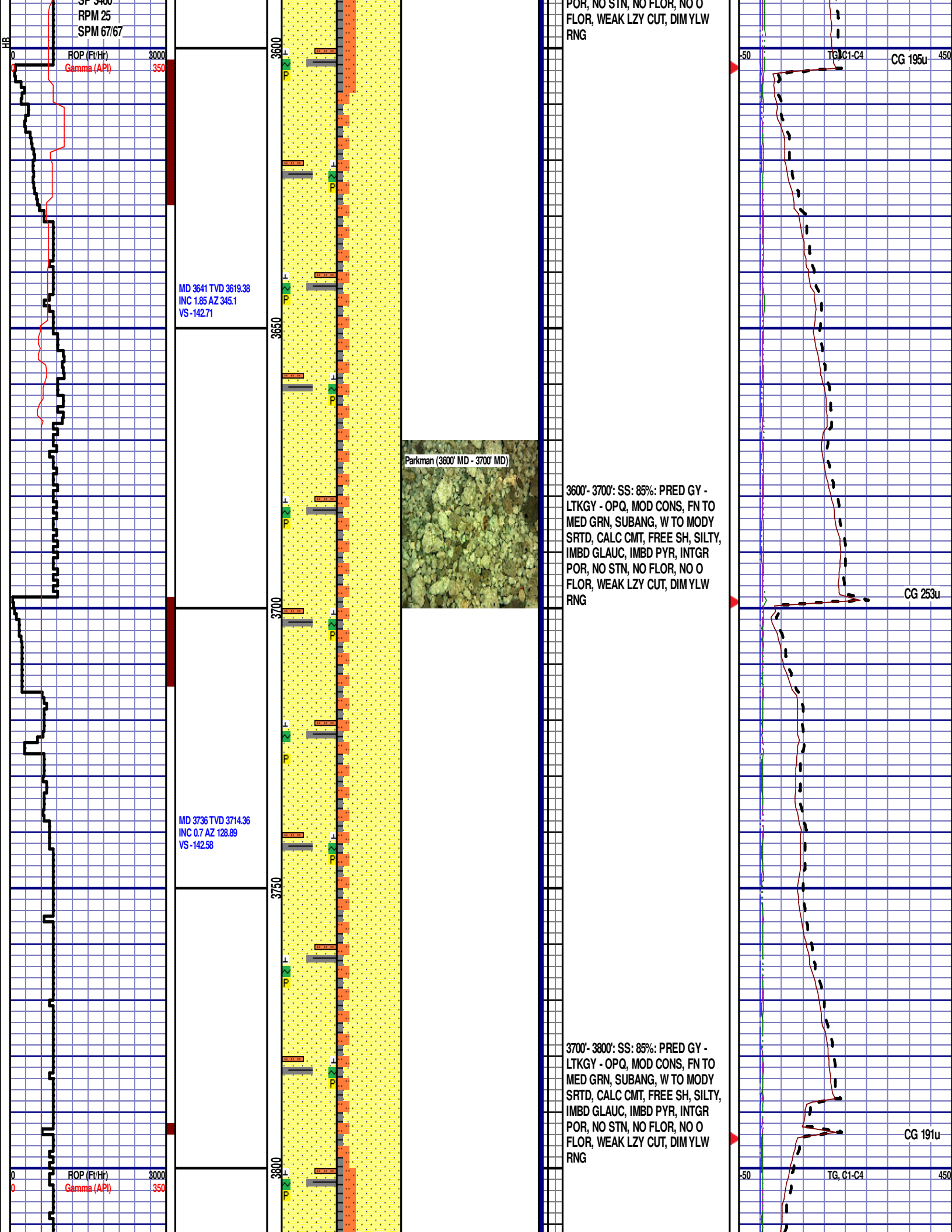
MD 3357 TVD 3335.73
INC 3.18 AZ 333.13
VS -138.54

3100'- 3200': SLTST: 80% LTGY -
MEDLTGY, FRI, FN TO MED GRN, W
SRTD, CALC CMT, SANDY, IMBD
GLAU, IMBD SS LAMN, INTGR POR,
NO STN, NO FLOR, NO O FLOR, NO
CUT, NO RNG

3200'- 3300': SLTST: 80% LTGY -
MEDLTGY, FRI, FN TO MED GRN, W
SRTD, CALC CMT, SANDY, IMBD
GLAU, TR IMBD PYR, INTGR POR,
NO STN, NO FLOR, NO O FLOR, NO
CUT, NO RNG

MD 3253'
WT 8.65
VIS 32.0
PH 9.5
FIL 24.8
CL 1900
CAL 80
H2O 97.5
OIL 0.0
SOL 2.2
CAKE 1/0
GELS 1/3/4
PV 4.0
YP 3.0





MD 3831 TVD 3809.35
INC 0.87 AZ 149.8
VS -141.83

3850

3900

MD 3926 TVD 3904.34
INC 0.94 AZ 148.22
VS -141.15

3950

4000

MD 4021 TVD 3999.33
INC 0.85 AZ 118.72
VS -140.2

Parkman (3900' MD - 4000' MD)

Parkman (4000' MD - 4050' MD)

3800'- 3900': SS: 70%: PRED GY -
LTKGY - OPQ, MOD CONS, FN TO
MED GRN, SUBANG, W TO MODY
SRTD, CALC CMT, FREE SH, SILTY,
IMBD GLAUC, IMBD PYR, INTGR
POR, NO STN, NO FLOR, NO O
FLOR, WEAK LZY CUT, DIM YLW
RNG

CG 177u

3900'-4000': SLTST: 70% LTGY -
MEDLTGY, FRI, FN TO MED GRN, W
SRTD, CALC CMT, FREE SH, TRC
FREE CALC, PYR LAMN, SANDY,
INTGR POR, NO STN, NO FLOR, NO
O FLOR, SLOW LZY CUT, DIM YLW
RNG

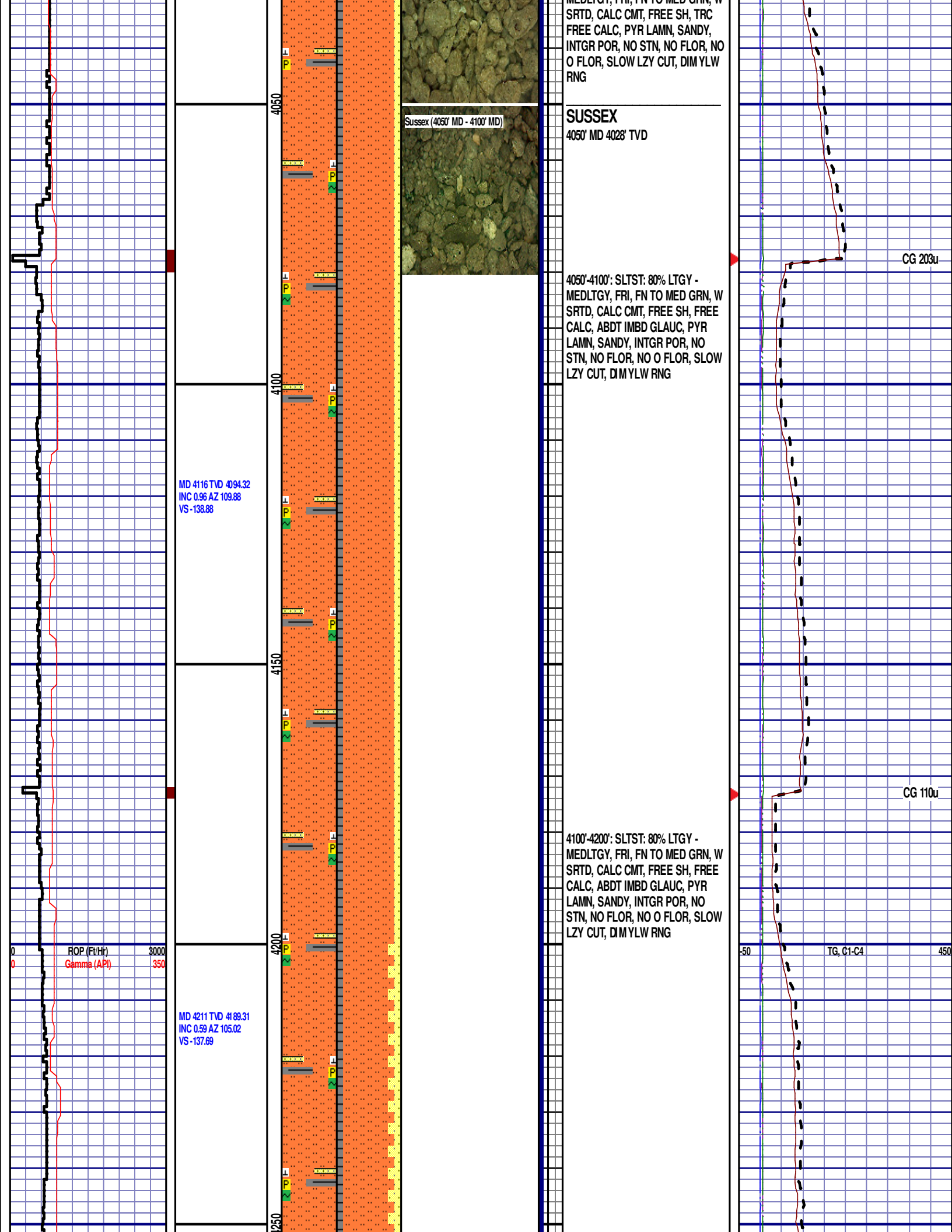
CG 204u

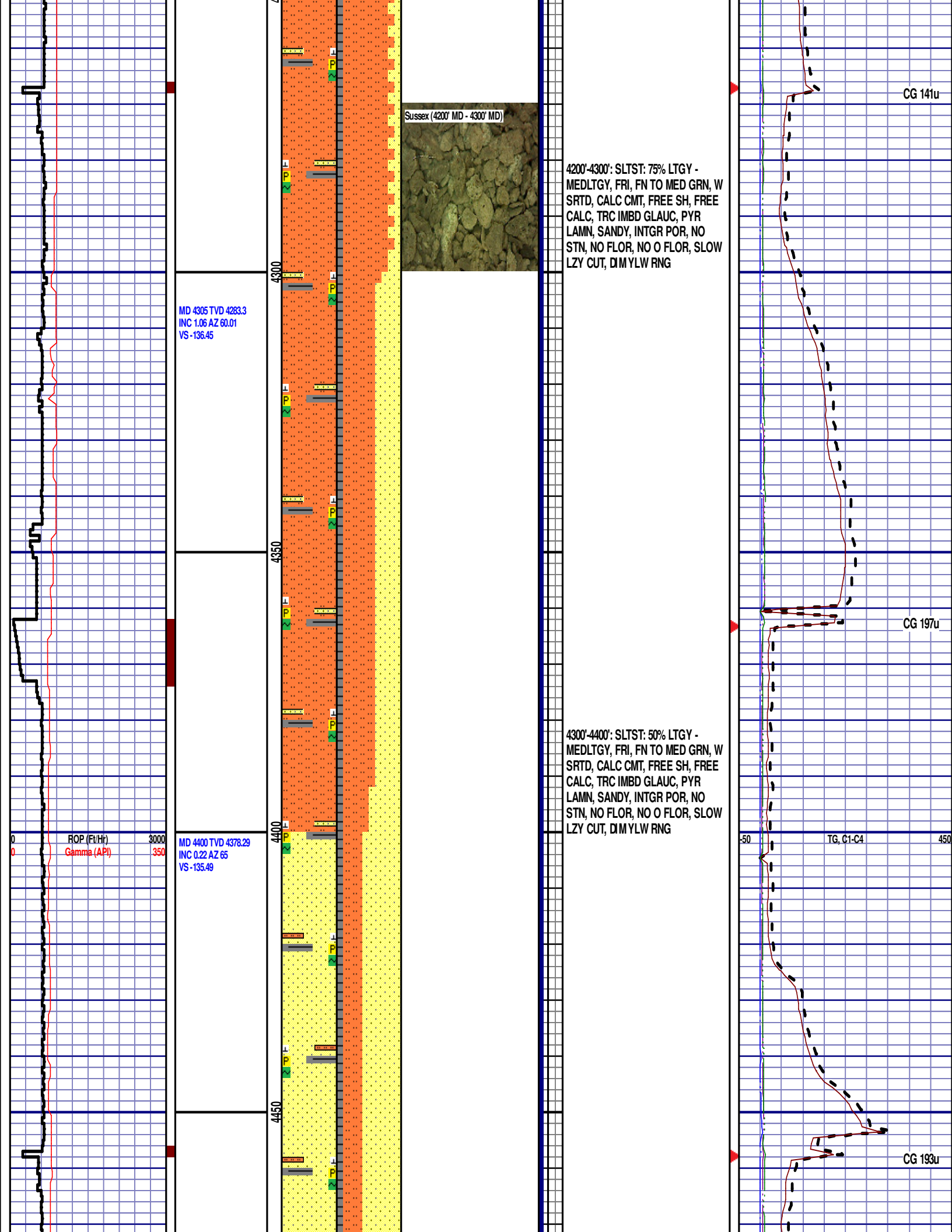
4000'-4050': SLTST: 80% LTGY -
MEDLTGY, FRI, FN TO MED GRN, W

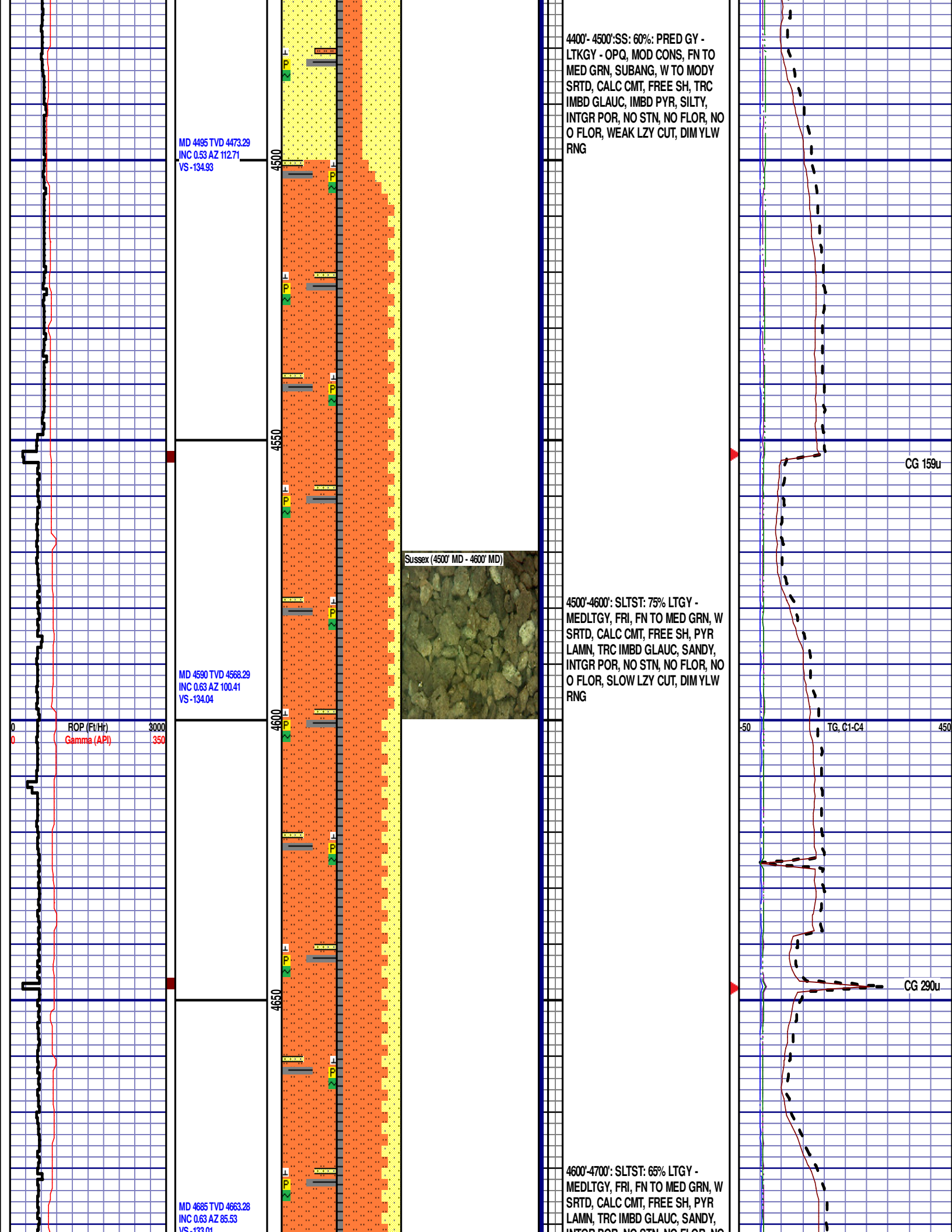
-50 TG, C1-C4 450

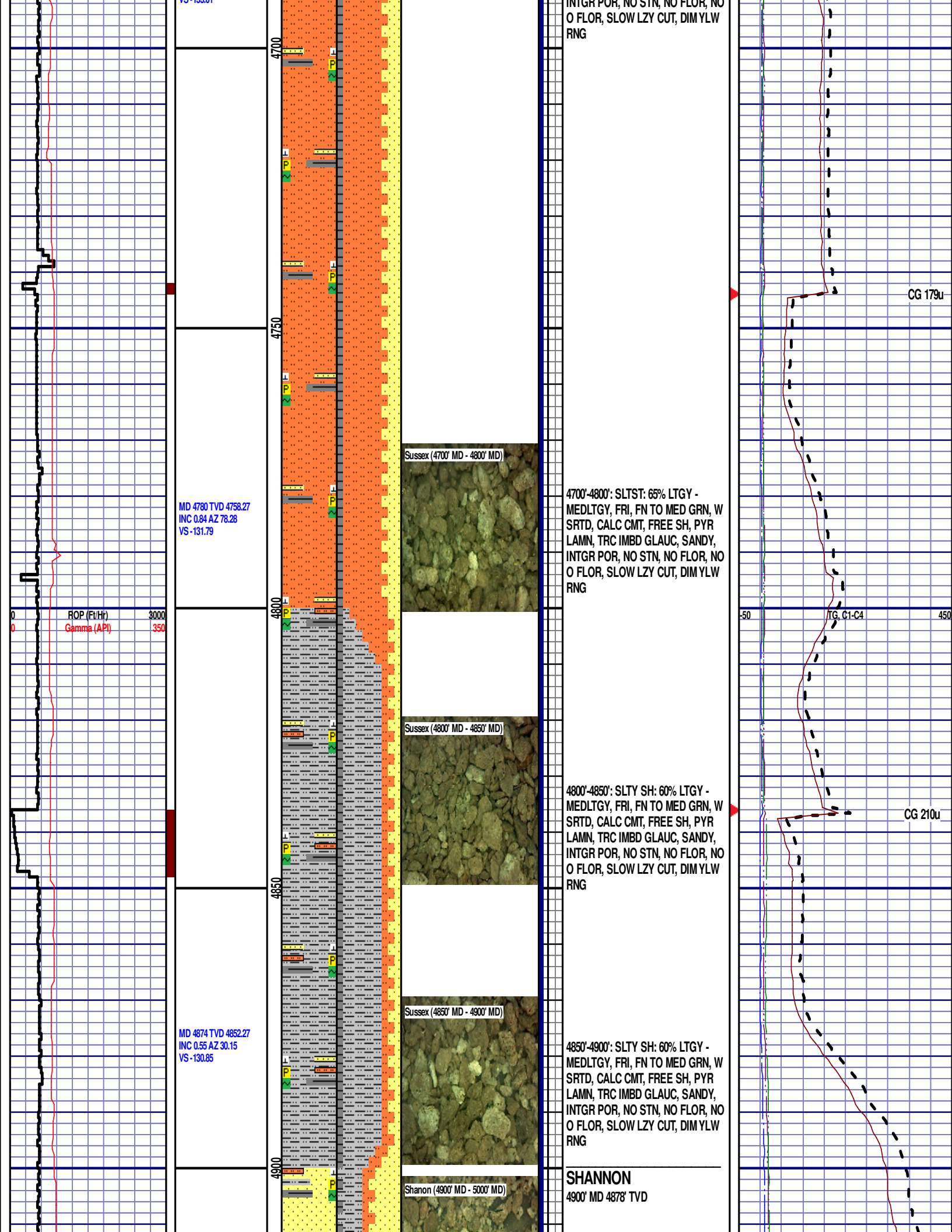
ROP (Ft/Hr)
Gamma (API)

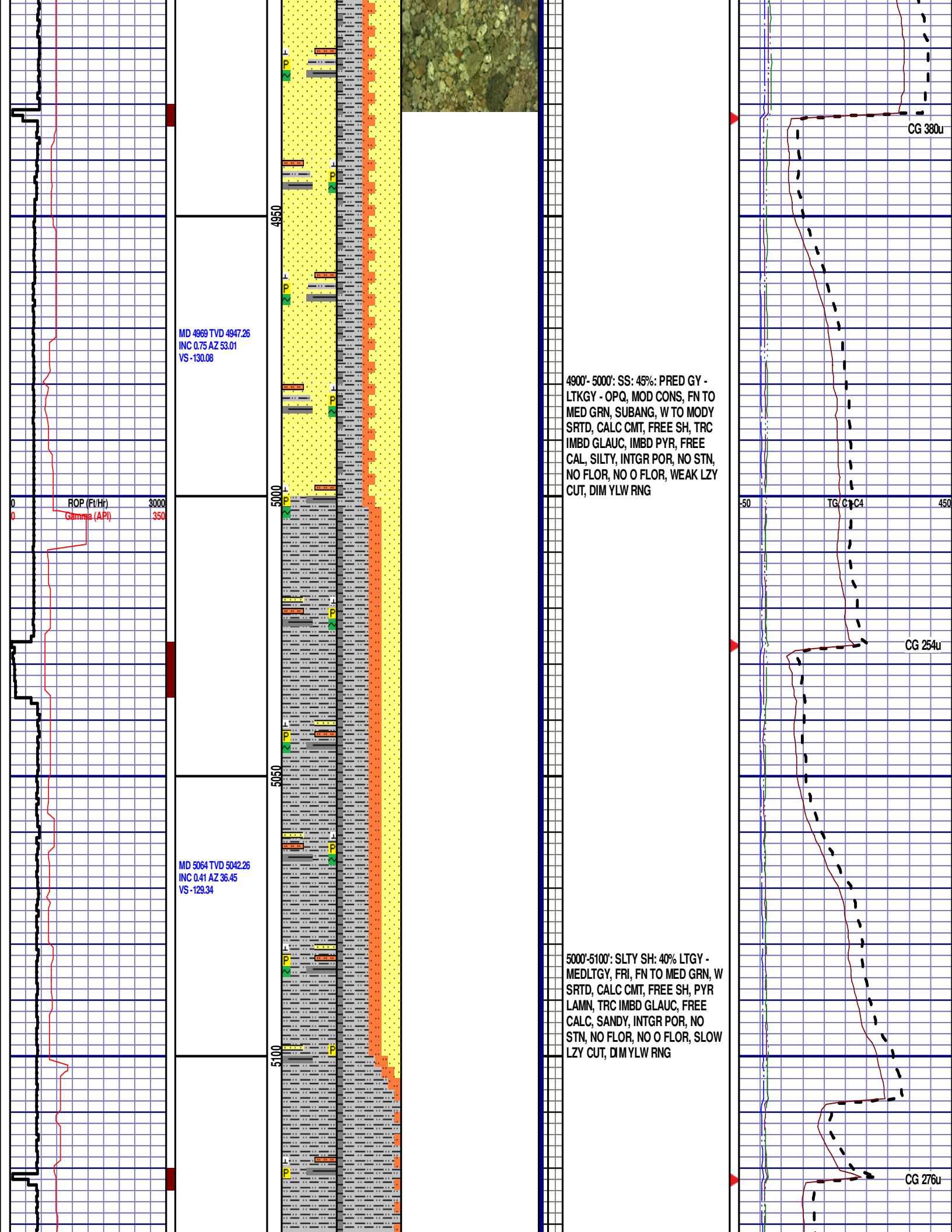
3000
350

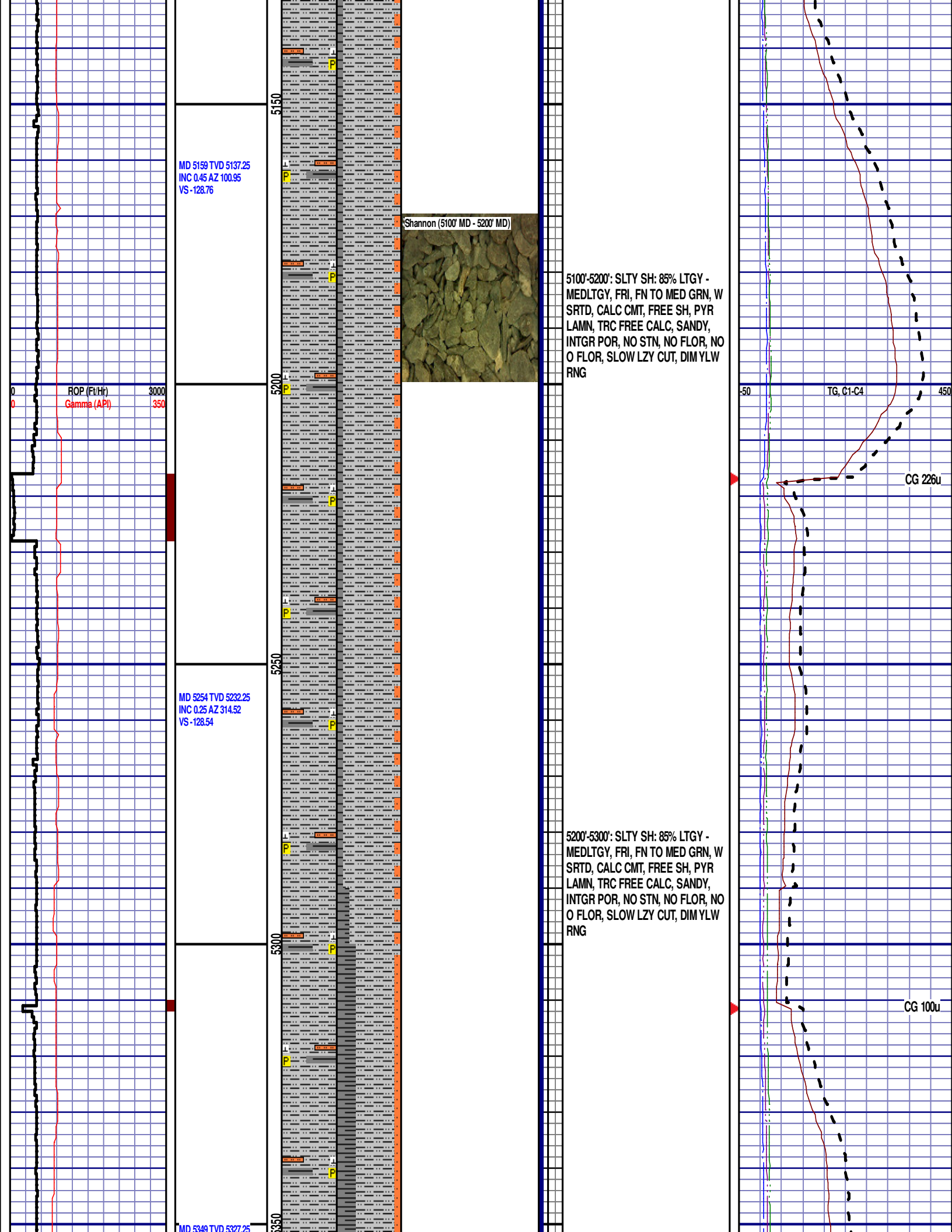












INC 0.38 AZ 47.4
VS -128.43

ROP (Ft/Hr)
Gamma (API)

3000
350

MD 5443 TVD 5421.25
INC 0.2 AZ 141.62
VS -128.09

MD 5538 TVD 5516.25
INC 0.56 AZ 108.6
VS -127.57

5400

5450

5500

5550

Shannon (5400' MD - 5500' MD)



5300'-5400': SLTY SH: 60% LTGY -
MEDLTGY, FRI, FN TO MED GRN, W
SRTD, CALC CMT, FREE SH, PYR
LAMN, TRC FREE CALC, SANDY,
INTGR POR, NO STN, NO FLOR, NO
O FLOR, SLOW LZY CUT, DIM YLW
RNG

5400'-5500': SH: 50% MEDDRKGY -
MEDLTGY, BLKY TO SUBBLKY,
GRY TO SLTY TXT, FRM TO BRIT,
TRC FREE CAL, TRC IMBD PYR, NO
STN, NO FLOR, SLOW LZY CUT,
FNT DRKYL RNG

-50

TG, C1-C4

CG 151u

CG 277u

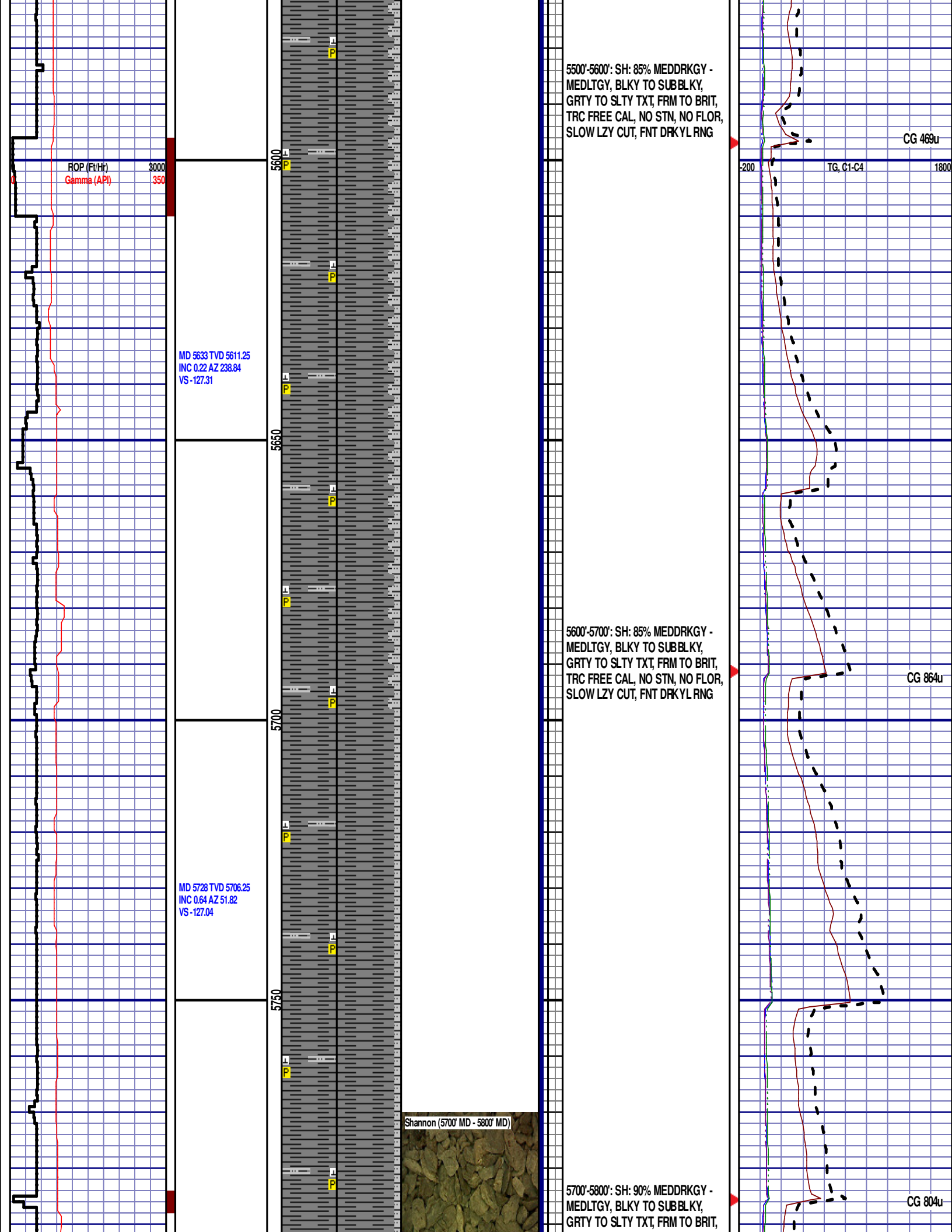
GAS SCALE
CHANGE: -200u TO
1800u

Scale Change
TG, C1-C4

200 UNITS/
DIVISION

-200

1800



ROP (Fe/Hr)
Gamma (API)

3000
350

MD 5633 TVD 5611.25
INC 0.22 AZ 238.84
VS -127.31

MD 5728 TVD 5706.25
INC 0.64 AZ 51.82
VS -127.04

Shannon (5700' MD - 5800' MD)

5500'-5600': SH: 85% MEDDRKGY -
MEDLTGY, BLKY TO SUBBLKY,
GRTY TO SLTY TXT, FRM TO BRIT,
TRC FREE CAL, NO STN, NO FLOR,
SLOW LZY CUT, FNT DRKYL RNG

CG 469u

TG, C1-C4

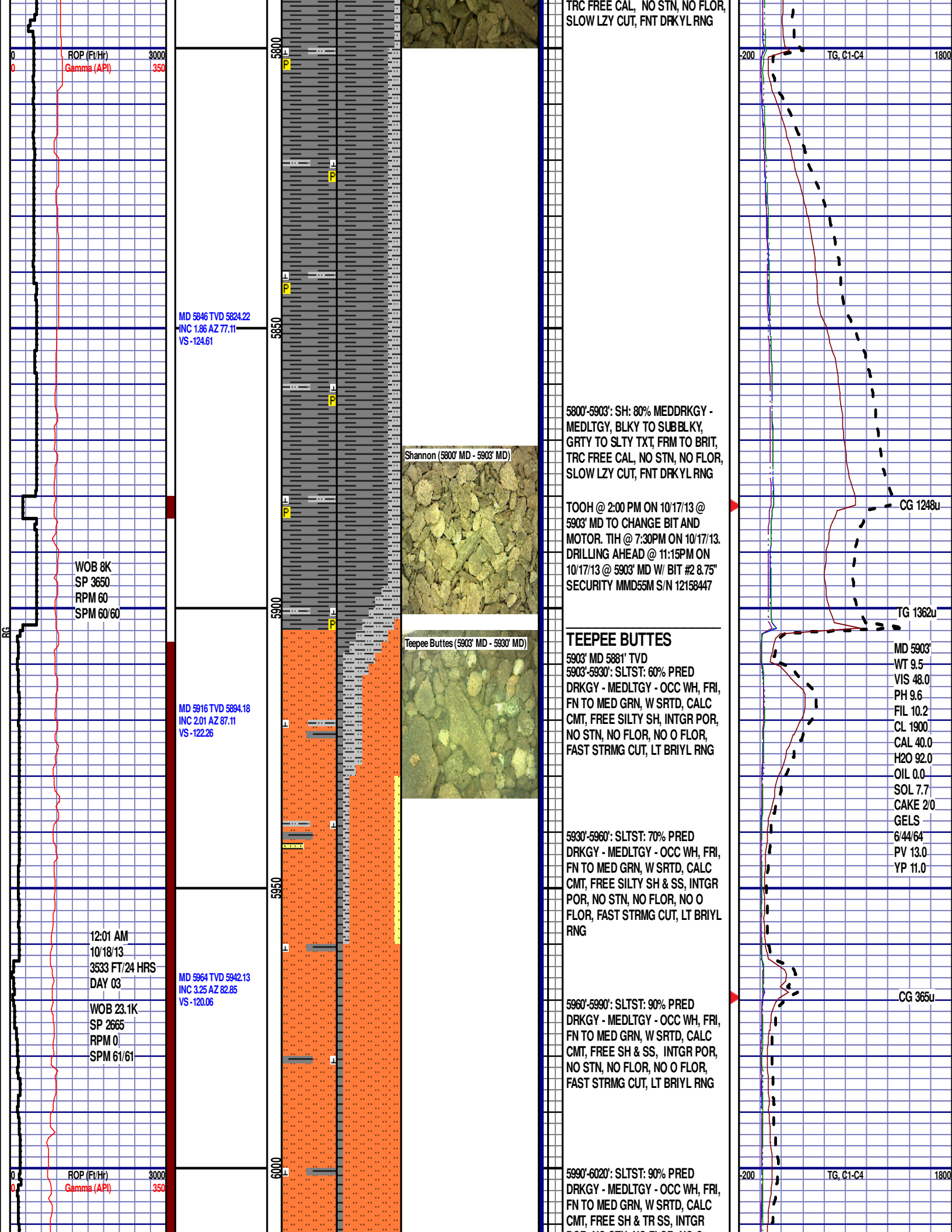
1800

5600'-5700': SH: 85% MEDDRKGY -
MEDLTGY, BLKY TO SUBBLKY,
GRTY TO SLTY TXT, FRM TO BRIT,
TRC FREE CAL, NO STN, NO FLOR,
SLOW LZY CUT, FNT DRKYL RNG

CG 864u

5700'-5800': SH: 90% MEDDRKGY -
MEDLTGY, BLKY TO SUBBLKY,
GRTY TO SLTY TXT, FRM TO BRIT,

CG 804u



MD 6011 TVD 6088.89
INC 7.9 AZ 79.03
VS -115.52

MD 6059 TVD 6036.2
INC 11.52 AZ 72.05
VS -107.59

MD 6106 TVD 6082
INC 14.38 AZ 72.27
VS -97.36

MD 6154 TVD 6128.3
INC 16.19 AZ 75.77
VS -84.98

MD 6201 TVD 6173.04
INC 19.44 AZ 81.03
VS -70.73

ROP (Ft/Hr)
Gamma (API)

3000
350

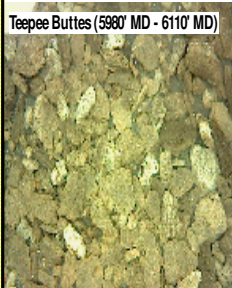
6050

6100

6150

6200

Teepee Buttes (5980' MD - 6110' MD)



POR, NO STN, NO FLOR, NO O
FLOR, FAST STRMG CUT, LT BRIYL RING

6020'-6050': SLTST: 80% PRED
DRKGY - MEDLTGY - OCC WH, FRI,
FN TO MED GRN, W SRTD, CALC
CMT, FREE SH & SS, INTGR POR,
NO STN, NO FLOR, NO O FLOR,
FAST STRMG CUT, LT BRIYL RING

6050'-6080': SLTST: 80% PRED
DRKGY - MEDLTGY - OCC WH, FRI,
FN TO MED GRN, W SRTD, CALC
CMT, FREE SH & SS, INTGR POR,
NO STN, NO FLOR, NO O FLOR,
FAST STRMG CUT, LT BRIYL RING

6080'-6110': SLTST: 90% PRED
DRKGY - MEDLTGY, FRI, FN TO MED
GRN, W SRTD, CALC CMT, FREE
SS, INTGR POR, NO STN, NO FLOR,
NO O FLOR, FAST STRMG CUT, LT
BRIYL RING

6110'-6140': SLTST: 90% PRED
DRKGY - MEDLTGY, FRI, FN TO MED
GRN, W SRTD, CALC CMT, FREE
SS, INTGR POR, NO STN, NO FLOR,
NO O FLOR, FAST STRMG CUT, LT
BRIYL RING

6140'-6170': SLTST: 90% PRED
DRKGY - MEDLTGY, FRI, FN TO MED
GRN, W SRTD, CALC CMT, FREE
SS, INTGR POR, NO STN, NO FLOR,
NO O FLOR, FAST STRMG CUT, LT
BRIYL RING

6170'-6200': SLTST: 90% PRED
DRKGY - MEDLTGY, FRI, FN TO MED
GRN, W SRTD, CALC CMT, FREE
SS, FREE PYR, INTGR POR, NO
STN, NO FLOR, NO O FLOR, FAST
STRMG CUT, LT BRIYL RING

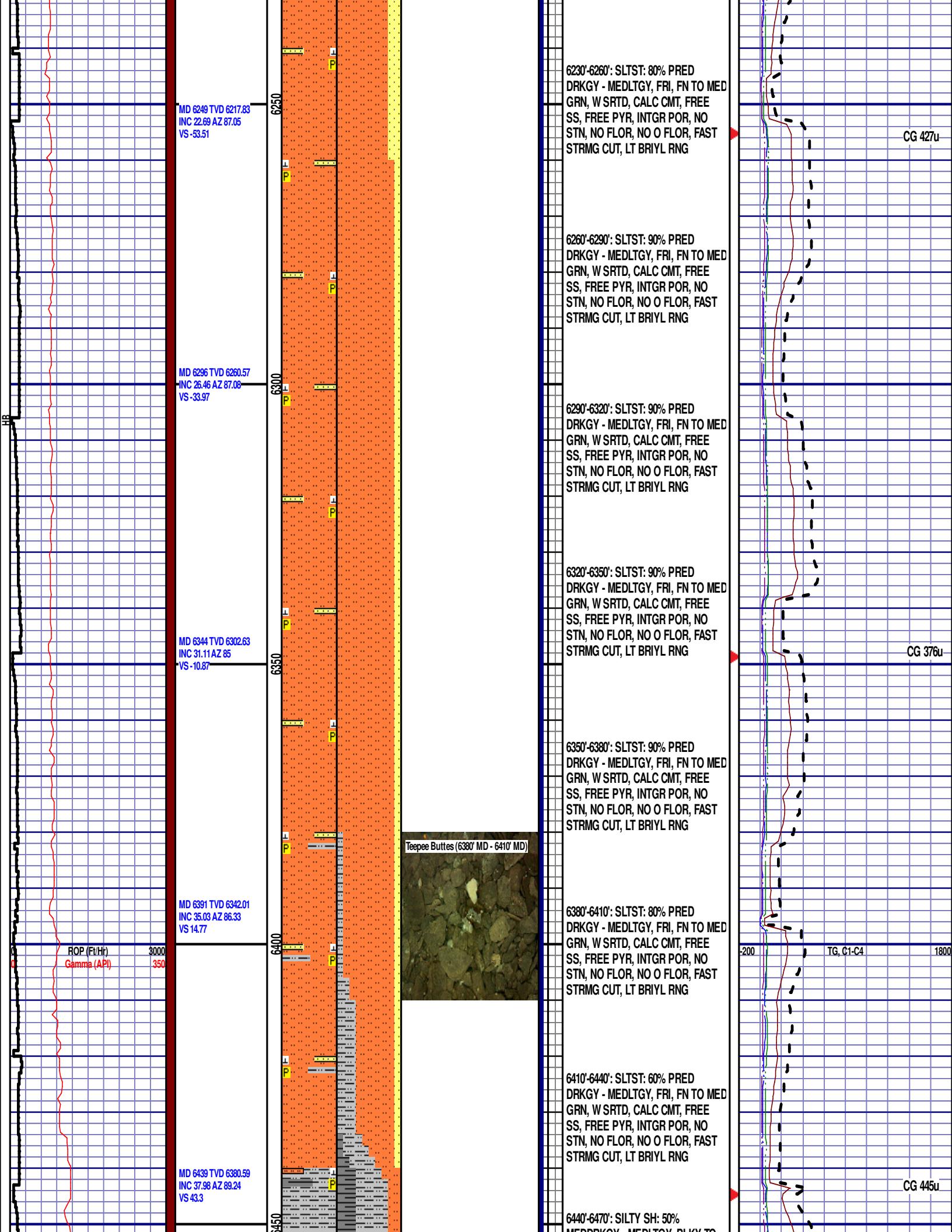
6200'-6230': SLTST: 90% PRED
DRKGY - MEDLTGY, FRI, FN TO MED
GRN, W SRTD, CALC CMT, FREE
SS, FREE PYR, INTGR POR, NO
STN, NO FLOR, NO O FLOR, FAST
STRMG CUT, LT BRIYL RING

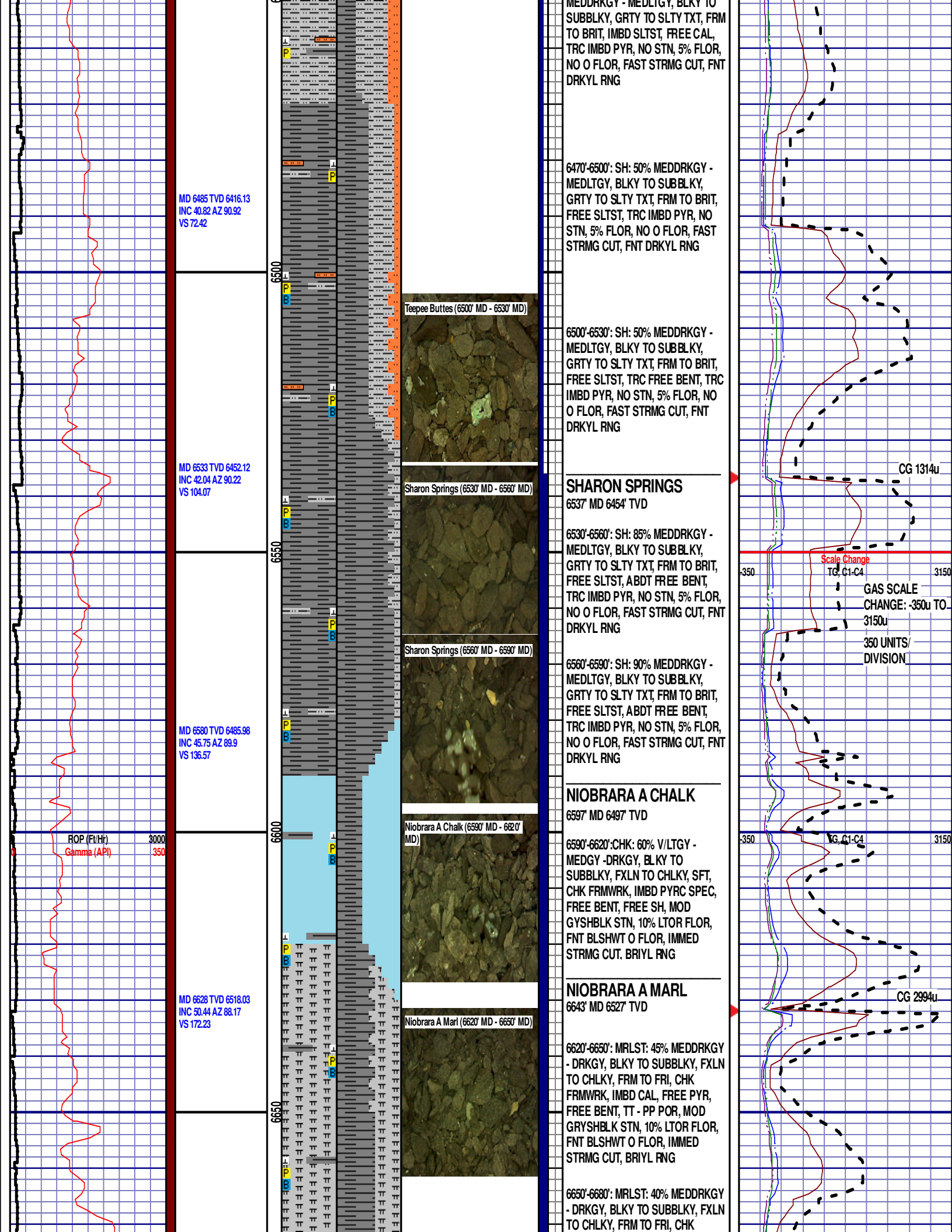
CG 205u

MD 6118'
WT 9.7
VIS 54
PH 9.4
FIL 8.4
CL 1800
CAL 40
H2O 92.2
LGS 44.2
OIL 0.0
SOL 7.5
CAKE 2/0
GELS 5/43/56
PV 14
YP 15
CG 221u

TG, C1-C4

1800





MD 6485 TVD 6416.13
INC 40.82 AZ 90.92
VS 72.42

MD 6533 TVD 6452.12
INC 42.04 AZ 90.22
VS 104.07

MD 6580 TVD 6485.98
INC 45.75 AZ 89.9
VS 136.57

MD 6628 TVD 6518.03
INC 50.44 AZ 88.17
VS 172.23

ROP (Ft/Hr)
Gamma (API)

3000
350

Teepee Buttes (6500' MD - 6530' MD)

Sharon Springs (6530' MD - 6560' MD)

Sharon Springs (6560' MD - 6590' MD)

Niobrara A Chalk (6590' MD - 6620' MD)

Niobrara A Marl (6620' MD - 6650' MD)

6470'-6500': SH: 50% MEDDRKGY - MEDLTGY, BLKY TO SUBBLKY, GRTY TO SLTY TXT, FRM TO BRIT, FREE SLTST, TRC IMBD PYR, NO STN, 5% FLOR, NO O FLOR, FAST STRMG CUT, FNT DRKYL RNG

6500'-6530': SH: 50% MEDDRKGY - MEDLTGY, BLKY TO SUBBLKY, GRTY TO SLTY TXT, FRM TO BRIT, FREE SLTST, TRC FREE BENT, TRC IMBD PYR, NO STN, 5% FLOR, NO O FLOR, FAST STRMG CUT, FNT DRKYL RNG

SHARON SPRINGS

6537' MD 6454' TVD

6530'-6560': SH: 85% MEDDRKGY - MEDLTGY, BLKY TO SUBBLKY, GRTY TO SLTY TXT, FRM TO BRIT, FREE SLTST, ABDT FREE BENT, TRC IMBD PYR, NO STN, 5% FLOR, NO O FLOR, FAST STRMG CUT, FNT DRKYL RNG

6560'-6590': SH: 90% MEDDRKGY - MEDLTGY, BLKY TO SUBBLKY, GRTY TO SLTY TXT, FRM TO BRIT, FREE SLTST, ABDT FREE BENT, TRC IMBD PYR, NO STN, 5% FLOR, NO O FLOR, FAST STRMG CUT, FNT DRKYL RNG

NIORARA A CHALK

6597' MD 6497' TVD

6590'-6620':CHK: 60% V/LTGY - MEDGY - DRKGY, BLKY TO SUBBLKY, FXLN TO CHLKY, SFT, CHK FRMWRK, IMBD PYRC SPEC, FREE BENT, FREE SH, MOD GYSHBLK STN, 10% LTOR FLOR, FNT BLSHWT O FLOR, IMMED STRMG CUT, BRIYL RNG

NIORARA A MARL

6643' MD 6527' TVD

6620'-6650': MRLST: 45% MEDDRKGY - DRKGY, BLKY TO SUBBLKY, FXLN TO CHLKY, FRM TO FRI, CHK FRMWRK, IMBD CAL, FREE PYR, FREE BENT, TT - PP POR, MOD GRYSHBLK STN, 10% LTOR FLOR, FNT BLSHWT O FLOR, IMMED STRMG CUT, BRIYL RNG

6650'-6680': MRLST: 40% MEDDRKGY - DRKGY, BLKY TO SUBBLKY, FXLN TO CHLKY, FRM TO FRI, CHK

CG 1314u

Scale Change
TG, C1-C4

GAS SCALE
CHANGE: -350u TO
3150u
350 UNITS/
DIVISION

VG, C1-C4

CG 2994u

MD 6675 TVD 6546.31
INC 55.57 AZ 87.51
VS 209.73

MD 6723 TVD 6571.35
INC 61.49 AZ 87.9
VS 250.64

6700

6750

00

FRMWRK, IMBD CAL, FREE PYR,
FREE BENT, TT - PP POR, MOD
GRYSHBLK STN, 10% LTOR FLOR,
FNT BLSHWT O FLOR, IMMED
STRMG CUT, BRIYL RNG

6680'-6710': MRLST: 45% MEDDRKGY
- DRKGY, BLKY TO SUBBLKY, FXLN
TO CHLKY, FRM TO FRI, CHK
FRMWRK, IMBD CAL, FREE PYR,
FREE BENT, TT - PP POR, MOD
GRYSHBLK STN, 10% LTOR FLOR,
FNT BLSHWT O FLOR, IMMED
STRMG CUT, BRIYL RNG

6710'-6740': MRLST: 45% MEDDRKGY
- DRKGY, BLKY TO SUBBLKY, FXLN
TO CHLKY, FRM TO FRI, CHK
FRMWRK, IMBD CAL, FREE PYR,
FREE BENT, TT - PP POR, MOD
GRYSHBLK STN, 10% LTOR FLOR,
FNT BLSHWT O FLOR, IMMED
STRMG CUT, BRIYL RNG

END OF VERTICAL LOG @ 6750' MD
ON 10/18/13. CONTINUED ON
HORIZONTAL LOG.

MD 6728'	LGS 34.35
WT 10.3	OIL 0.0
VIS 37.0	SOL 9.2
PH 9.7	CAKE 1/0
FIL 9.8	GELS 2/17/27
CL 1850	PV 12
CAL 20.0	YP 8
H2O 90.5	
	CG 1474u