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## Customer Information

**Operator:** Noble Energy Inc  
1625 Broadway  
Suite 2200  
Denver, Colorado 80202

**Geologist:** Renee Clackler  
Noble Energy Inc.

## Mud Logging Details

**Logger:** Brian Whitfield &  
Tom Denney

**Log Interval:** 2500' MD to 6710' MD

**Start Date:** December 12, 2013

**Release Date:** December 20, 2013

## Well Information

**Well Name:** Wells Ranch State  
AA27-79HN

**Location:** 21-6N-63W  
1749' FNL, 426' FEL

**County:** Weld  
**State:** Colorado

**Drilling Rig:** H&P 277

**Total Depth:** 14568' MD

**TD Date:** December 20, 2013

**Formation:** Niobrara B Chalk

**KB Elevation:** 4751'

**GR Elevation:** 4724'

**API Number:** 05-123-37717-0000

## ROCK TYPES

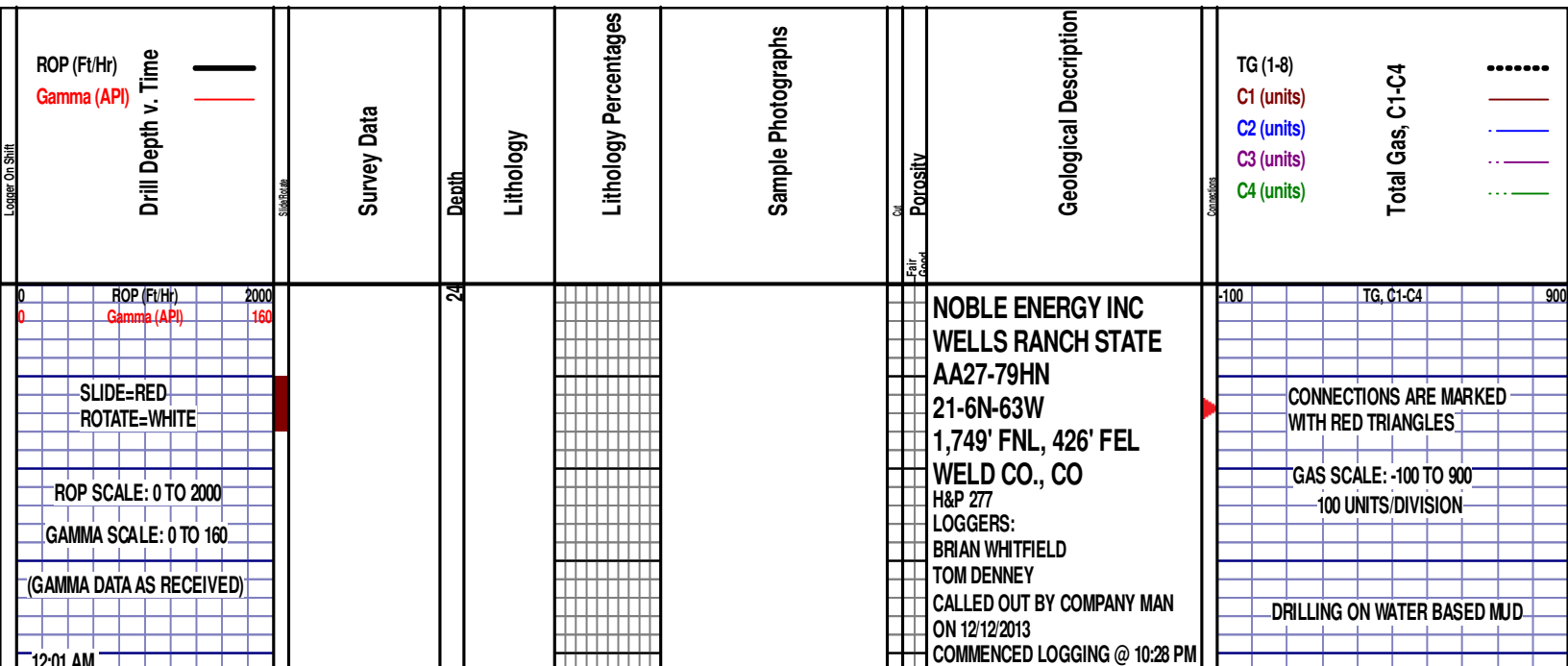
Anhy  
Bent  
Cht  
Clyst  
Coal  
Congl  
Dol

Gyp  
Igne  
Lmst  
Meta  
Mrlst  
Salt  
Shale

Shcol  
Chalk  
Slst  
Ss  
Till  
gw  
Imywash

ogw  
olmywash  
oshly gw  
shly gw  
sdygw  
hvyrcbsh  
nosmpl

Lsdetrit  
sltst  
sdy sh



12/13/2013  
FT/24 HRS 926  
DAY 02  
WOB 18.0K  
PP 2671  
RPM 75  
SPM 67/66

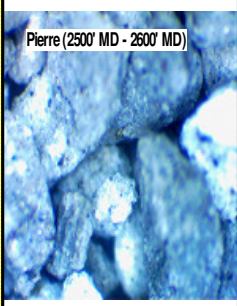
MD 2541 TVD 2522.06  
INC 11.8AZ 112.3  
VS 63.79

MD 2636 TVD 2615.12  
INC 11.4AZ 111.9  
VS 71.96

ON 12/13/2013 @ 2500' MD W/BIT #2,  
8.75", SMITH/MDI516, (S/N) JH1864  
IN @ 926' MD

**PIERRE**  
1088' MD 1088' TVD

DEPTH 926'  
WT 8.70  
VIS 35  
PH 8.8  
FIL 24.8  
CL 2000  
CAL 160  
H2O 97.3  
OIL 0.0  
LGS 19.22  
GELS 1/2/3  
PV 1  
YP 4  
CK 2/0  
SOL 2.4  
CG 143u



2500'- 2600': SLTST: 70% LTGY  
-MEDLTGY, FRI, FN TO MED GRN,  
WSRTD, CALC CMT, SANDY,  
INTGRPOR, NO STN, NO MIN FLOR,  
NO O FLOR, NO CUT, NO RNG

TG, C1-C4 CG 125u 900

2600'- 2700': SLTST: 70% LTGY  
-MEDLTGY, FRI, FN TO MED GRN,  
WSRTD, CALC CMT, SANDY,  
INTGRPOR, NO STN, NO MIN FLOR,  
NO O FLOR, NO CUT, NO RNG

CG 123u

MD 2731 TVD 2708.32  
INC 10.9 AZ 111.7  
VS 79.73

2750

2800

2850

2900

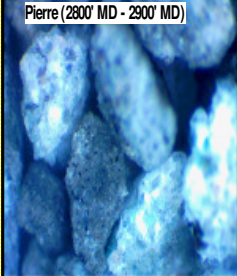
MD 2825 TVD 2800.45  
INC 12 AZ 106.3  
VS 86.74

MD 2920 TVD 2893.33  
INC 12.3 AZ 104.9  
VS 93.18

2700'- 2800': SLTST: 70% LTGY  
-MEDLTGY, FRI, FN TO MED GRN,  
WSRTD, CALC CMT, SANDY,  
INTGRPOR, NO STN, NO MIN FLOR,  
NO O FLOR, NO CUT, NO RNG

CG 192u

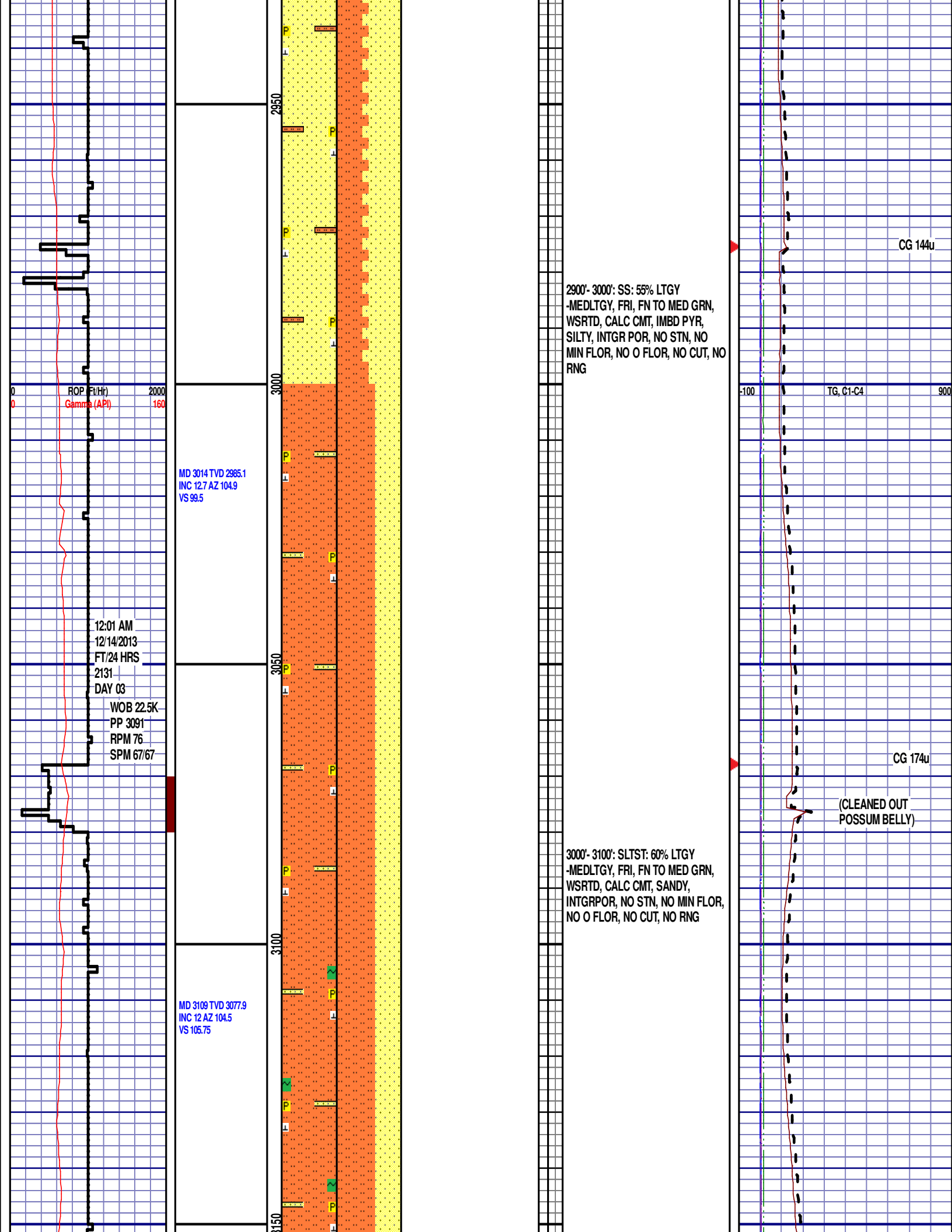
TG, C1-C4

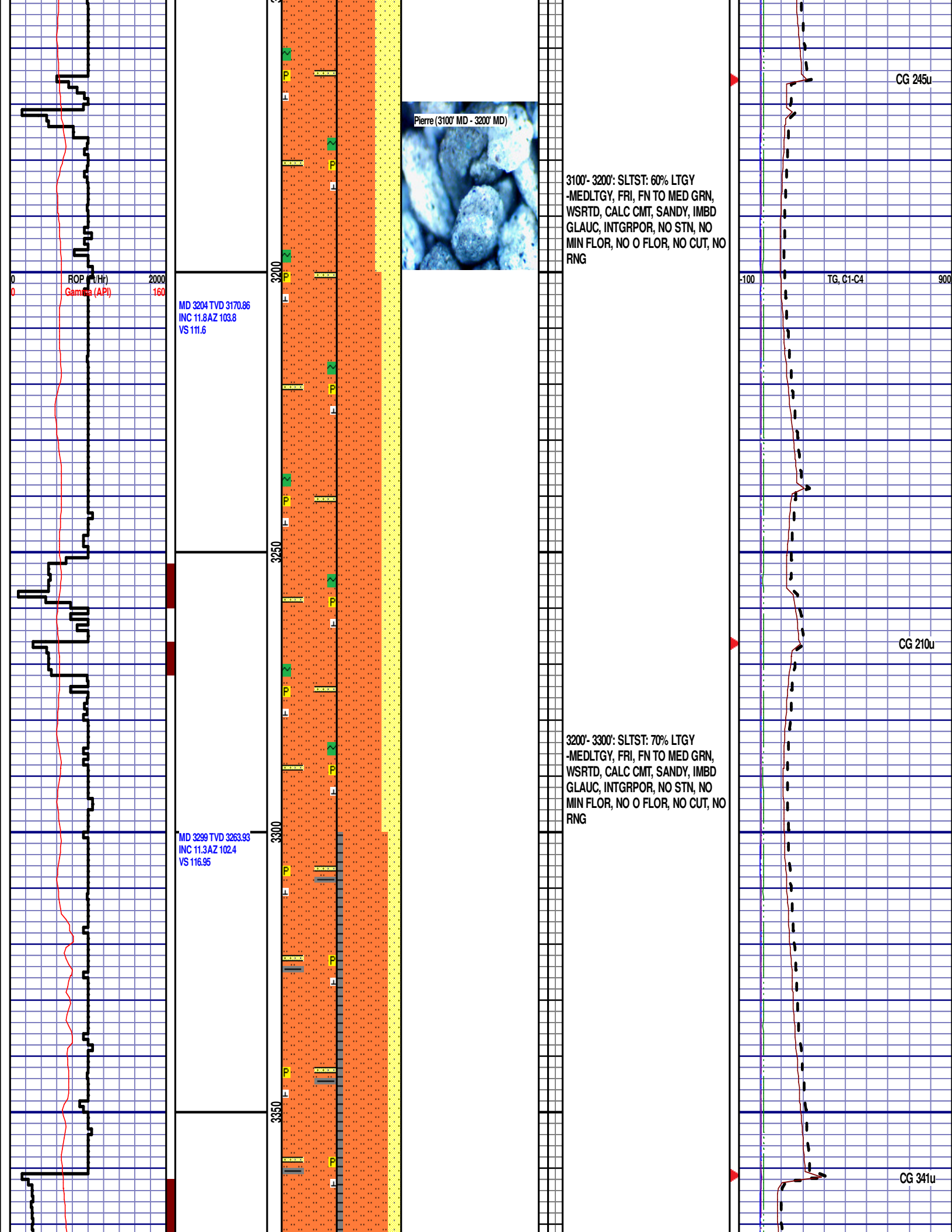


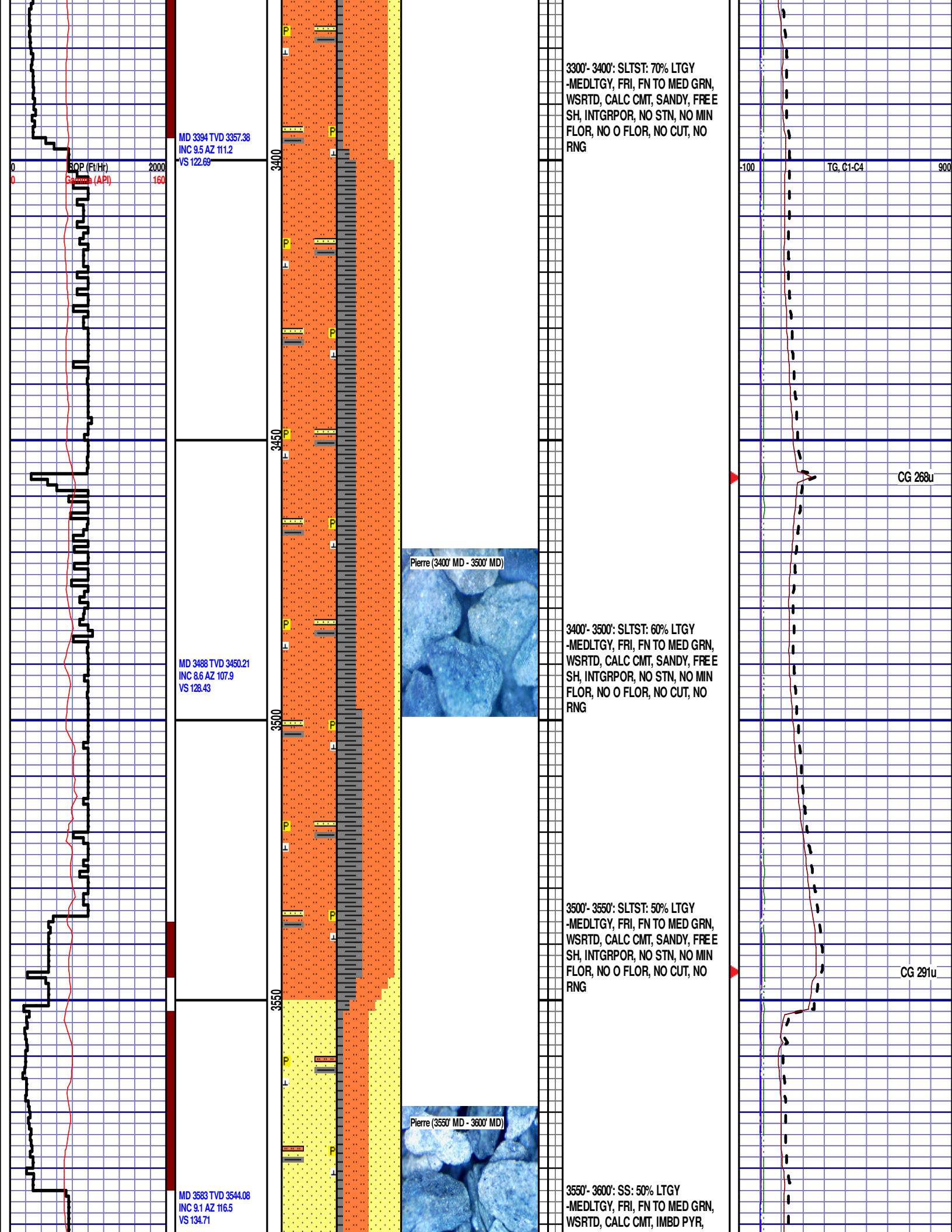
Pierre (2800' MD - 2900' MD)

2800'- 2900': SS: 60% LTGY  
-MEDLTGY, FRI, FN TO MED GRN,  
WSRTD, CALC CMT, IMBD PYR,  
SILTY, INTGR POR, NO STN, NO  
MIN FLOR, NO O FLOR, NO CUT, NO  
RNG

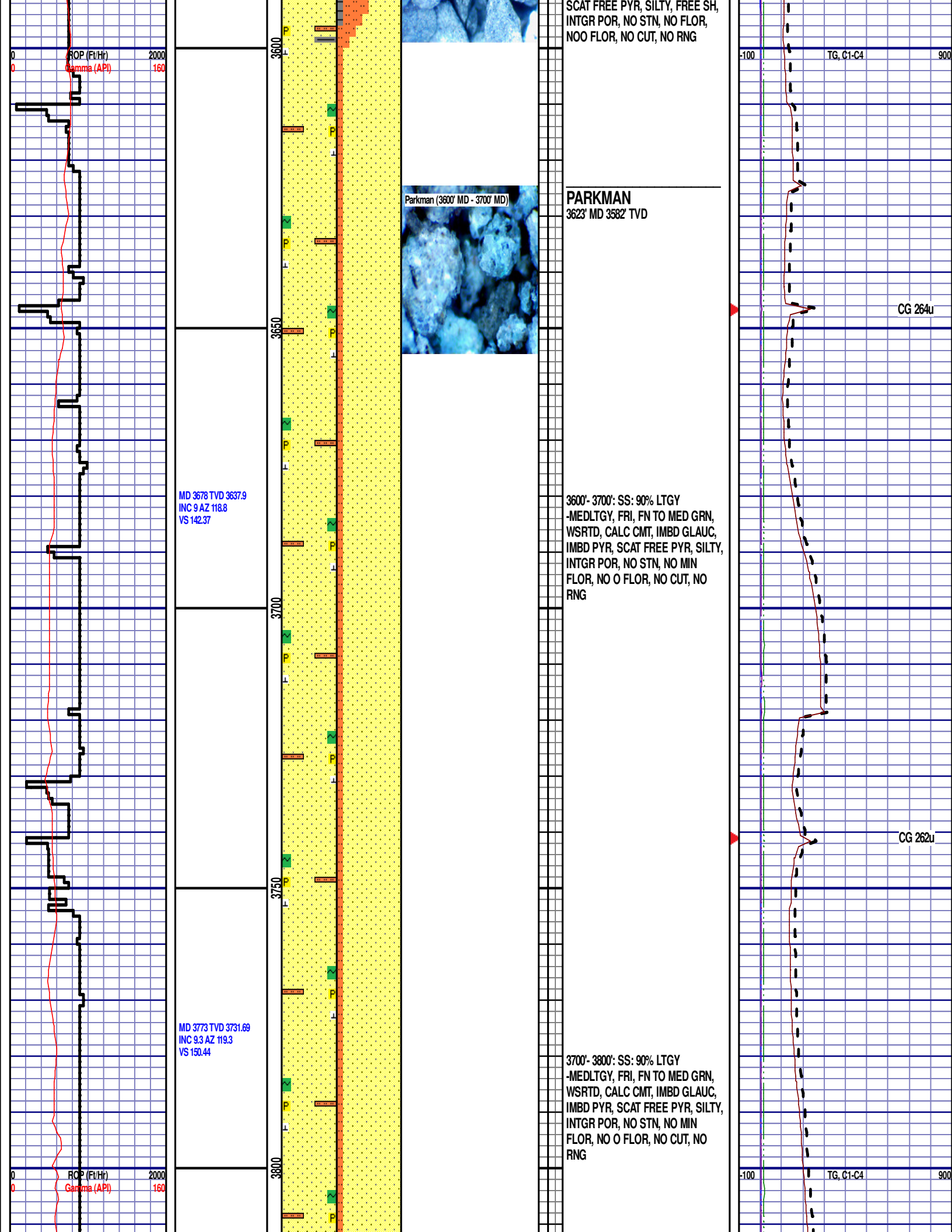
CG 150u

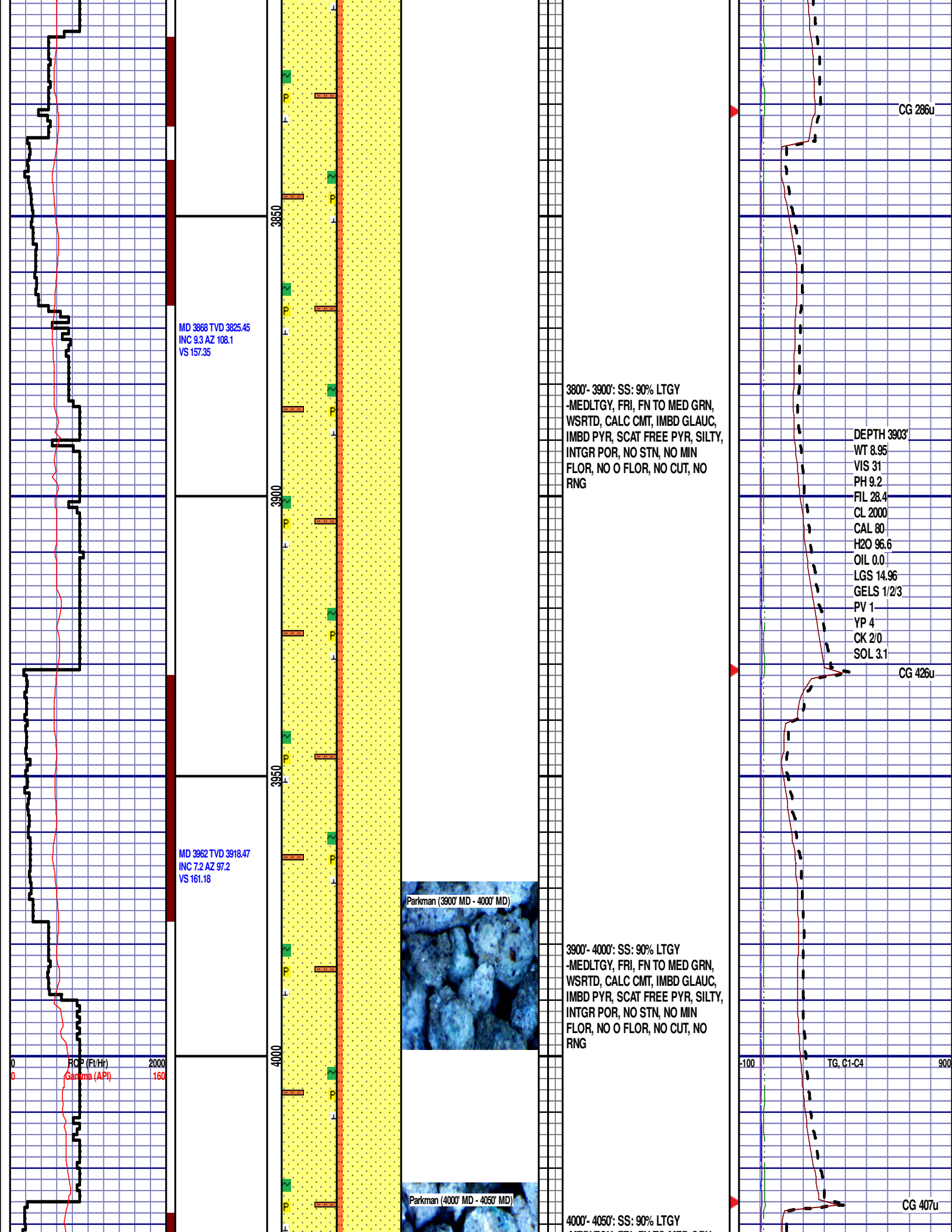




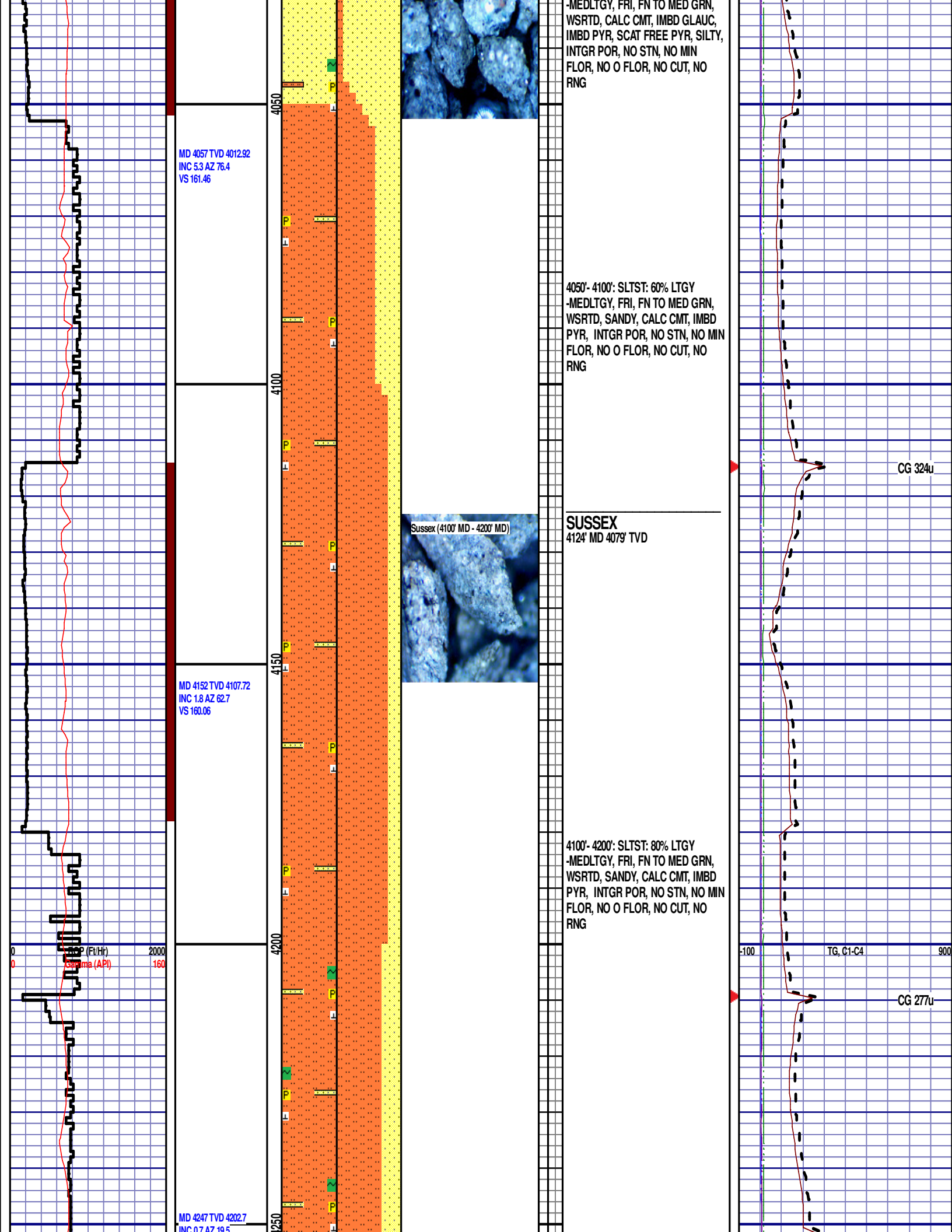












VS 158.92

MD 4341 TVD 4296.69  
INC 0.4 AZ 45.5  
VS 158.17

WOB 16.6K  
PP 3117  
RPM 76  
SPM 66/66

ROP (Ft/Hr) 2000  
Gamma (API) 160

MD 4436 TVD 4391.69  
INC 0.5 AZ 49  
VS 157.7

4200'- 4300': SLTST: 70% LTGY  
-MEDLTGY, FRI, FN TO MED GRN,  
WSRTD, SANDY, CALC CMT, IMBD  
PYR, IMBD GLAUC, INTGR POR,  
NO STN, NO MIN FLOR, NO O  
FLOR, NO CUT, NO RNG

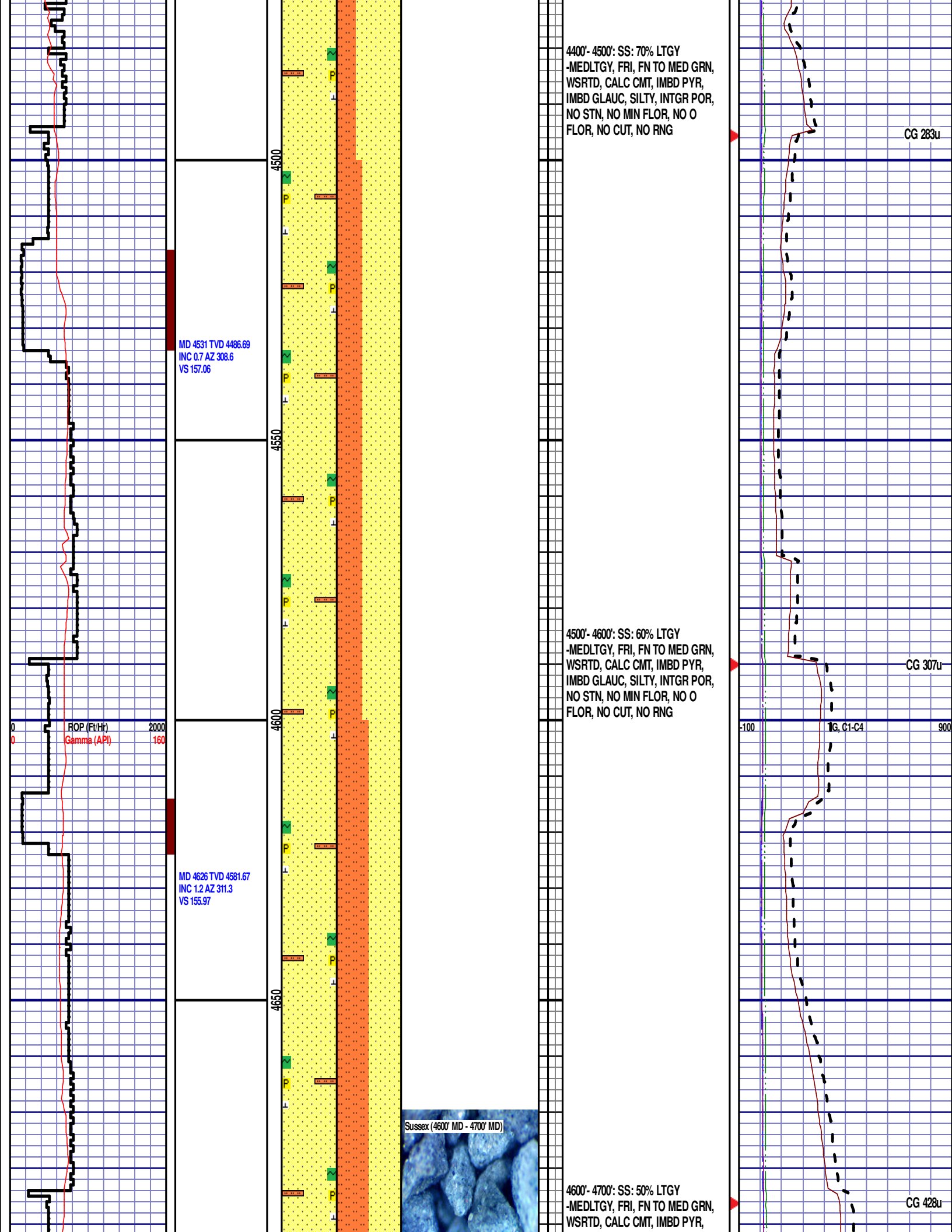
Sussex (4300' MD - 4400' MD)

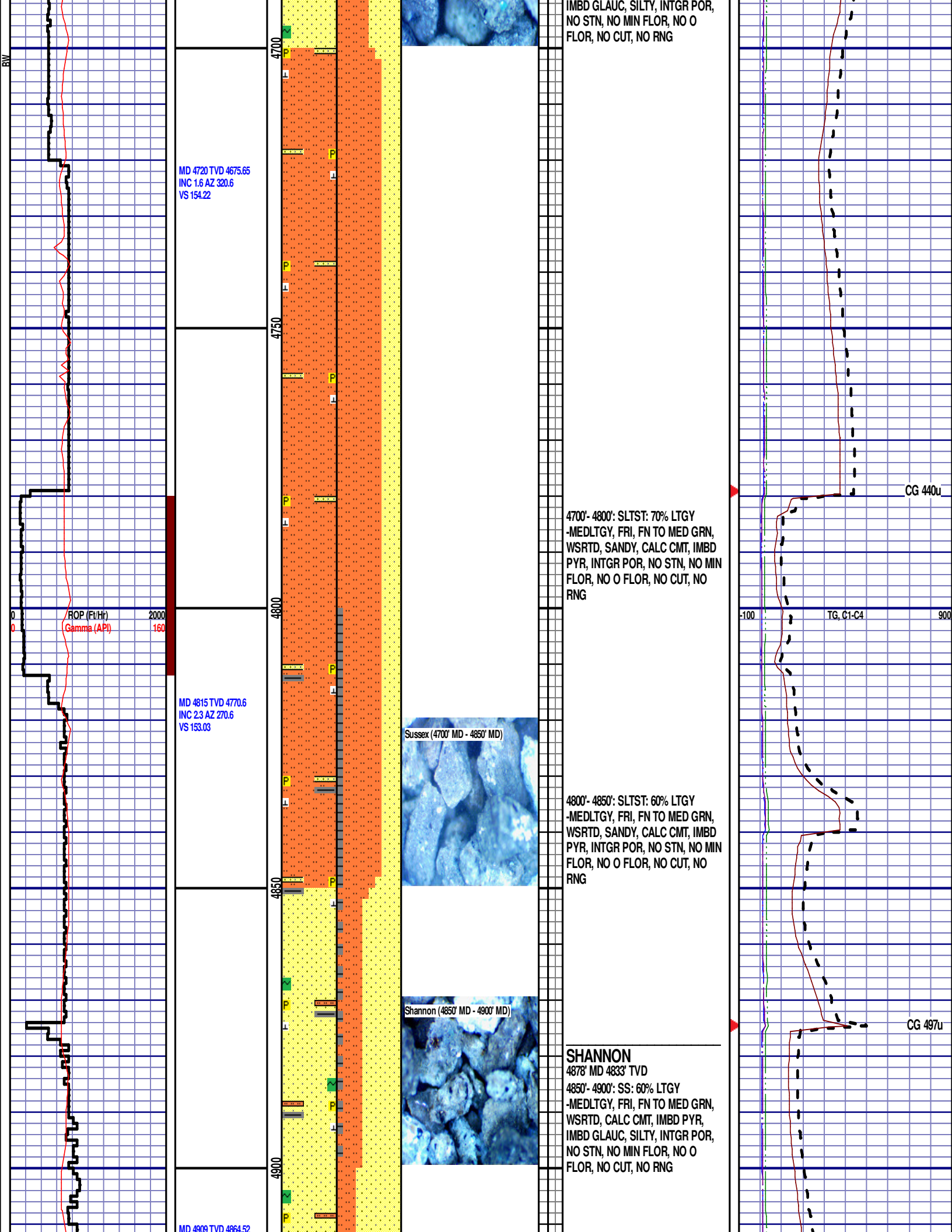
4300'- 4400': SLTST: 60% LTGY  
-MEDLTGY, FRI, FN TO MED GRN,  
WSRTD, SANDY, CALC CMT, IMBD  
PYR, FREE SH, INTGR POR, NO  
STN, NO MIN FLOR, NO O FLOR,  
NO CUT, NO RNG

CG 289u

CG 312u

TG, C1-C4





INC 25 AZ 289.6  
VS 152.11

MD 5004 TVD 4959.42  
INC 28 AZ 256.4  
VS 151.72

MD 5099 TVD 5054.33  
INC 21 AZ 249.2  
VS 152.67

ROP (Ft/Hr)  
Gamma (API)

2000  
160

4950

5000

5050

5100

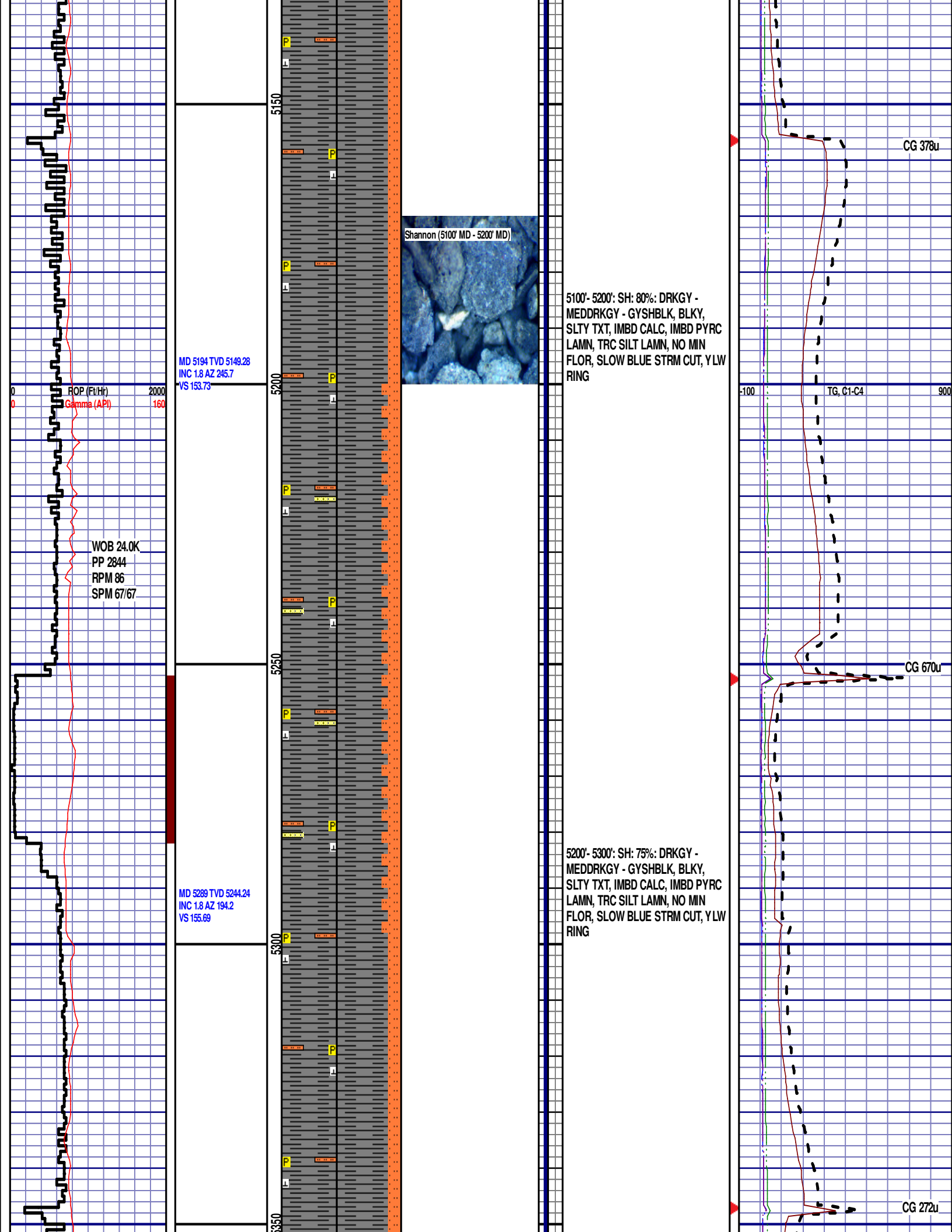
4900'- 5000': SS: 70% LTGY  
-MEDLTGY, FRI, FN TO MED GRN,  
WSRTD, CALC CMT, IMBD PYR,  
IMBD GLAUC, SILTY, INTGR POR,  
NO STN, NO MIN FLOR, NO O  
FLOR, NO CUT, NO RNG

5000'- 5100': SH: 60%: DRKGY -  
MEDDRKGY - GYSHBLK, BLKY,  
SLTY TXT, IMBD CALC, IMBD PYRC  
LAMN, TRC SILT LAMN, NO MIN  
FLOR, SLOW BLUE STRM CUT, YLW  
RING

CG 173u

TG, C1-C4

CG 375u



MD 5194 TVD 5149.28  
INC 1.8 AZ 245.7  
VS 153.73

WOB 24.0K  
PP 2844  
RPM 86  
SPM 67/67

MD 5289 TVD 5244.24  
INC 1.8 AZ 194.2  
VS 155.69

Shannon (5100' MD - 5200' MD)

5100'- 5200': SH: 80%: DRKGY -  
MEDDRKGY - GYSHBLK, BLKY,  
SLTY TXT, IMBD CALC, IMBD PYRC  
LAMN, TRC SILT LAMN, NO MIN  
FLOR, SLOW BLUE STRM CUT, YLW  
RING

5200'- 5300': SH: 75%: DRKGY -  
MEDDRKGY - GYSHBLK, BLKY,  
SLTY TXT, IMBD CALC, IMBD PYRC  
LAMN, TRC SILT LAMN, NO MIN  
FLOR, SLOW BLUE STRM CUT, YLW  
RING

CG 378u

TG, C1-C4

CG 670u

CG 272u



MD 5384 TVD 5339.2  
INC 1.4 AZ 185.9  
VS 158.26

ROP (Ft/Hr)  
Gamma (API)

2000  
160

5400

5450

5500

5550

5300'- 5400': SH: 80%: DRKGY -  
MEDDRKGY - GYSHBLK, BLKY,  
SLTY TXT, IMBD CALC, IMBD PYRC  
LAMN, TRC SILT LAMN, NO MIN  
FLOR, SLOW BLUE STRM CUT, Y LW  
RING

Shannon (5400' MD - 5500' MD)



5400'- 5500': SH: 90%: DRKGY -  
MEDDRKGY - GYSHBLK, BLKY,  
SLTY TXT, IMBD CALC, IMBD PYRC  
LAMN, TRC SILT LAMN, NO MIN  
FLOR, SLOW BLUE STRM CUT, Y LW  
RING

-100 TG, C1-C4 900

CG 56u

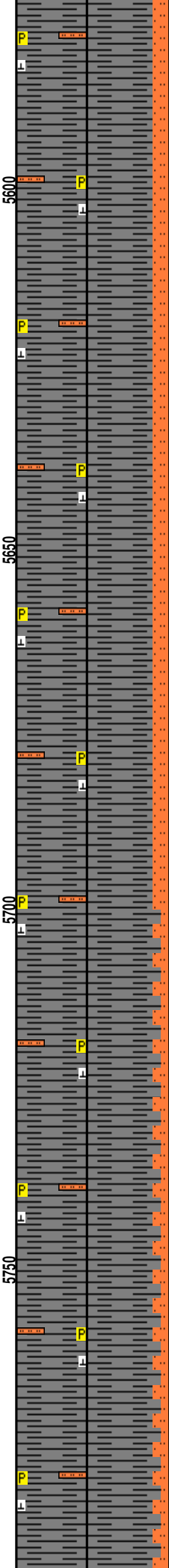
CG 52u

MD 5573 TVD 5528.15  
INC 1.8 AZ 151.1  
VS 162.47

ROP (Ft/Hr) 2000  
Gamma (API) 160

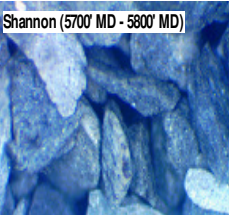
MD 5668 TVD 5623.11  
INC 1.6 AZ 147.8  
VS 164.98

MD 5763 TVD 5718.08  
INC 1.2 AZ 139.2  
VS 166.92



5500'- 5600': SH: 80%: DRKGY -  
MEDDRKGY - GYSHBLK, BLKY,  
SLTY TXT, IMBD CALC, IMBD PYRC  
LAMN, TRC SILT LAMN, NO MIN  
FLOR, SLOW BLUE STRM CUT, YLW  
RING

5600'- 5700': SH: 80%: DRKGY -  
MEDDRKGY - GYSHBLK, BLKY,  
SLTY TXT, IMBD CALC, IMBD PYRC  
LAMN, TRC SILT LAMN, NO MIN  
FLOR, SLOW BLUE STRM CUT, YLW  
RING



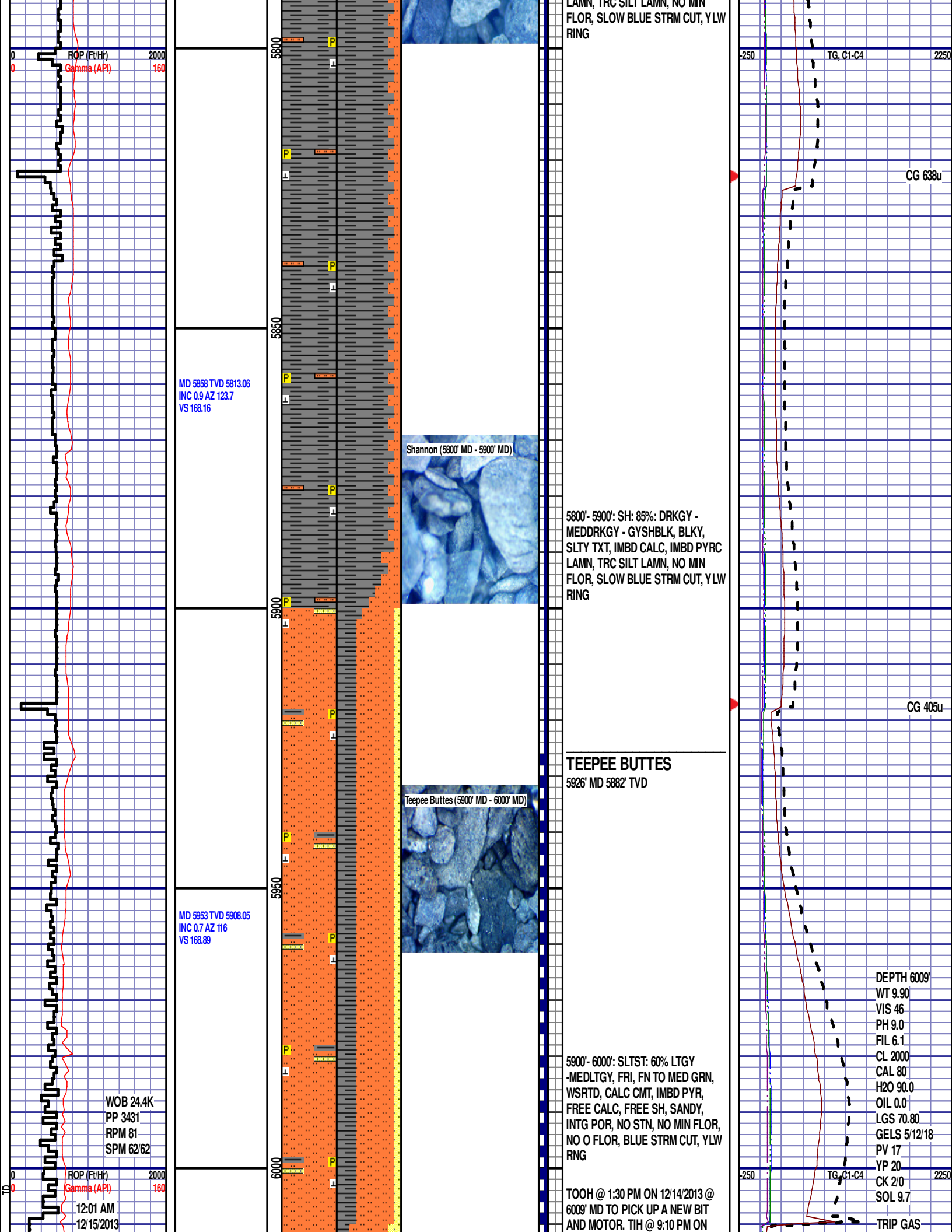
5700'- 5800': SH: 85%: DRKGY -  
MEDDRKGY - GYSHBLK, BLKY,  
SLTY TXT, IMBD CALC, IMBD PYRC  
LAMN, TRC SILT LAMN, NO MIN  
FLOR, SLOW BLUE STRM CUT, YLW  
RING

Scale Change  
TG, C1-C4

GAS SCALE: -250 TO 2250  
250 UNITS/SUBDIVISION

CG 452u

CG 736u



LAMN, TRC SILT LAMN, NO MIN  
FLOR, SLOW BLUE STRM CUT, YLW  
RING

MD 5858 TVD 5813.06  
INC 0.9 AZ 123.7  
VS 168.16

Shannon (5800' MD - 5900' MD)

5800'- 5900': SH: 85%: DRKGY -  
MEDDRKGY - GYSHBLK, BLKY,  
SLTY TXT, IMBD CALC, IMBD PYRC  
LAMN, TRC SILT LAMN, NO MIN  
FLOR, SLOW BLUE STRM CUT, YLW  
RING

Teepee Buttes (5900' MD - 6000' MD)

**TEEPEE BUTTES**  
5926' MD 5882' TVD

MD 5953 TVD 5908.05  
INC 0.7 AZ 116  
VS 168.89

WOB 24.4K  
PP 3431  
RPM 81  
SPM 62/62

5900'- 6000': SLTST: 60% LTGY  
-MEDLTGY, FRI, FN TO MED GRN,  
WSRTD, CALC CMT, IMBD PYR,  
FREE CALC, FREE SH, SANDY,  
INTG POR, NO STN, NO MIN FLOR,  
NO O FLOR, BLUE STRM CUT, YLW  
RNG

TOOH @ 1:30 PM ON 12/14/2013 @  
6009' MD TO PICK UP A NEW BIT  
AND MOTOR. TIH @ 9:10 PM ON

DEPTH 6009'  
WT 9.90  
VIS 46  
PH 9.0  
FIL 6.1  
CL 2000  
CAL 80  
H2O 90.0  
OIL 0.0  
LGS 70.80  
GELS 5/12/18  
PV 17  
YP 20  
CK 2/0  
SOL 9.7  
TRIP GAS

ROP (Ft/Hr)  
Gamma (API)

2000  
160

ROP (Ft/Hr)  
Gamma (API)

2000  
160

12:01 AM  
12/15/2013

FT/24 HRS  
2952  
DAY 04

WOB 12.7K  
PP 2566  
RPM 0  
SPM 57/56

MD 6047 TVD 6002.01  
INC 2.7 AZ 189.4  
VS 171.33

MD 6094 TVD 6048.68  
INC 10.3 AZ 185.5  
VS 176.57

MD 6141 TVD 6094.45  
INC 15.8 AZ 188.9  
VS 186.99

WOB 31.6K  
PP 1958  
RPM 0  
SPM 62/61

MD 6189 TVD 6140.19  
INC 19.4 AZ 184.2  
VS 201.29

ROP (Ft/Hr) 2000  
Gamma (API) 160

6050

6100

6150

6200

Teepee Buttes (6200' MD - 6230' MD)



12/14/2013. RESUMED DRILLING @  
1:42 AM ON 12/15/2013 W/ BIT #3,  
8.75", SMITH/SDI513, (S/N) JH7452 IN  
@ 6009' MD.

6000'- 6050': SLTST: 60% LTGY  
-MEDLTGY, FRI, FN TO MED GRN,  
WSRTD, CALC CMT, IMBD PYR,  
FREE CALC, FREE SH, SANDY,  
INTG POR, NO STN, NO MIN FLOR,  
NO O FLOR, BLUE STRM CUT, YLW  
RNG

SWITCHING TO 30' SAMPLE  
INTERVAL

6050'- 6080': SLTST: 80% LTGY  
-MEDLTGY, FRI, FN TO MED GRN,  
WSRTD, CALC CMT, IMBD PYR,  
FREE CALC, FREE SH, SANDY,  
INTG POR, NO STN, NO MIN FLOR,  
NO O FLOR, BLUE STRM CUT, YLW  
RNG

6080'- 6110': SLTST: 70% LTGY  
-MEDLTGY, FRI, FN TO MED GRN,  
WSRTD, CALC CMT, IMBD PYR,  
FREE CALC, FREE SH, SANDY,  
INTG POR, NO STN, NO MIN FLOR,  
NO O FLOR, BLUE STRM CUT, YLW  
RNG

6110'- 6140': SLTST: 70% LTGY  
-MEDLTGY, FRI, FN TO MED GRN,  
WSRTD, CALC CMT, IMBD PYR,  
FREE CALC, FREE SH, SANDY,  
INTG POR, NO STN, NO MIN FLOR,  
NO O FLOR, IMMED BLUE STRM  
CUT, YLW RNG

6140'- 6170': SLTST: 60% LTGY  
-MEDLTGY, FRI, FN TO MED GRN,  
WSRTD, CALC CMT, IMBD PYR,  
FREE CALC, FREE SH, SANDY,  
INTG POR, NO STN, NO MIN FLOR,  
NO O FLOR, IMMED BLUE STRM  
CUT, YLW RNG

6170'- 6200': SLTST: 60% LTGY  
-MEDLTGY, FRI, FN TO MED GRN,  
WSRTD, CALC CMT, IMBD PYR,  
FREE CALC, FREE SH, SANDY,  
INTG POR, NO STN, NO MIN FLOR,  
NO O FLOR, IMMED BLUE STRM  
CUT, YLW RNG

6200'- 6230': SLTST: 60% LTGY  
-MEDLTGY, FRI, FN TO MED GRN,  
WSRTD, CALC CMT, IMBD PYR,  
FREE CALC, FREE SH, INTG POR,  
NO STN, NO MIN FLOR, NO O  
FLOR, IMMED BLUE STRM CUT,  
YLW RNG

(CHANGE IN PIPE TALLY)

DEPTH 6077

WT 9.95

VIS 46

PH 8.7

FIL 7.8

CL 2100

CAL 100

H2O 92.0

OIL 0.0

LGS 30.82

GELS 5/11/17

PV 14

YP 18

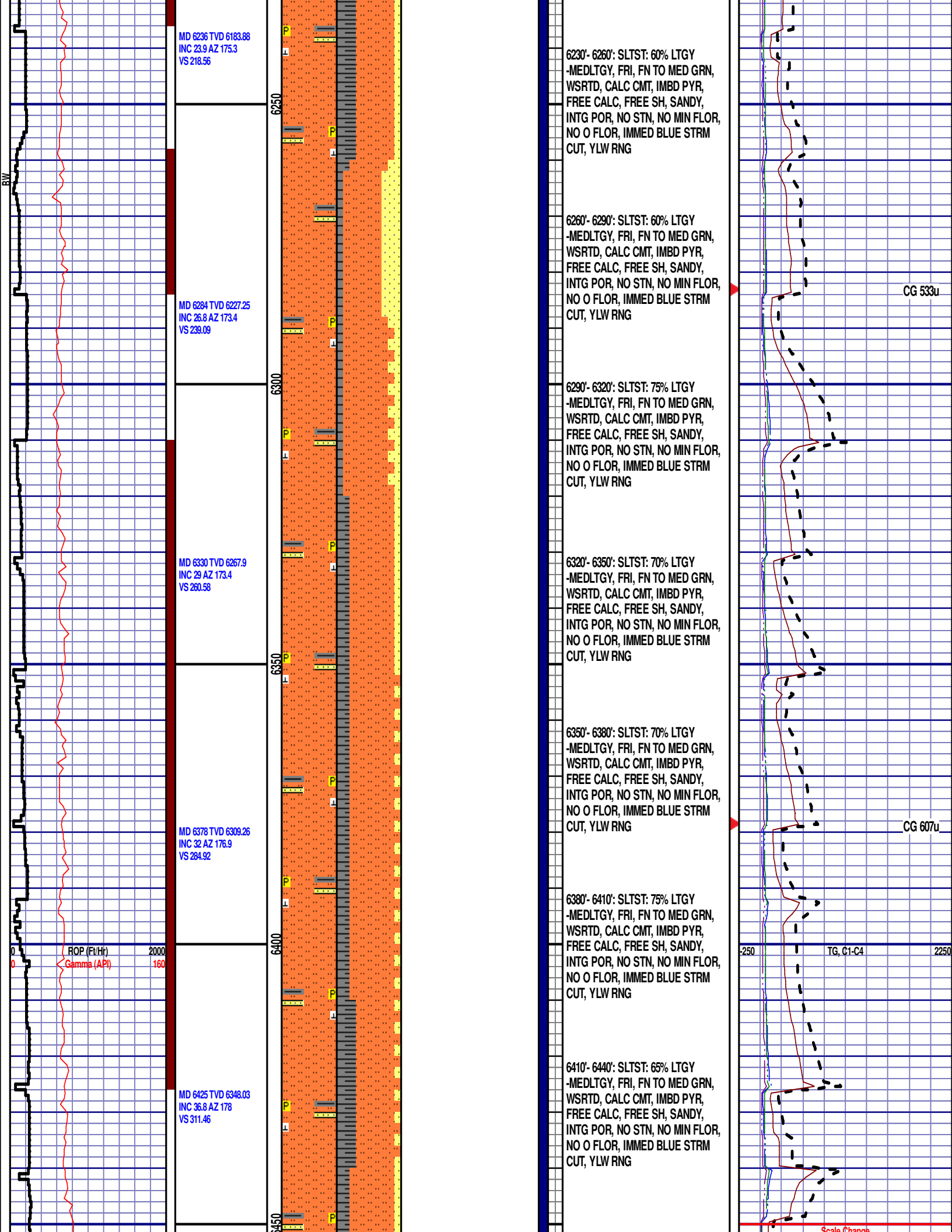
CK 2/0

SOL 7.7

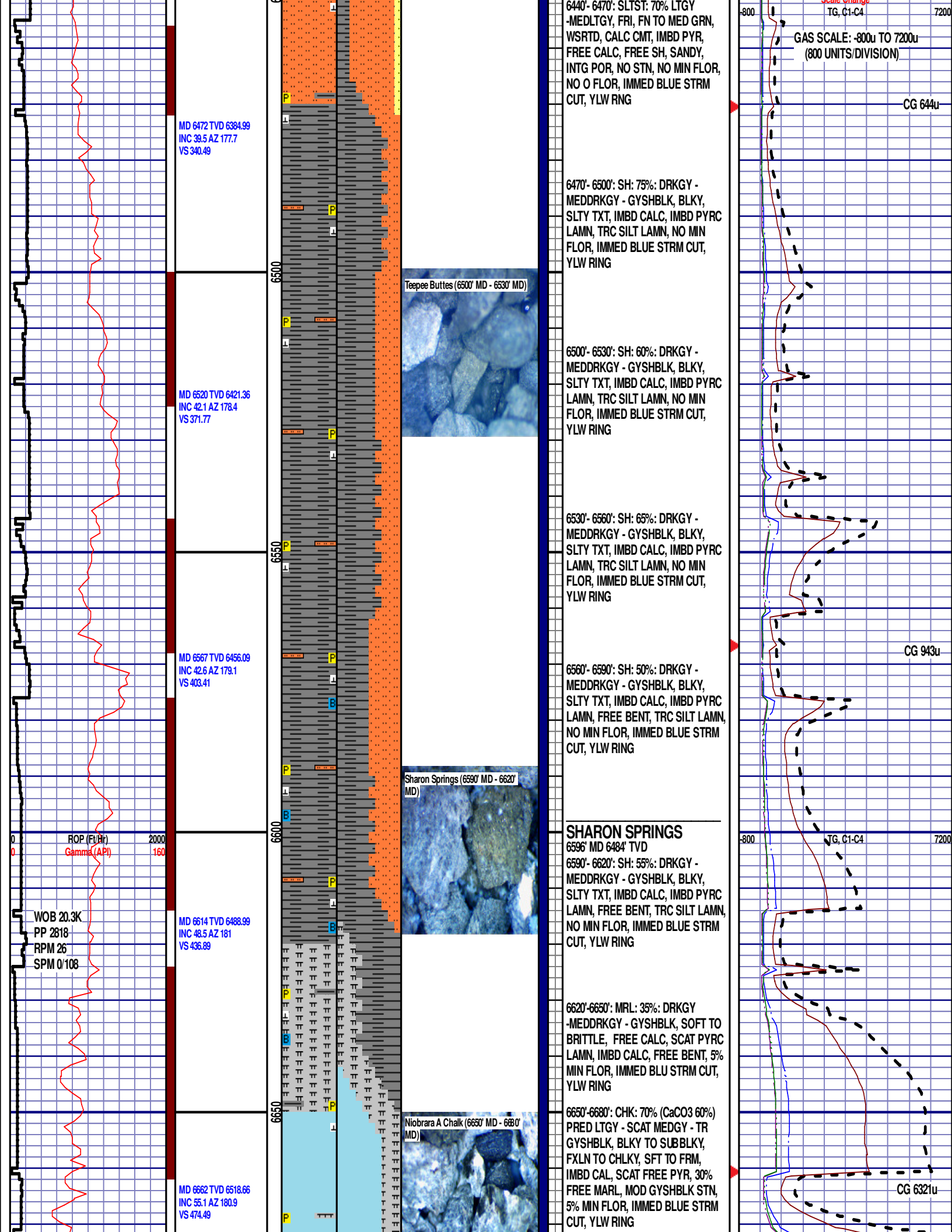
CG 402u

CG 406u

TG, C1-C4









WOB 42.6K  
PP 2798  
RPM 0  
SPM 0/108

MD 6709 TVD 6543.56  
INC 60.9 AZ 179.9  
VS 514.25

6700

6750



## NIOBRARA A CHALK

6675' MD 6524' TVD

6680'-6710': CHK: 80% (CaCO<sub>3</sub> 51%)  
PRED LTGY - SCAT MEDGY - TR  
GYSHBLK, BLKY TO SUBBLKY,  
FXLN TO CHLKY, SFT TO FRM,  
IMBD CAL, SCAT FREE PYR, 20%  
FREE MARL, MOD GYSHBLK STN,  
5% MIN FLOR, IMMED BLUE STRM  
CUT, YLW RING

END OF VERTICAL LOG @ 6710' MD  
ON 12/15/2013, CONTINUED ON  
HORIZONTAL LOG.