

COMMENCED LOGGING @ 3:15 AM
@ 2500' MD ON 03/16/14 W/BIT # 1
8.75 ULTERRA U519M PDC S/N
21293 IN @ 654' MD

PIERRE
BEFORE LOGGING DEPTH

MD 2460'
WT 8.8
VIS 32.0
PH 10.1
FIL 16.0
CL 1800
CAL 140.0
H2O 97.1
OIL 0.0
SOL 2.6
CAKE 1/0
GELS 2 3/4
PV 4.0
YP 5.0

CG 44u

TG, C1-C4

CG 50u

2500'- 2600': SS: 60%: PRED GY -
LTKGY - OPQ, MOD CONS, FN TO
MED GRN, SUBANG, W TO MODY
SRTD, CALC CMT, SILTY, TRC IMBD
PYR, TRC IMBD GLAUC, INTGR
POR, NO STN, NO FLOR, NO O
FLOR, NO CUT, NO RNG

Pierre (2500' MD - 2600' MD)



2600'- 2700': SLTST: 60% LTGY -
MEDLTGY, FRI, FN TO MED GRN, W
SRTD, CALC CMT, TRC FREE CALC,
SANDY, TRC IMBD PYR, TRC IMBD
GLAUC, IMBD SS LAMN, INTGR
POR, NO STN, NO FLOR, NO O
FLOR, NO CUT, NO RNG

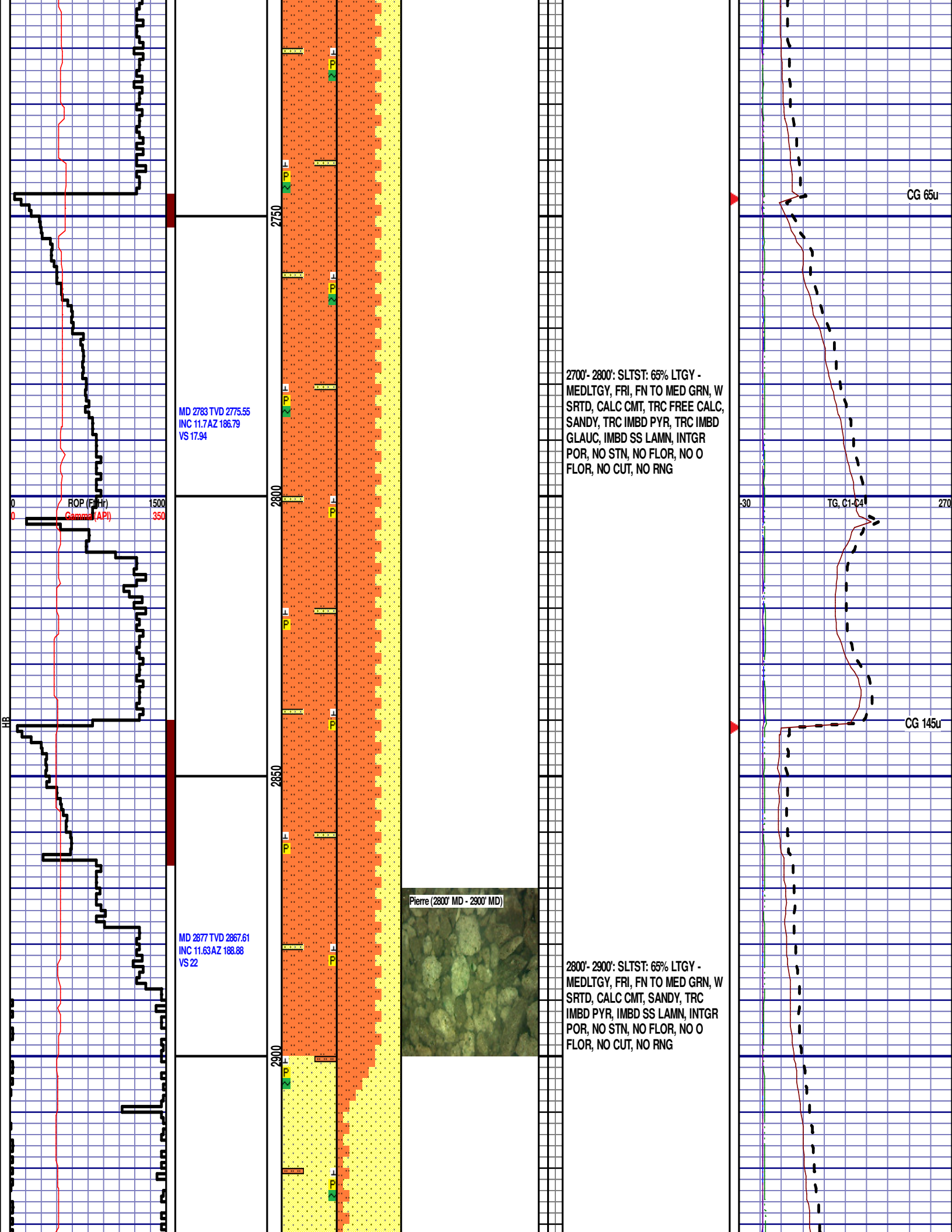
12:01 AM
3/16/14
0 FT/24 HRS
DAY 02

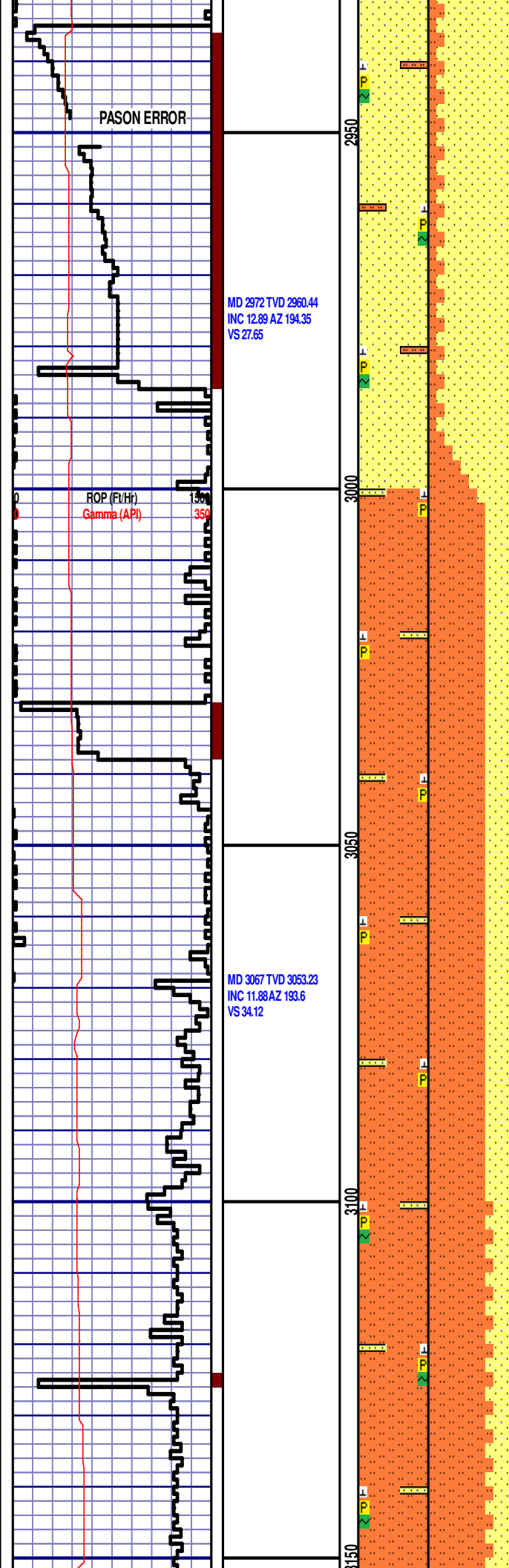
WOB 8.8K
PP 2893
RPM 81
SPM 67/67

MD 2593 TVD 2588.94
INC 10.55 AZ 179.7
VS 13.04

ROP (FIR)
Gamma (API)

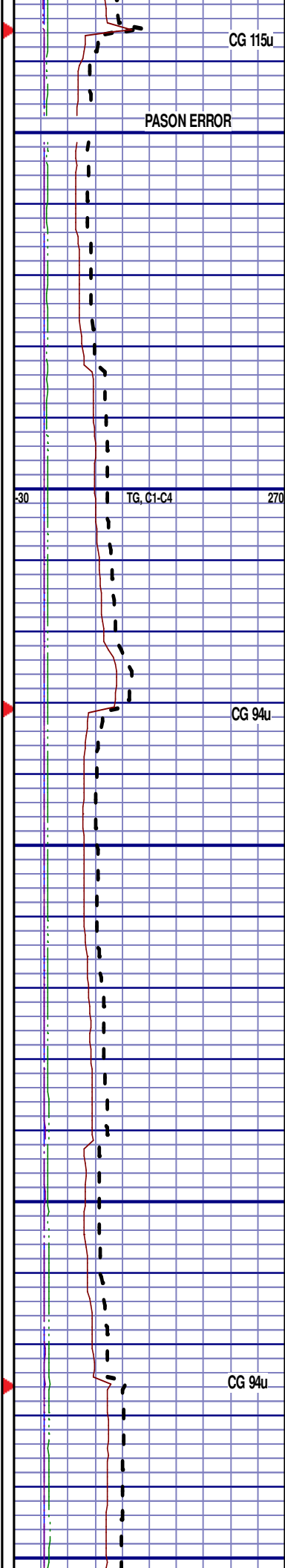
MD 2688 TVD 2682.34
INC 10.55 AZ 183.3
VS 14.86





2900'- 3000': SS: 85%: PRED GY -
LTKGY - OPQ, MOD CONS, FN TO
MED GRN, SUBANG, W TO MODY
SRTD, CALC CMT, SILTY, TRC IMBD
PYR, TRC IMBD GLAUC, INTGR
POR, NO STN, NO FLOR, NO O
FLOR, NO CUT, NO RNG

3000'- 3100': SLTST: 70% LTGY -
MEDLTGY, FRI, FN TO MED GRN, W
SRTD, CALC CMT, SANDY, TRC
IMBD PYR, IMBD SS LAMN, INTGR
POR, NO STN, NO FLOR, NO O
FLOR, NO CUT, NO RNG



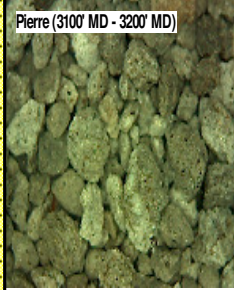
MD 3162 TVD 3146.5
INC 10.02 AZ 191.97
VS 39.5

ROP (Ft/Hr)
Gamma (API)

MD 3256 TVD 3239.11
INC 9.66 AZ 193.8
VS 44.3

MD 3351 TVD 3332.92
INC 8.5 AZ 192.34
VS 48.85

Pierre (3100' MD - 3200' MD)



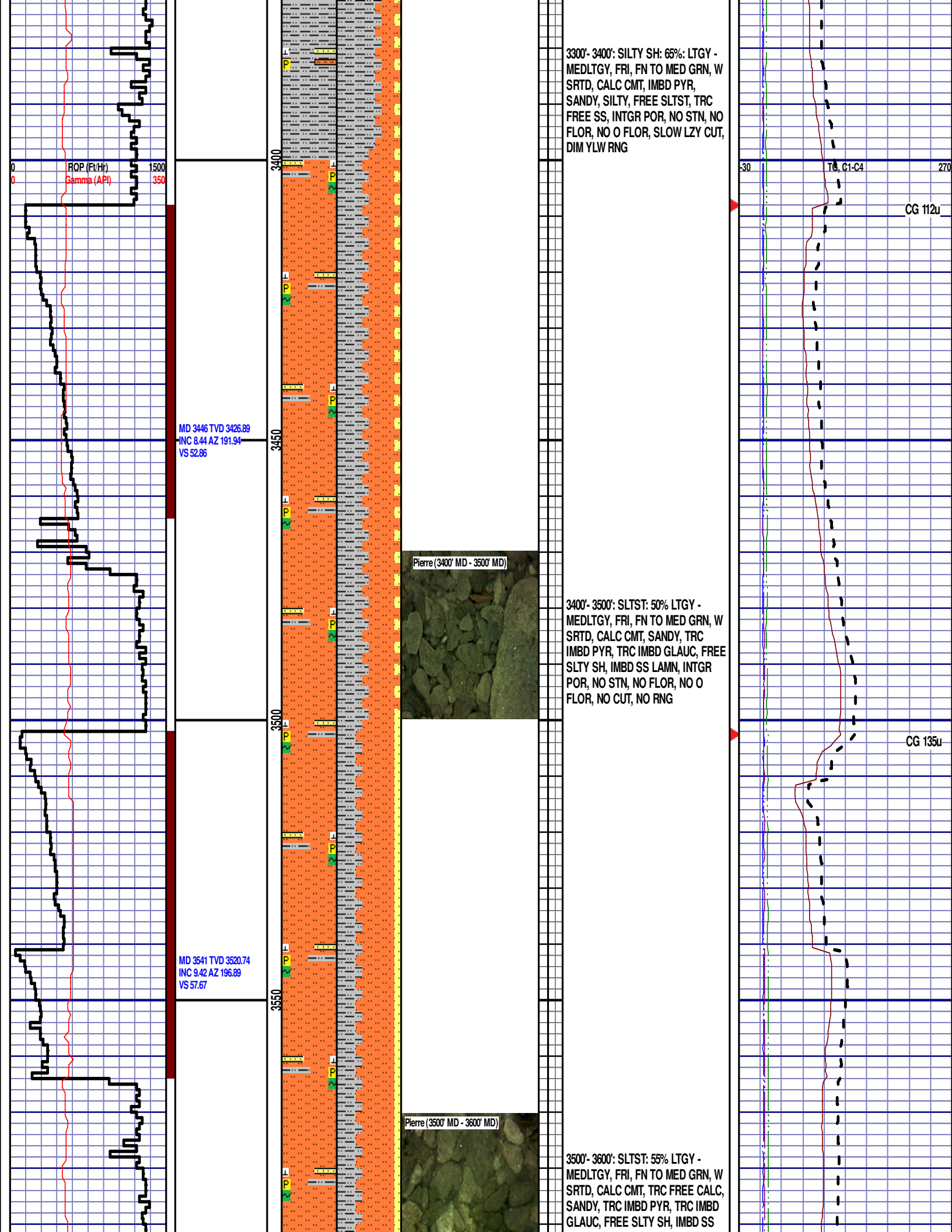
3100'- 3200': SLTST: 75% LTGY -
MEDLTGY, FRI, FN TO MED GRN, W
SRTD, CALC CMT, SANDY, TRC
IMBD PYR, TRC IMBD GLAUC, IMBD
SS LAMN, INTGR POR, NO STN, NO
FLOR, NO O FLOR, NO CUT, NO
RNG

3200'- 3300': SLTST: 65% LTGY -
MEDLTGY, FRI, FN TO MED GRN, W
SRTD, CALC CMT, SANDY, TRC
IMBD PYR, TRC IMBD GLAUC, IMBD
SS LAMN, INTGR POR, NO STN, NO
FLOR, NO O FLOR, NO CUT, NO
RNG

VG, C1-C4

CG 138u

CG 121u



ROP (ft/hr)
Gamma (API)

MD 3446 TVD 3426.89
INC 8.44 AZ 191.94
VS 52.86

MD 3541 TVD 3520.74
INC 9.42 AZ 196.89
VS 57.67

Pierre (3400' MD - 3500' MD)



Pierre (3500' MD - 3600' MD)



3300'- 3400': SILTY SH: 65%: LTGY -
MEDLTGY, FRI, FN TO MED GRN, W
SRTD, CALC CMT, IMBD PYR,
SANDY, SILTY, FREE SLTST, TRC
FREE SS, INTGR POR, NO STN, NO
FLOR, NO O FLOR, SLOW LZY CUT,
DIM YLW RNG

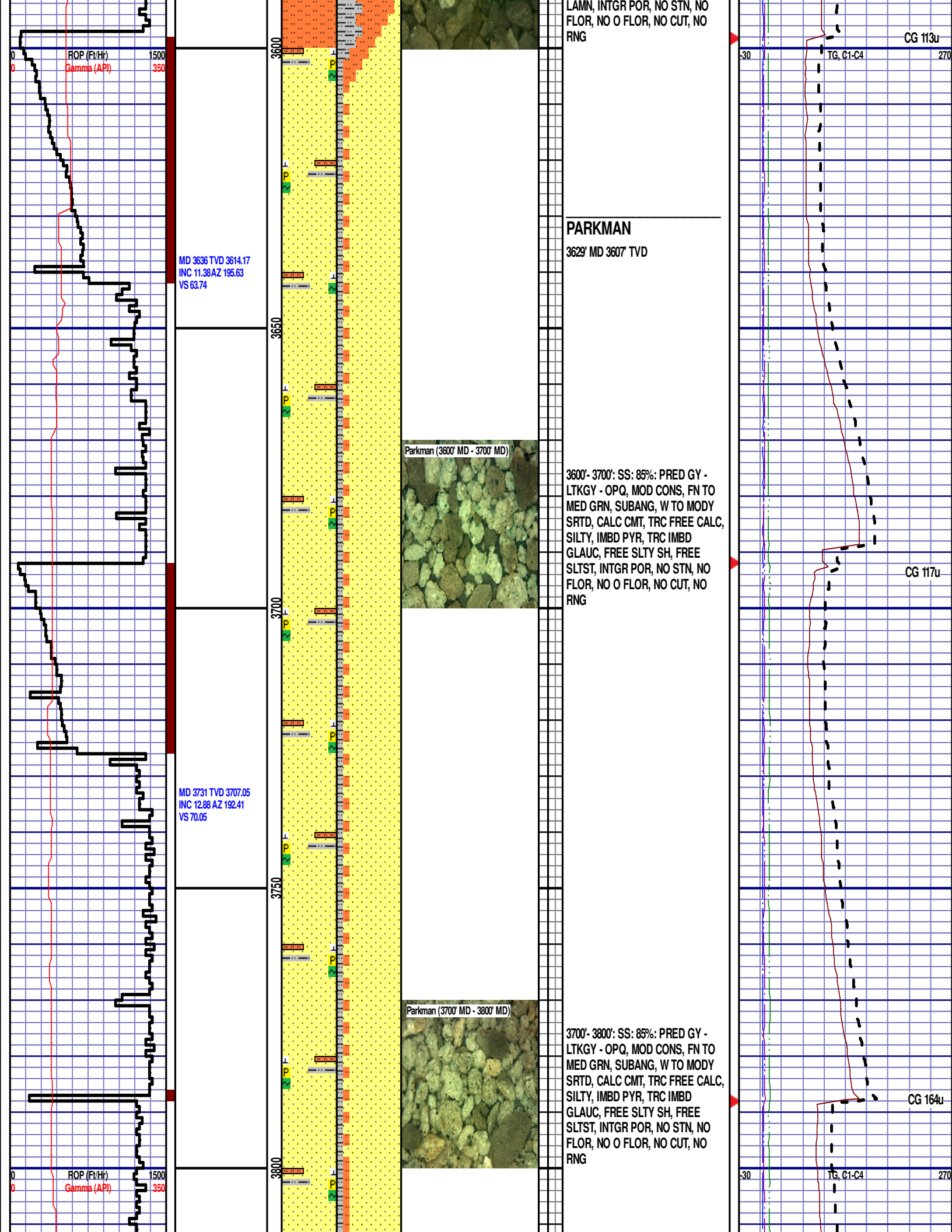
3400'- 3500': SLTST: 50% LTGY -
MEDLTGY, FRI, FN TO MED GRN, W
SRTD, CALC CMT, SANDY, TRC
IMBD PYR, TRC IMBD GLAUC, FREE
SLTY SH, IMBD SS LAMN, INTGR
POR, NO STN, NO FLOR, NO O
FLOR, NO CUT, NO RNG

3500'- 3600': SLTST: 55% LTGY -
MEDLTGY, FRI, FN TO MED GRN, W
SRTD, CALC CMT, TRC FREE CALC,
SANDY, TRC IMBD PYR, TRC IMBD
GLAUC, FREE SLTY SH, IMBD SS

30 TB, C1-C4 270

CG 112u

CG 135u



MD 3826 TVD 3799.55
INC 13.44 AZ 193.65
VS 76.58

MD 3921 TVD 3892.26
INC 11.76 AZ 197.39
VS 83.63

MD 4016 TVD 3985.7
INC 8.99 AZ 198.43
VS 90.14

3800'- 3900': SS: 80%: PRED GY -
LTKGY - OPQ, MOD CONS, FN TO
MED GRN, SUBANG, W TO MODY
SRTD, CALC CMT, TRC FREE CALC,
SILTY, IMBD PYR, TRC IMBD
GLAUC, FREE SLTY SH, FREE
SLTST, INTGR POR, NO STN, NO
FLOR, NO O FLOR, NO CUT, NO
RNG

3900'- 4000': SLTST: 80% LTGY -
MEDLTGY, FRI, FN TO MED GRN, W
SRTD, CALC CMT, SANDY, TRC
IMBD PYR, TRC IMBD GLAUC,
SILTY, IMBD SS LAMN, INTGR POR,
NO STN, NO FLOR, NO O FLOR,
SLOW LZY CUT, DIM YLW RNG

CG 202u

CG 161u

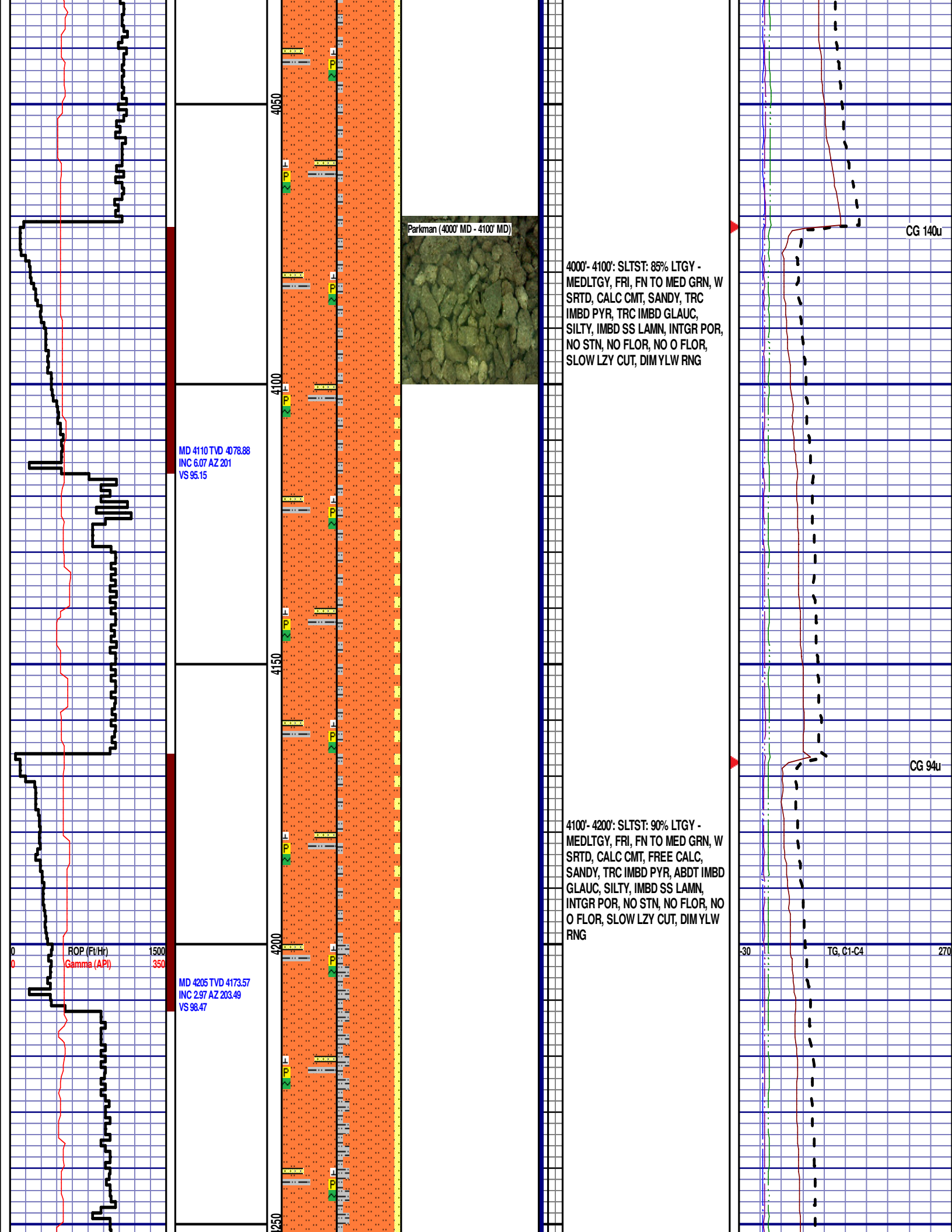
ROP (Ft/Hr)
Gamma (API)

1500
350

30

TG, C1-C4

270



4000'- 4100': SLTST: 85% LTGY - MEDLTGY, FRI, FN TO MED GRN, W SRTD, CALC CMT, SANDY, TRC IMBD PYR, TRC IMBD GLAUC, SILTY, IMBD SS LAMN, INTGR POR, NO STN, NO FLOR, NO O FLOR, SLOW LZ Y CUT, DIM YLW RNG

4100'- 4200': SLTST: 90% LTGY - MEDLTGY, FRI, FN TO MED GRN, W SRTD, CALC CMT, FREE CALC, SANDY, TRC IMBD PYR, ABTD IMBD GLAUC, SILTY, IMBD SS LAMN, INTGR POR, NO STN, NO FLOR, NO O FLOR, SLOW LZ Y CUT, DIM YLW RNG

MD 4110 TVD 4078.88
INC 6.07 AZ 201
VS 95.15

MD 4205 TVD 4173.57
INC 2.97 AZ 203.49
VS 98.47

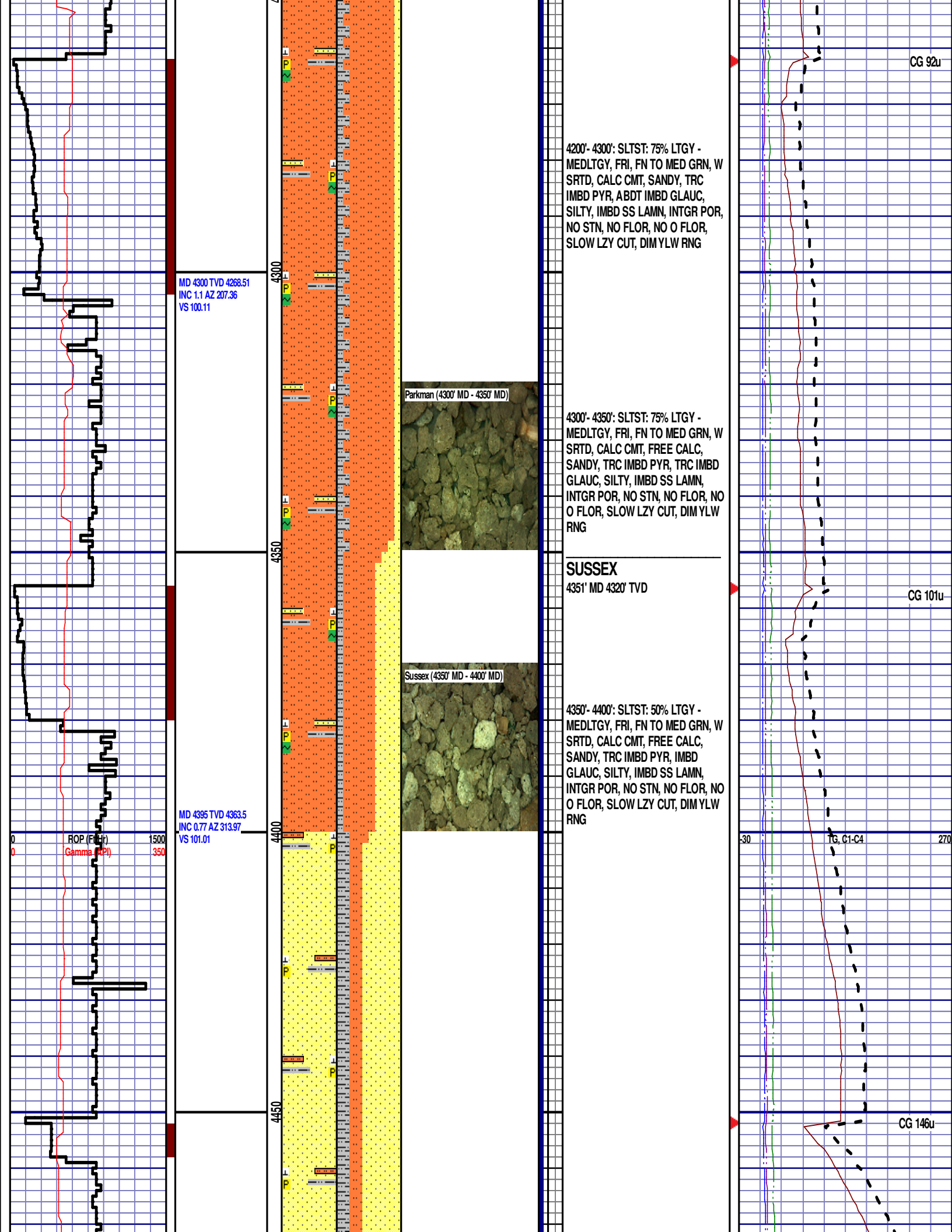
ROP (Ft/Hr)
Gamma (API)

1500
350

CG 140u

CG 94u

TG, C1-C4



MD 4489 TVD 4457.49
INC 1.31 AZ 302.5
VS 102.29

MD 4584 TVD 4552.45
INC 1.66 AZ 302.78
VS 104.25

MD 4679 TVD 4647.43
INC 1.03 AZ 325.33
VS 105.77

4400'- 4500': SS: 60%: PRED GY -
LTKGY - OPQ, MOD CONS, FN TO
MED GRN, SUBANG, W TO MODY
SRTD, CALC CMT, SILTY, IMBD PYR,
FREE SLTST, FREE SLTY SH,
INTGR POR, NO STN, NO FLOR, NO
O FLOR, SLOW LZY CUT, DIM YLW
RNG

GAS SCALE: -60
TO 540
60 UNITS/DIVISION

Scale Change
TG, 01-C4

CG 292u

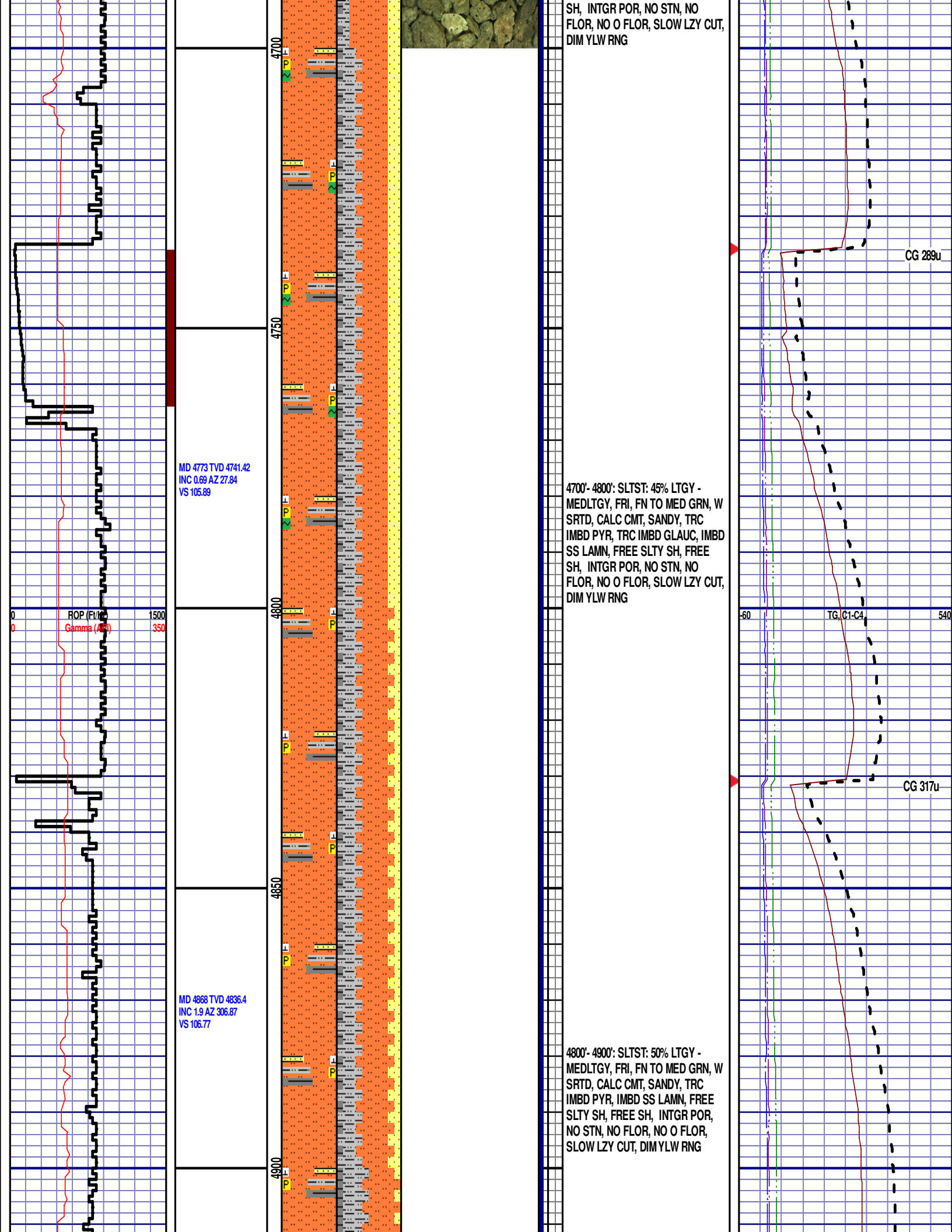
4500'- 4600': SLTST: 50% LTGY -
MEDLTGY, FRI, FN TO MED GRN, W
SRTD, CALC CMT, SANDY, TRC
IMBD PYR, TRC IMBD GLAUC, IMBD
SS LAMN, FREE SLTY SH, FREE
SH, INTGR POR, NO STN, NO
FLOR, NO O FLOR, SLOW LZY CUT,
DIM YLW RNG

TG, 01-C4

CG 331u

Sussex (4600' MD - 4700' MD)

4600'- 4700': SLTST: 60% LTGY -
MEDLTGY, FRI, FN TO MED GRN, W
SRTD, CALC CMT, SANDY, TRC
IMBD PYR, TRC IMBD GLAUC, IMBD
SS LAMN, FREE SLTY SH, FREE



SH, INTGR POR, NO STN, NO
FLOR, NO O FLOR, SLOW LZ CUT,
DIM YLW RNG

MD 4773 TVD 4741.42
INC 0.69 AZ 27.84
VS 105.89

ROP (Feet)
Gamma (API)

1500
350

4700'- 4800': SLTST: 45% LTGY -
MEDLTGY, FRI, FN TO MED GRN, W
SRTD, CALC CMT, SANDY, TRC
IMBD PYR, TRC IMBD GLAUC, IMBD
SS LAMN, FREE SLTY SH, FREE
SH, INTGR POR, NO STN, NO
FLOR, NO O FLOR, SLOW LZ CUT,
DIM YLW RNG

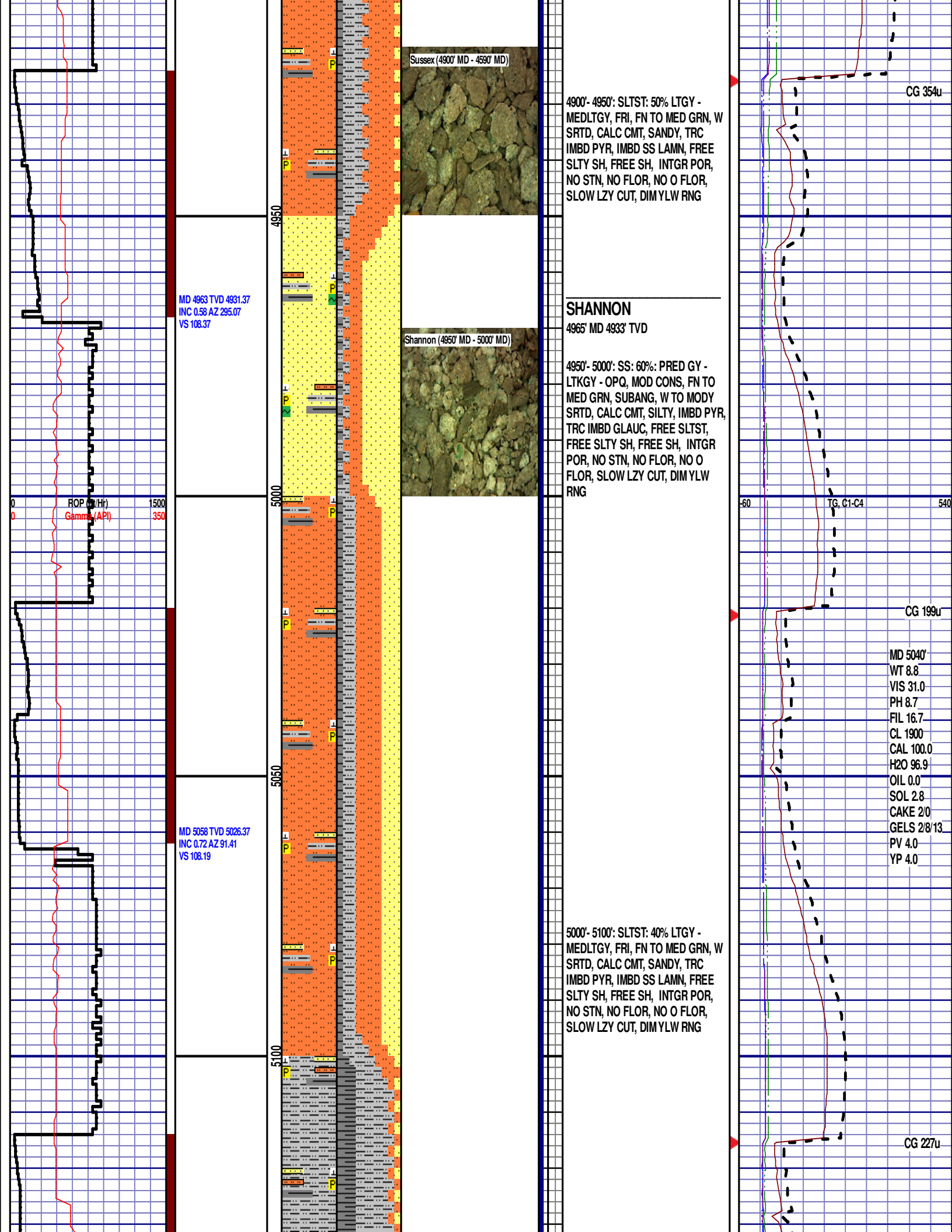
CG 289u

-60 TG, C1-C4 540

CG 317u

MD 4868 TVD 4836.4
INC 1.9 AZ 306.87
VS 106.77

4800'- 4900': SLTST: 50% LTGY -
MEDLTGY, FRI, FN TO MED GRN, W
SRTD, CALC CMT, SANDY, TRC
IMBD PYR, IMBD SS LAMN, FREE
SLTY SH, FREE SH, INTGR POR,
NO STN, NO FLOR, NO O FLOR,
SLOW LZ CUT, DIM YLW RNG



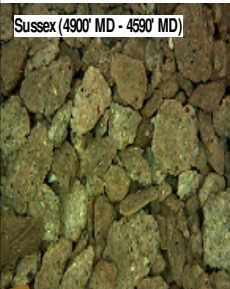
MD 4963 TVD 4931.37
INC 0.58 AZ 295.07
VS 108.37

ROP (ft/hr)
Gamma (API)

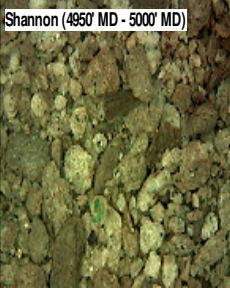
1500
350

MD 5058 TVD 5026.37
INC 0.72 AZ 91.41
VS 108.19

Sussex (4900' MD - 4950' MD)



Shannon (4950' MD - 5000' MD)



4900'- 4950': SLTST: 50% LTGY -
MEDLTGY, FRI, FN TO MED GRN, W
SRTD, CALC CMT, SANDY, TRC
IMBD PYR, IMBD SS LAMN, FREE
SLTY SH, FREE SH, INTGR POR,
NO STN, NO FLOR, NO O FLOR,
SLOW LZY CUT, DIM YLW RNG

SHANNON

4965' MD 4933' TVD

4950'- 5000': SS: 60%: PRED GY -
LTKGY - OPQ, MOD CONS, FN TO
MED GRN, SUBANG, W TO MODY
SRTD, CALC CMT, SILTY, IMBD PYR,
TRC IMBD GLAUC, FREE SLTST,
FREE SLTY SH, FREE SH, INTGR
POR, NO STN, NO FLOR, NO O
FLOR, SLOW LZY CUT, DIM YLW
RNG

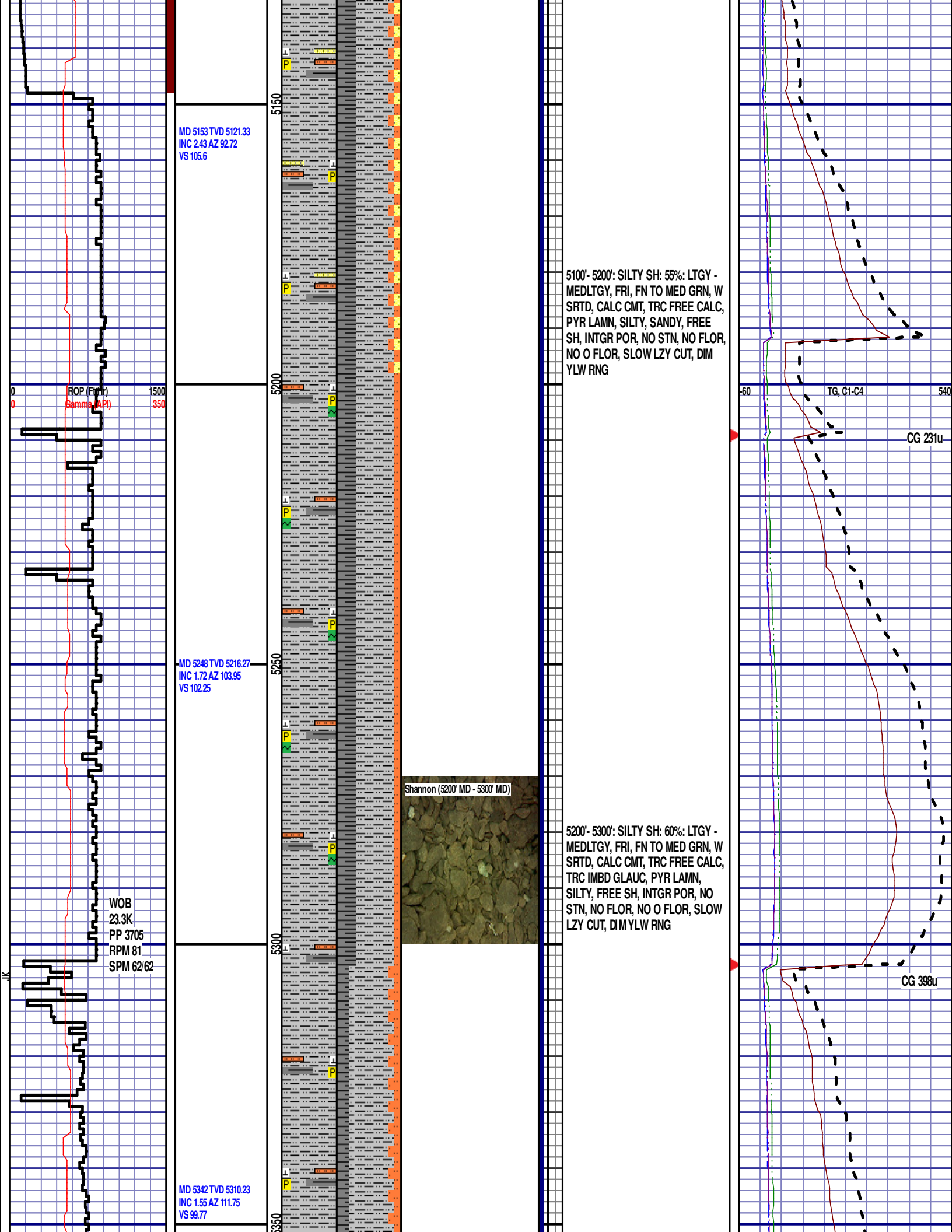
5000'- 5100': SLTST: 40% LTGY -
MEDLTGY, FRI, FN TO MED GRN, W
SRTD, CALC CMT, SANDY, TRC
IMBD PYR, IMBD SS LAMN, FREE
SLTY SH, FREE SH, INTGR POR,
NO STN, NO FLOR, NO O FLOR,
SLOW LZY CUT, DIM YLW RNG

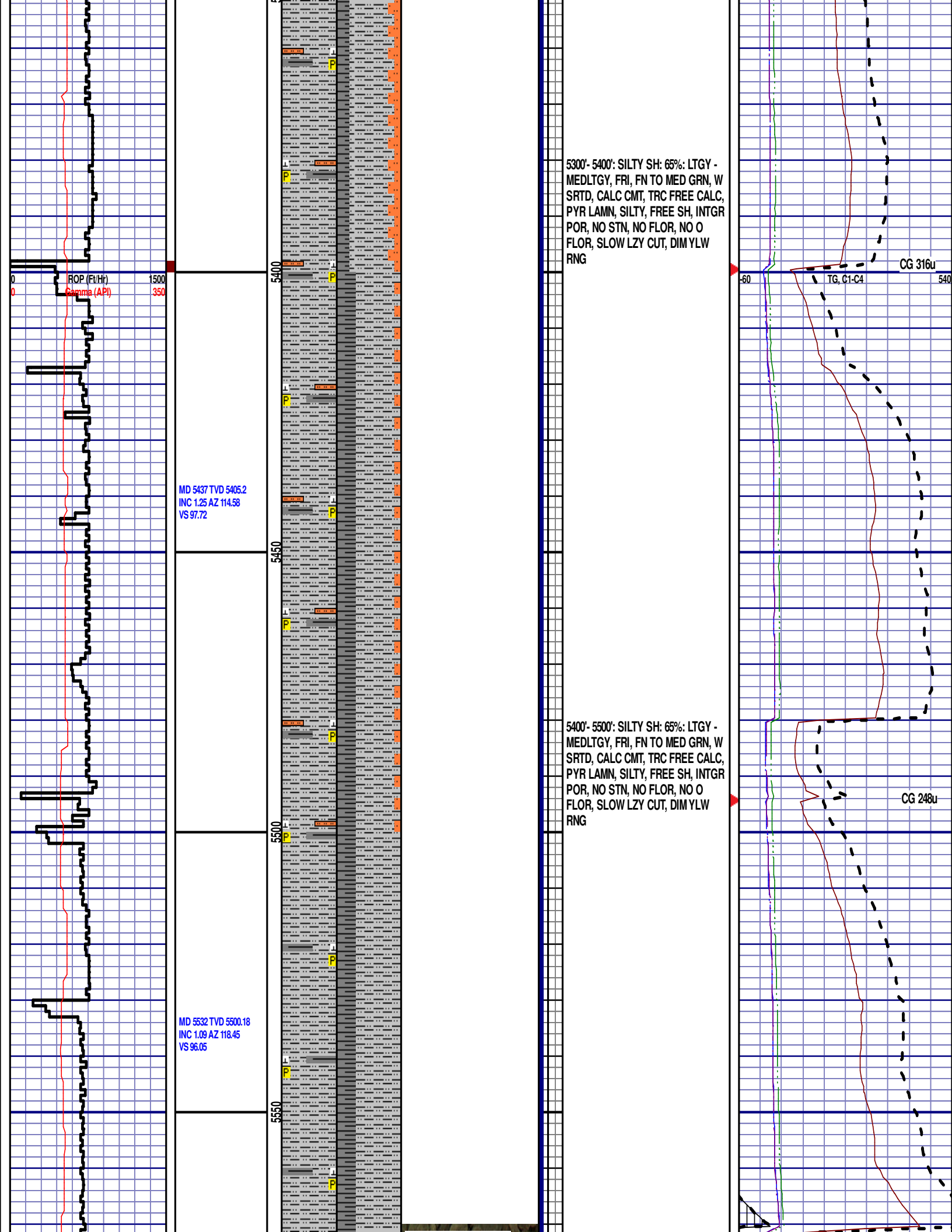
CG 354u

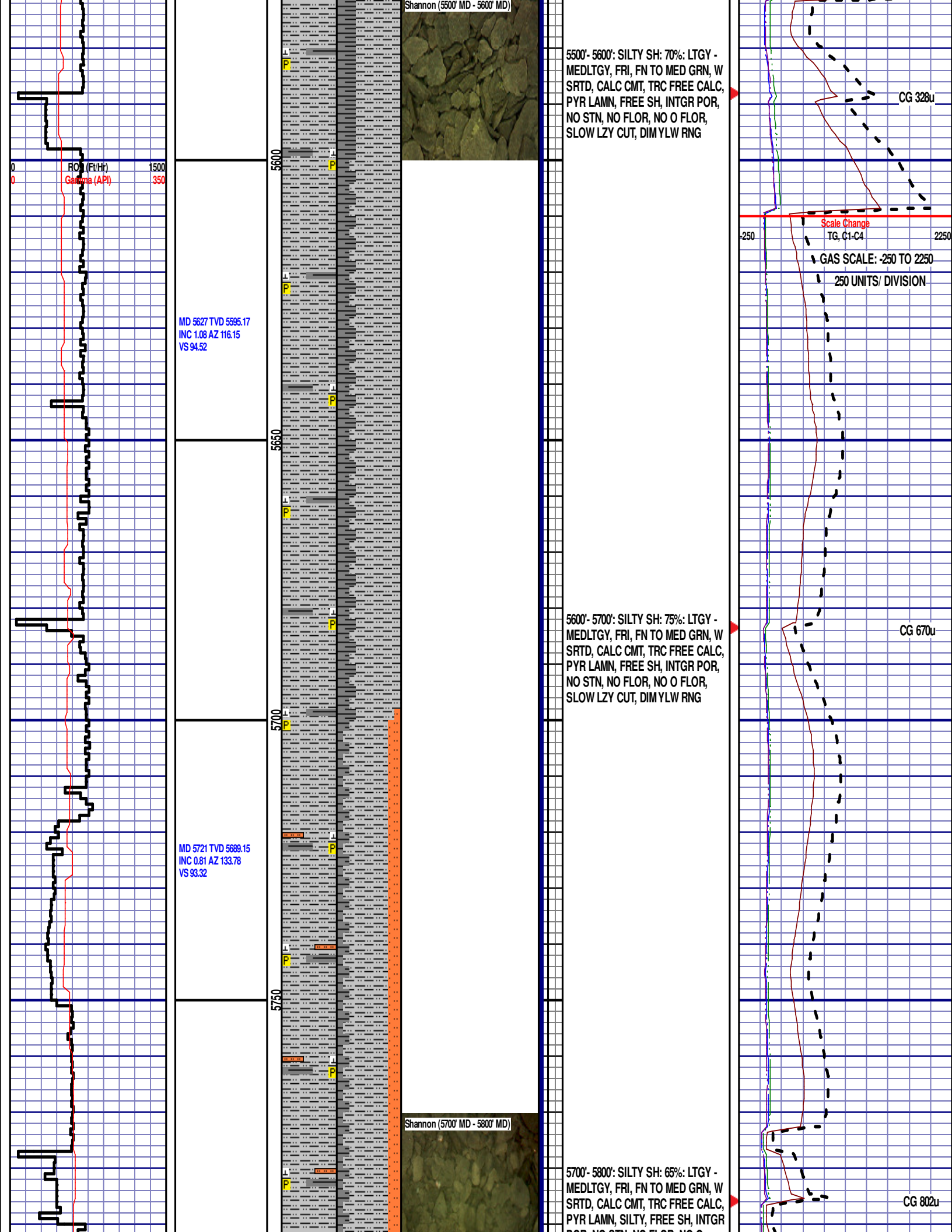
CG 199u

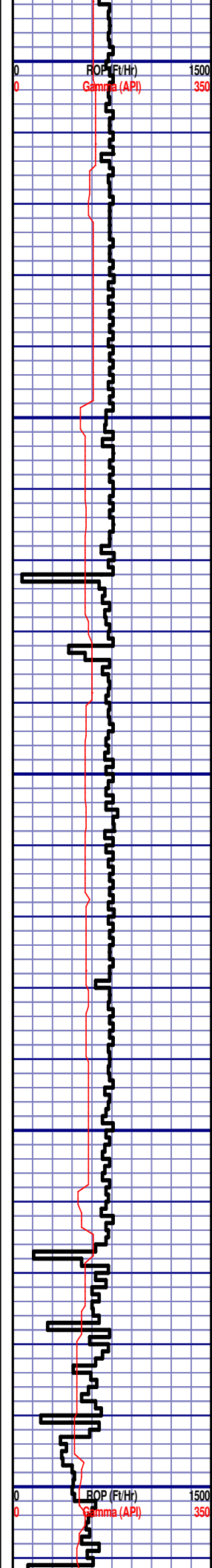
MD 5040'
WT 8.8
VIS 31.0
PH 8.7
FIL 16.7
CL 1900
CAL 100.0
H2O 96.9
OIL 0.0
SOL 2.8
CAKE 2/0
GELS 2/8/13
PV 4.0
YP 4.0

CG 227u





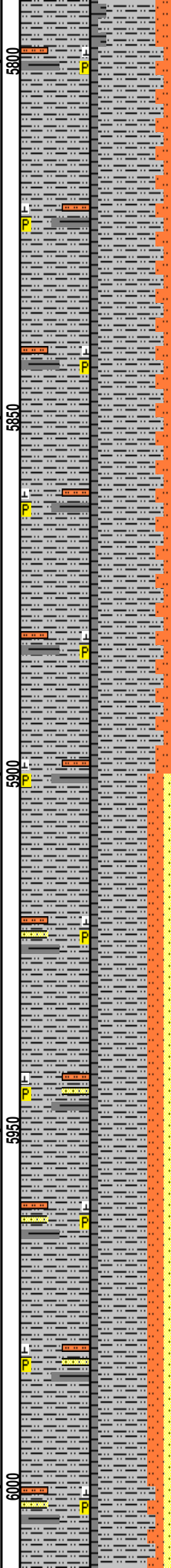




MD 5816 TVD 5784.15
INC 0.61 AZ 142.38
VS 92.6

MD 5911 TVD 5879.14
INC 0.63 AZ 151.77
VS 92.11

MD 5984 TVD 5952.14
INC 0.46 AZ 160.48
VS 91.87



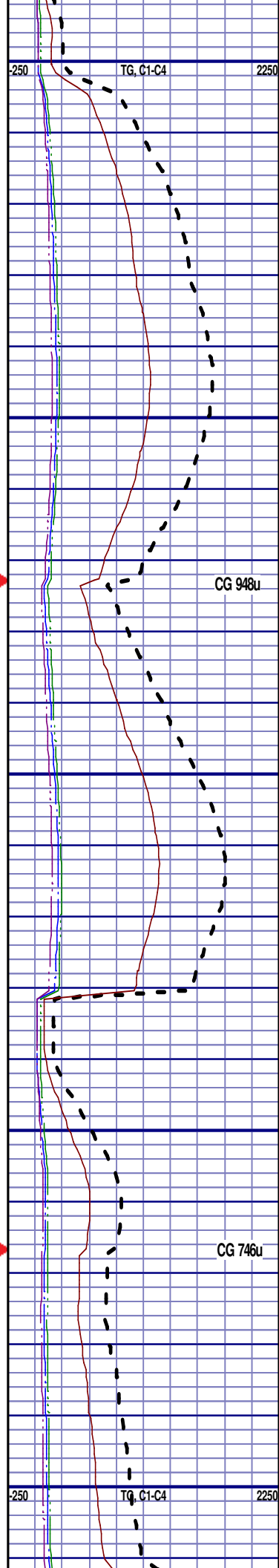
POR, NO STN, NO FLOR, NO O
FLOR, SLOW LZY CUT, DIM YLW
RNG

TEEPEE BUTTES

5814' MD 5782' TVD

5800'- 5900': SILTY SH: 75%: LTGY -
MEDLTGY, FRI, FN TO MED GRN, W
SRTD, CALC CMT, TRC FREE CALC,
PYR LAMN, SILTY, FREE SH, INTGR
POR, NO STN, NO FLOR, NO O
FLOR, SLOW LZY CUT, DIM YLW
RNG

5900'- 6000': SILTY SH: 60%: LTGY -
MEDLTGY, FRI, FN TO MED GRN, W
SRTD, CALC CMT, TRC FREE CALC,
PYR LAMN, SILTY, SANDY, FREE
SH, INTGR POR, NO STN, NO FLOR,
NO O FLOR, SLOW LZY CUT, DIM
YLW RNG



CG 948u

CG 746u

WOB 23.7K
PP 3855
RPM 81
SPM 55/54

12:01 AM
3/17/14
3540 FT/24 HRS
DAY 03

MD 6046 TVD 6014.14
INC 0.13 AZ 156.77
VS 91.79

MD 6099 TVD 6067.13
INC 1.01 AZ 230.15
VS 92.15

MD 6147 TVD 6115
INC 7.01 AZ 241.35
VS 95.17

MD 6194 TVD 6161.23
INC 13.4 AZ 246.83
VS 102.95

WOB 5.4K
PP 3015
RPM 0
SPM 67/67

ROP (Ft/Hr)
Gamma (API)

1500
350

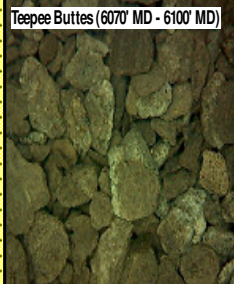
6050

6100

6150

6200

Tepee Buttes (6070' MD - 6100' MD)



6000'- 6040': SILTY SH: 65%: LTGY -
MEDLTGY, FRI, FN TO MED GRN, W
SRTD, CALC CMT, TRC FREE CALC,
PYR LAMN, SILTY, SANDY, FREE
SH, INTGR POR, NO STN, NO FLOR,
NO O FLOR, SLOW LZY CUT, DIM
YLW RNG

TOOH @ 8:15PM ON 3/16/14 @ 6040'
MD TO PICK UP CURVE BHA. THH @
11:45PM ON 3/16/14. RESUMED
DRILLING @ 2:45 AM ON 3/17/14 W/
BIT # 2 8.75" SMITH SDi519 HPX
S/N JH8252 IN @ 6040' MD

SWITCH TO 30' SAMPLE INTERVAL

6040'- 6070': SILTY SH: 65%: LTGY -
MEDLTGY, FRI, FN TO MED GRN, W
SRTD, CALC CMT, TRC FREE CALC,
PYR LAMN, SILTY, SANDY, FREE
SH, INTGR POR, NO STN, NO FLOR,
NO O FLOR, SLOW LZY CUT, DIM
YLW RNG

6070'- 6100': SILTY SH: 45%: LTGY -
MEDLTGY, FRI, FN TO MED GRN, W
SRTD, CALC CMT, TRC FREE CALC,
PYR LAMN, SILTY, SANDY, FREE
SH, INTGR POR, NO STN, NO FLOR,
NO O FLOR, SLOW LZY CUT, DIM
YLW RNG

6100'- 6130': SILTY SH: 55%: LTGY -
MEDLTGY, FRI, FN TO MED GRN, W
SRTD, CALC CMT, TRC FREE CALC,
PYR LAMN, SILTY, SANDY, FREE
SH, INTGR POR, NO STN, NO FLOR,
NO O FLOR, SLOW LZY CUT, DIM
YLW RNG

6130'- 6160': SILTY SH: 60%: LTGY -
MEDLTGY, FRI, FN TO MED GRN, W
SRTD, CALC CMT, TRC FREE CALC,
PYR LAMN, SILTY, SANDY, FREE
SH, INTGR POR, NO STN, NO FLOR,
NO O FLOR, SLOW LZY CUT, DIM
YLW RNG

6160'- 6190': SILTY SH: 55%: LTGY -
MEDLTGY, FRI, FN TO MED GRN, W
SRTD, CALC CMT, TRC FREE CALC,
PYR LAMN, SILTY, SANDY, FREE
SH, INTGR POR, NO STN, NO FLOR,
NO O FLOR, SLOW LZY CUT, DIM
YLW RNG

6190'- 6220': SILTY SH: 50%: LTGY -
MEDLTGY, FRI, FN TO MED GRN, W
SRTD, CALC CMT, PYR LAMN,
SILTY, SANDY, INTGR POR, NO
STN, NO FLOR, NO O FLOR, SLOW
LZY CUT, DIM YLW RNG

MD 6040'
WT 9.5
VIS 42.0
PH 9.0
FIL 9.1
CL 1900
CAL 80.0
H2O 93.7
OIL 0.0
SOL 6.0
CAKE 2/0
GELS 4/17/26
PV 10.0
YP 11.0

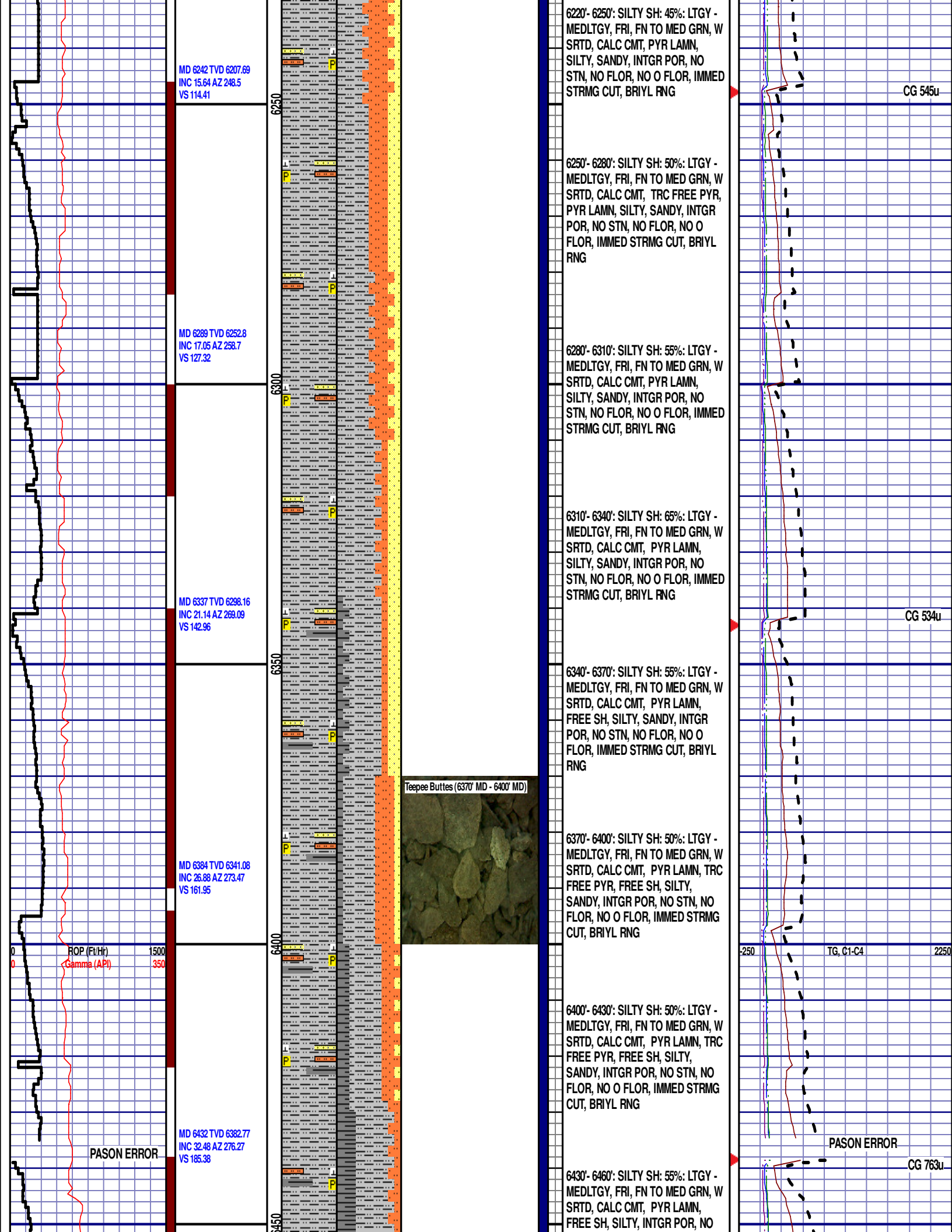
TG 893u

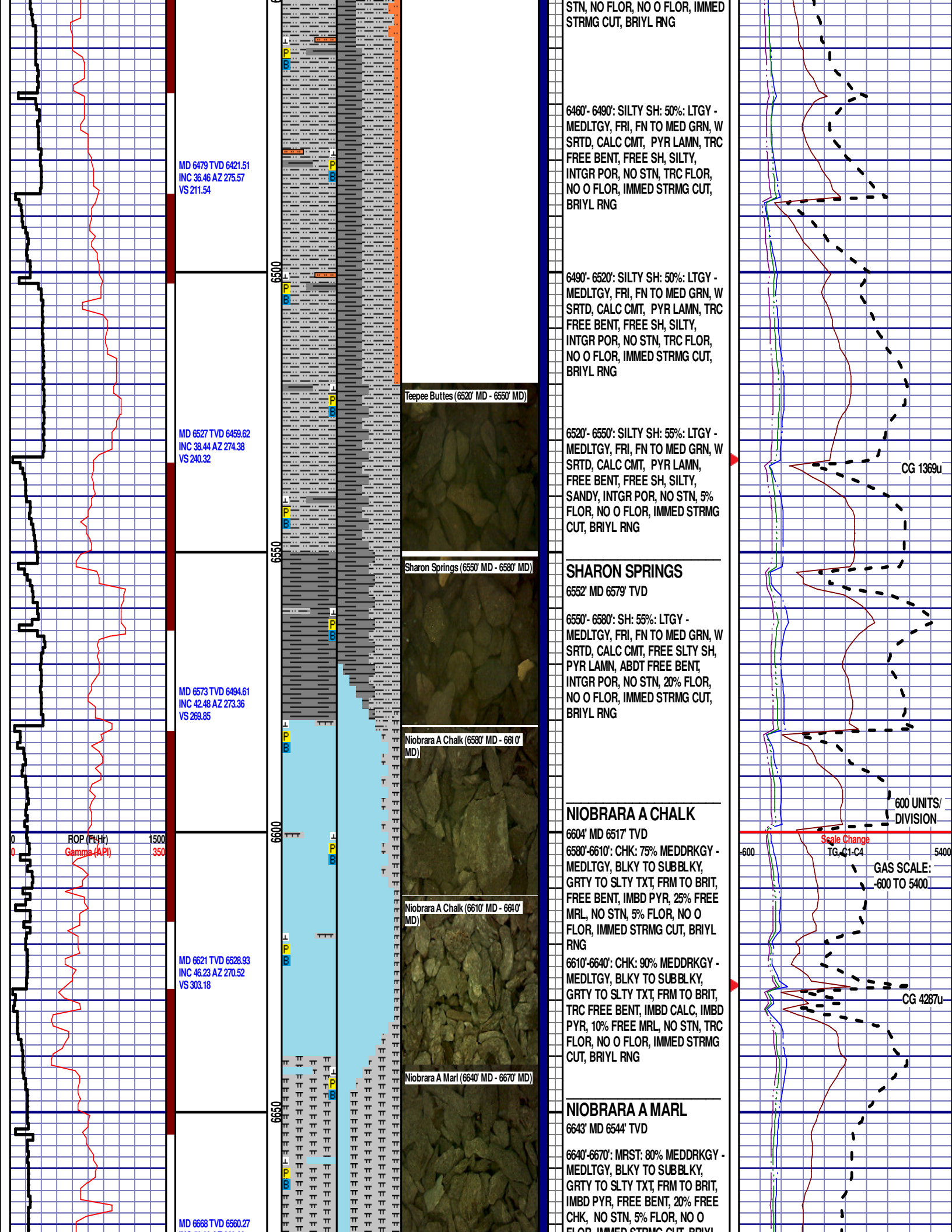
CG 463u

CG 702u

TG, C1-C4

2250





INC 50.09 AZ 269.66
VS 338.08

WOB 33.8K
PP 3511
RPM 0
SPM 62/62

MD 6716 TVD 6588.97
INC 56.44 AZ 271.07
VS 376.38

MD 6763 TVD 6613.05
INC 61.9 AZ 273.09
VS 416.45

WOB 24.0K
PP 3557
RPM 20
SPM 60/59

ROP (Ft/Hr) 1500
Gamma (API) 350

6700

6750

6800

Niobrara A Marl (6670' MD - 6700' MD)

Niobrara A Marl (6700' MD - 6730' MD)

Niobrara B Chalk (6730' MD - 6760' MD)

FLOO, IMMED STRMG CUT, BRIYL
RNG

6670'-6700': MRST: 80% MEDDRKGY -
MEDLTGY, BLKY TO SUBBLKY,
GRTY TO SLTY TXT, FRM TO BRIT,
IMBD PYR, FREE BENT, 20% FREE
CHK, NO STN, 5% FLOR, NO O
FLOR, IMMED STRMG CUT, BRIYL
RNG

6700'-6730': MRST: 85% MEDDRKGY -
MEDLTGY, BLKY TO SUBBLKY,
GRTY TO SLTY TXT, FRM TO BRIT,
IMBD PYR, FREE BENT, 15% FREE
CHK, NO STN, 5% FLOR, NO O
FLOR, IMMED STRMG CUT, BRIYL
RNG

NIOBRARA B CHALK

6730' MD 6596' TVD

6730'-6760': CHK: 75% MEDDRKGY -
MEDLTGY, BLKY TO SUBBLKY,
GRTY TO SLTY TXT, FRM TO BRIT,
TRC FREE BENT, IMBD CALC, IMBD
PYR, 25% FREE MRL, NO STN, TRC
FLOR, NO O FLOR, IMMED STRMG
CUT, BRIYL RNG

6760'-6790': CHK: 95% MEDDRKGY -
MEDLTGY, BLKY TO SUBBLKY,
GRTY TO SLTY TXT, FRM TO BRIT,
FREE BENT, IMBD CALC, FREE
CALC, IMBD PYR, 5% FREE MRL,
NO STN, 5% FLOR, NO O FLOR,
IMMED STRMG CUT, BRIYL RNG

END OF VERTICAL LOG @ 6790' MD
ON 3/17/14. CONTINUED ON
HORIZONTAL LOG.

CG 3130u

-600 TG, C1-C4 5400