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## Customer Information

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

**Geologist:** Holly Duncan  
Noble Energy Inc.

## Mud Logging Details

**Logger:** Casey Sensecqua &  
Michael Yeager

**Log Interval:** 2500' MD to 6600' MD

**Start Date:** February 7, 2014

**Release Date:** February 12, 2014

## Well Information

**Well Name:** Wells Ranch AA35-65-1AHNA

**Location:** 36-T6N-R63W  
2079' FSL, 174' FWL

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

**Drilling Rig:** H&P 343  
**Total Depth:** 11065' MD  
**TD Date:** February 12, 2014  
**Formation:** Niobrara A Marl  
**KB Elevation:** 4799'  
**GR Elevation:** 4775'  
**API Number:** 05-123-38658-0000

## ROCK TYPES

shale  
Anhy  
Bent  
Brec  
Cht  
Clyst  
Coal

Congl  
Dol  
Gyp  
Igne  
Lmst  
Meta  
Mrlist

Salt  
Shale  
Shcol  
Shgy  
Sltst  
Ss  
Till

gw  
lmywash  
ogw  
olmywash  
oshly gw  
shly gw  
sdygw

hvyrcrbsh  
nosmpl  
Lsdetrst  
sltst  
sdy sh

LOGGING ON SHIFT	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
	ROP (Ft/Hr) Gamma (API)	2000 250		24					NOBLE ENERGY INC WELLS RANCH AA35-65-1AHNA 36-T6N-R63W 2079' FSL, 174' FWL WELD CO., CO H&P 343 LOGGERS: CASEY SENSECQUA MICHAEL YEAGER CALLED OUT BY COMPANY MAN ON 2/7/2014 COMMENCED LOGGING @ 2500' MD	75 TG, C1-C4 675	
									CONNECTIONS ARE MARKED WITH RED TRIANGLES		
									GAS SCALE: -75u TO 675u (75 UNITS/DIVISION)		
									DRILLING ON WATER BASED MUD		

2/8/2014  
DAY 02  
FT/24HRS 0

WOB 29.7K  
PP 3095  
RPM 81  
SPM67/67

ROP (Ft/Hr)  
Gammex 1000

MD 2593 TVD 2584.47  
INC 9.27 AZ 327.82  
VS 67.93

MD 2688 TVD 2678.22  
INC 9.33 AZ 329.44  
VS 76.61

@ 3:45 PM ON 2/8/2014 W/BIT # 2,  
8.75", HDBS, MMD56 (S/N) 12385492  
IN @ 632' MD

**PIERRE**  
CAME IN BEFORE LOGGING  
DEPTH



PIERRE 2500' MD - 2600' MD

2500' MD-2600' MD: SLTST: 70% LTGY  
- MEDLTGY, FRI, FN TO MED GRN,  
W SRTD, CALC CMT, SANDY, INTGR  
POR, NO STN, NO FLOR, NO O  
FLOR, NO CUT, NO RNG

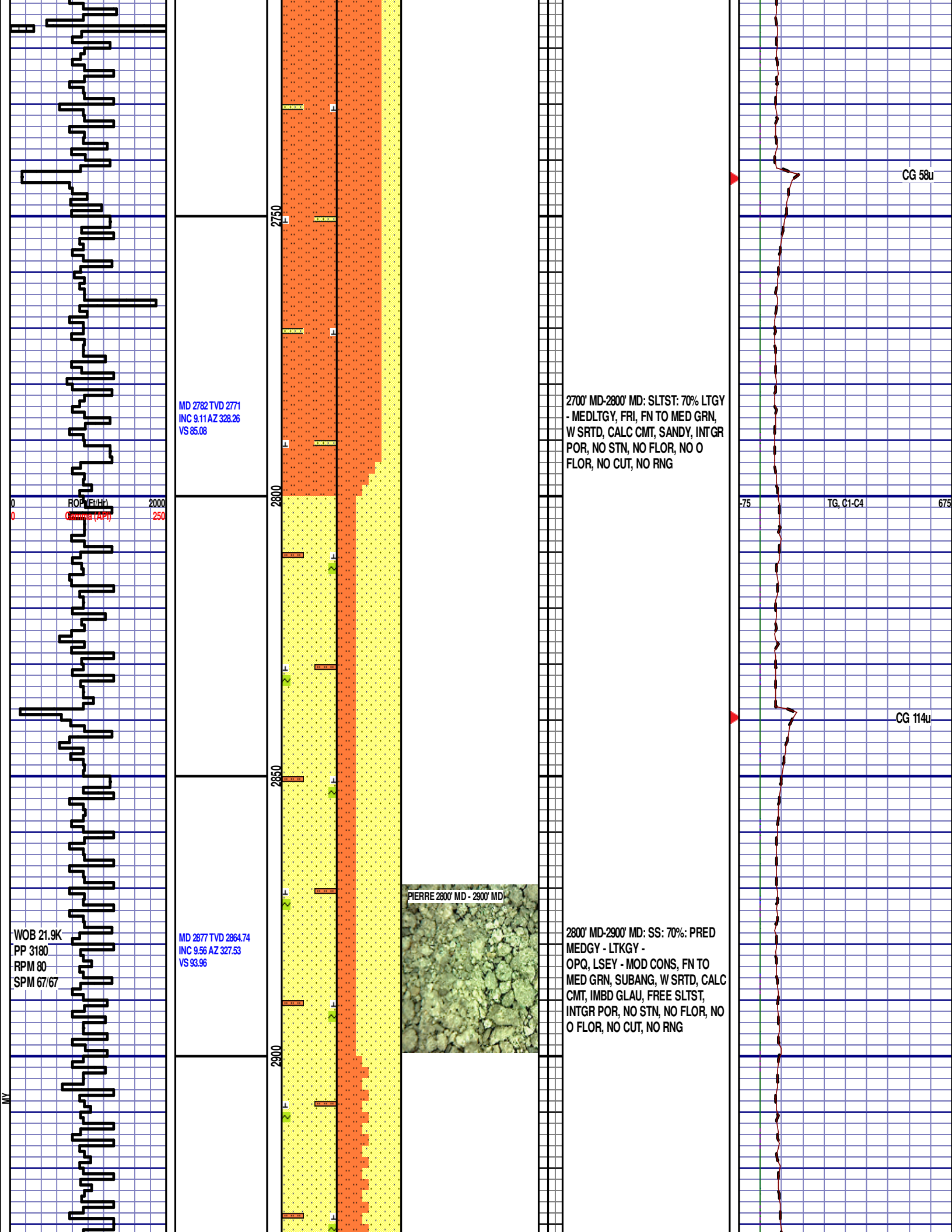
2600' MD-2700' MD: SLTST: 80% LTGY  
- MEDLTGY, FRI, FN TO MED GRN,  
W SRTD, CALC CMT, SANDY, INTGR  
POR, NO STN, NO FLOR, NO O  
FLOR, NO CUT, NO RNG

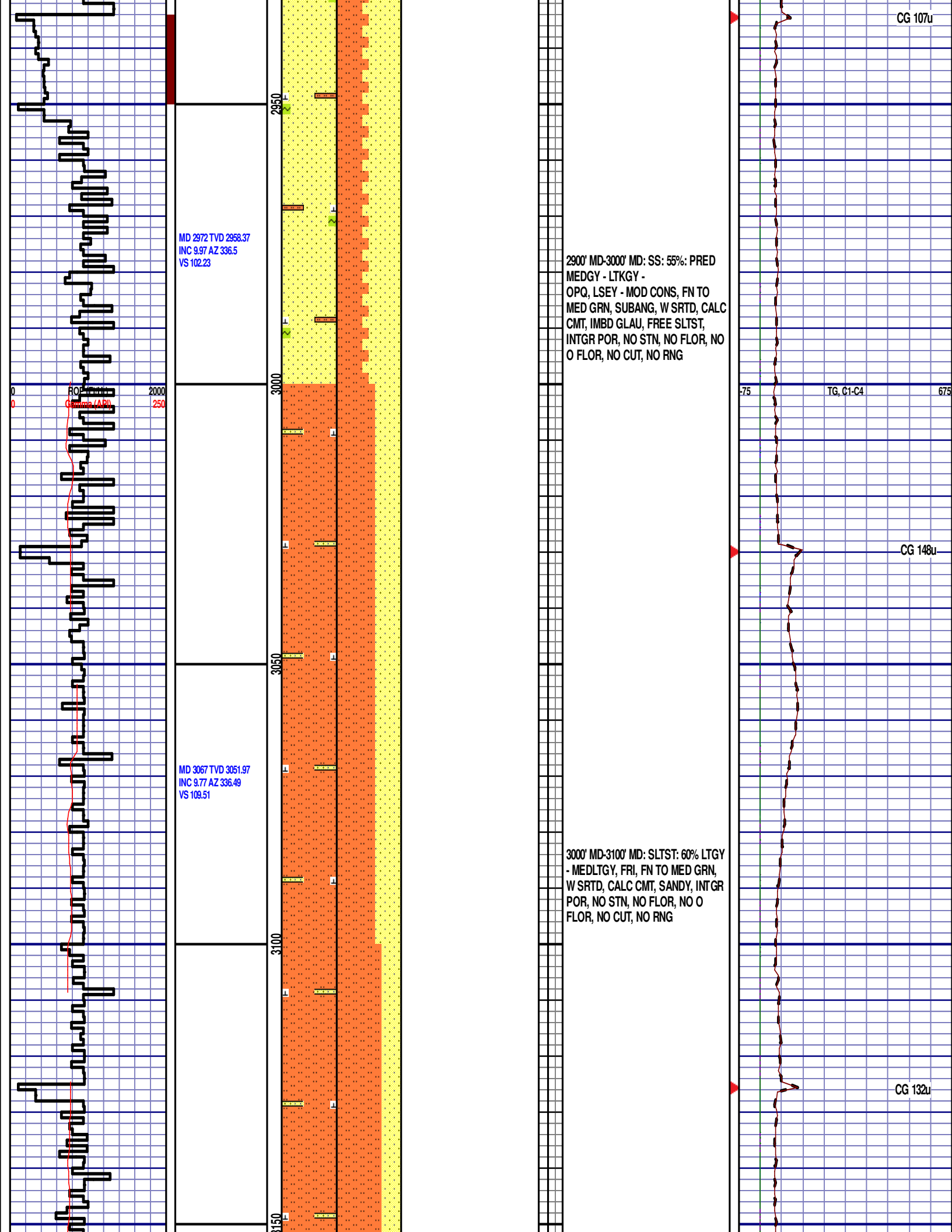
DEPTH 1901'  
WT 8.75  
VIS 31  
PH 10  
FIL 25.1  
CL 2200  
CAL 100  
H2O 97.2  
OIL 0  
LGS 17.6  
GEL 2/4/5  
PV 5  
YP 4  
CK 1/0  
SOL 2.5

CG 86u

TG, C1-C4

CG 123u



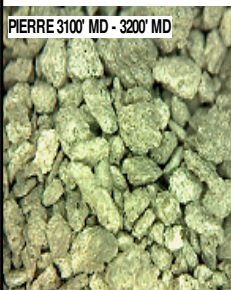


MD 3162 TVD 3145.53  
INC 10.16 AZ 336.69  
VS 116.84

MD 3256 TVD 3238.26  
INC 8.69 AZ 330.78  
VS 124.32

MD 3352 TVD 3333.26  
INC 7.91 AZ 325.76  
VS 132.19

PIERRE 3100' MD - 3200' MD



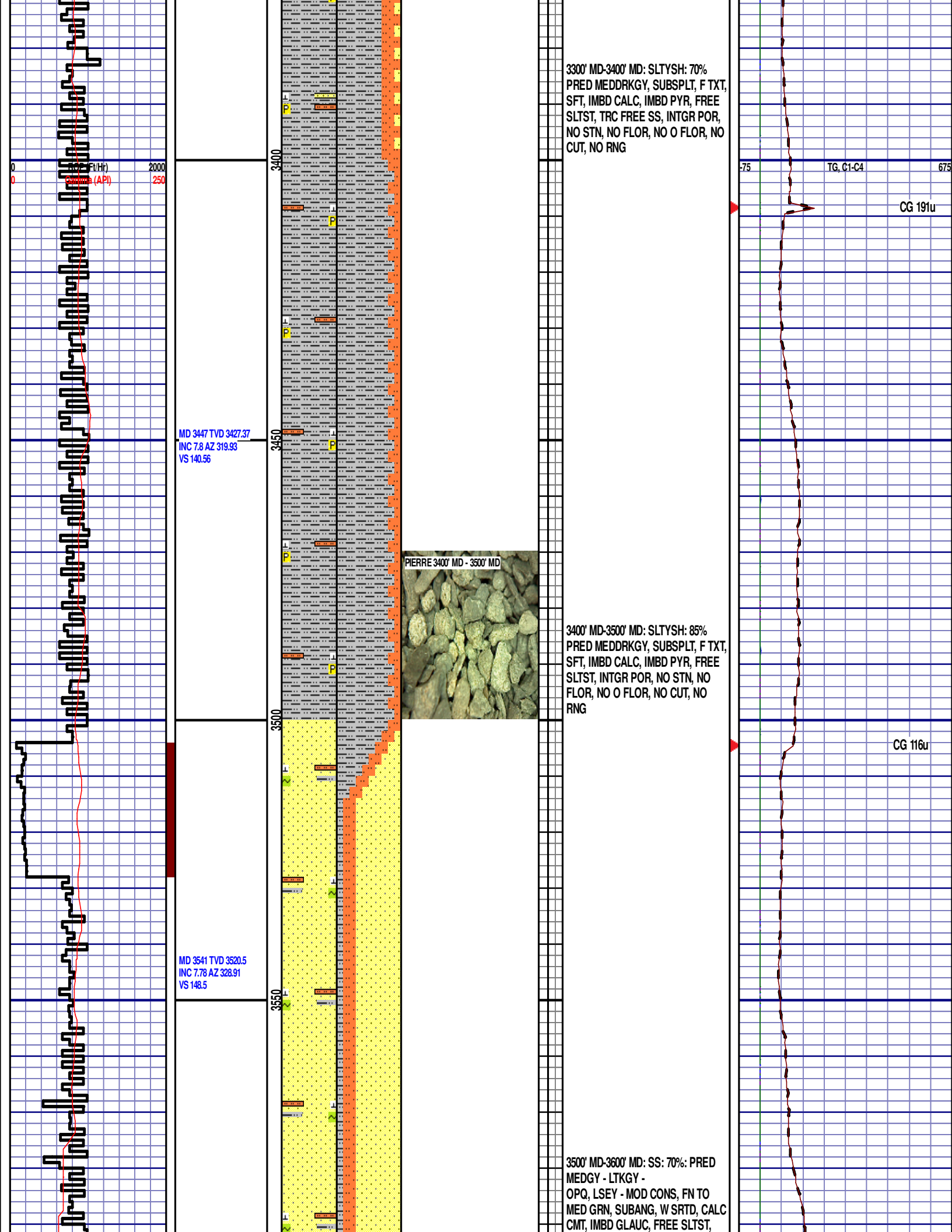
3100' MD-3200' MD: SLTST: 70% LTGY  
- MEDLTGY, FRI, FN TO MED GRN,  
W SRTD, CALC CMT, SANDY, INTGR  
POR, NO STN, NO FLOR, NO O  
FLOR, NO CUT, NO RNG

3200' MD-3300' MD: SLTYSH: 60%  
PRED MEDDRKGY, SUBSPLT, F TXT,  
SFT, IMBD CALC, IMBD PYR, FREE  
SLTST, FREE SS, INTGR POR, NO  
STN, NO FLOR, NO O FLOR, NO  
CUT, NO RNG

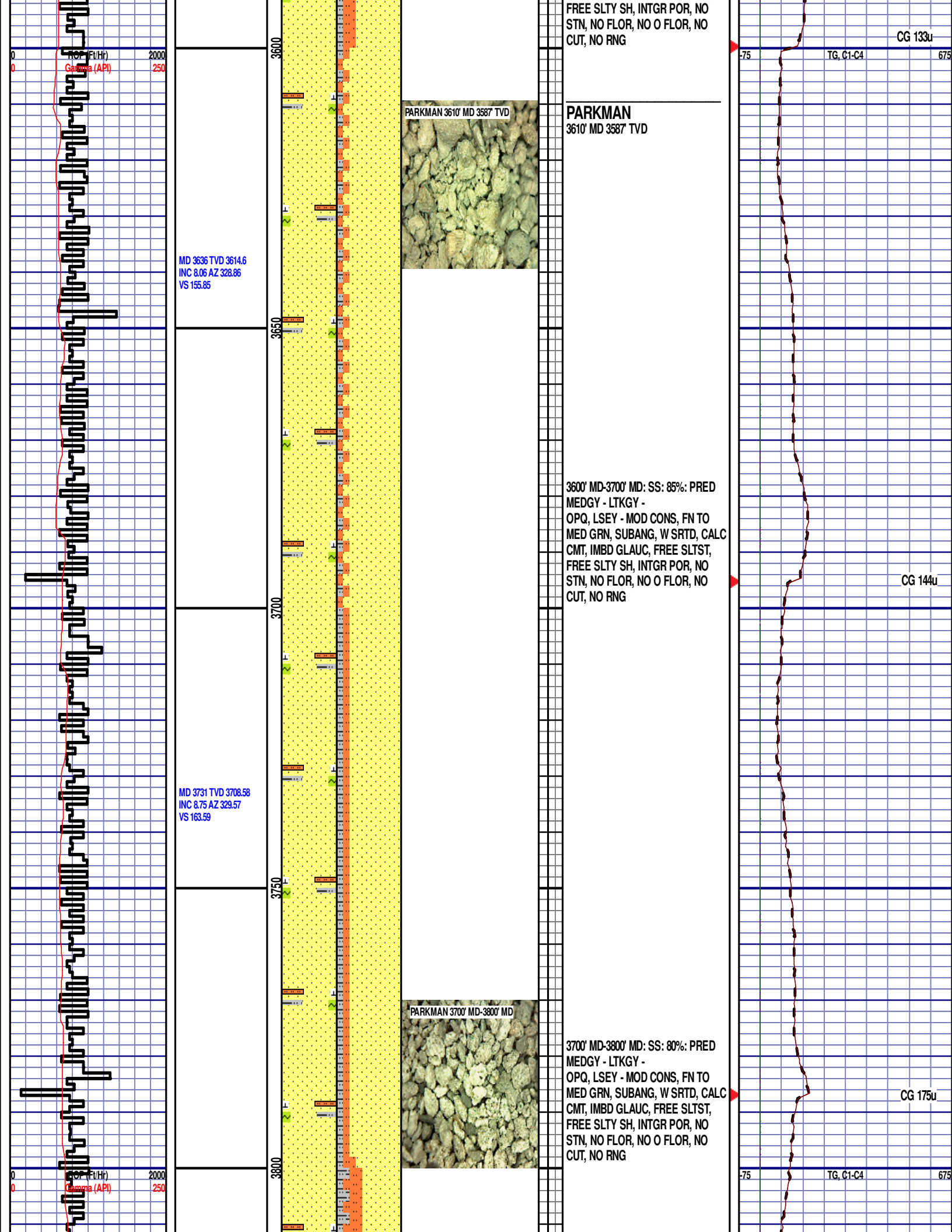
75 TG, C1-C4 675

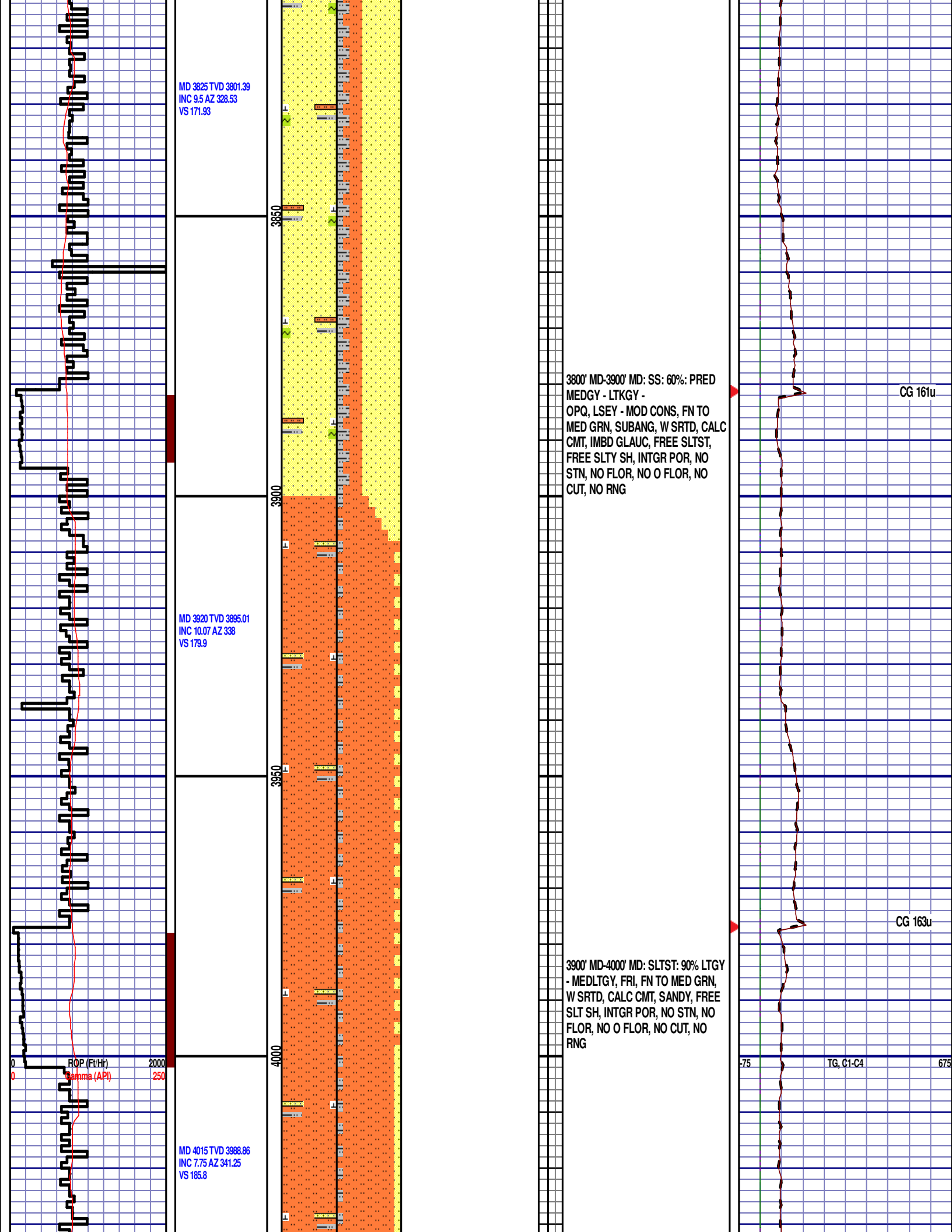
CG 102u

CG 156u











WOB 8.8K  
PP 3982  
RPM 80  
SPM 67/67

MD 4110 TVD 4083.13  
INC 6.45 AZ 343.68  
VS 189.95

MD 4204 TVD 4176.65  
INC 5.11 AZ 342.02  
VS 193.21



4000' MD-4100' MD: SLTST: 85% LTGY  
- MEDLTGY, FRI, FN TO MED GRN,  
W SRTD, CALC CMT, SANDY, FREE  
SLT SH, INTGR POR, NO STN, NO  
FLOR, NO O FLOR, NO CUT, NO  
RNG

4100' MD-4200' MD: SLTST: 90% LTGY  
- MEDLTGY, FRI, FN TO MED GRN,  
W SRTD, CALC CMT, SANDY, FREE  
SLT SH, INTGR POR, NO STN, NO  
FLOR, NO O FLOR, NO CUT, NO  
RNG

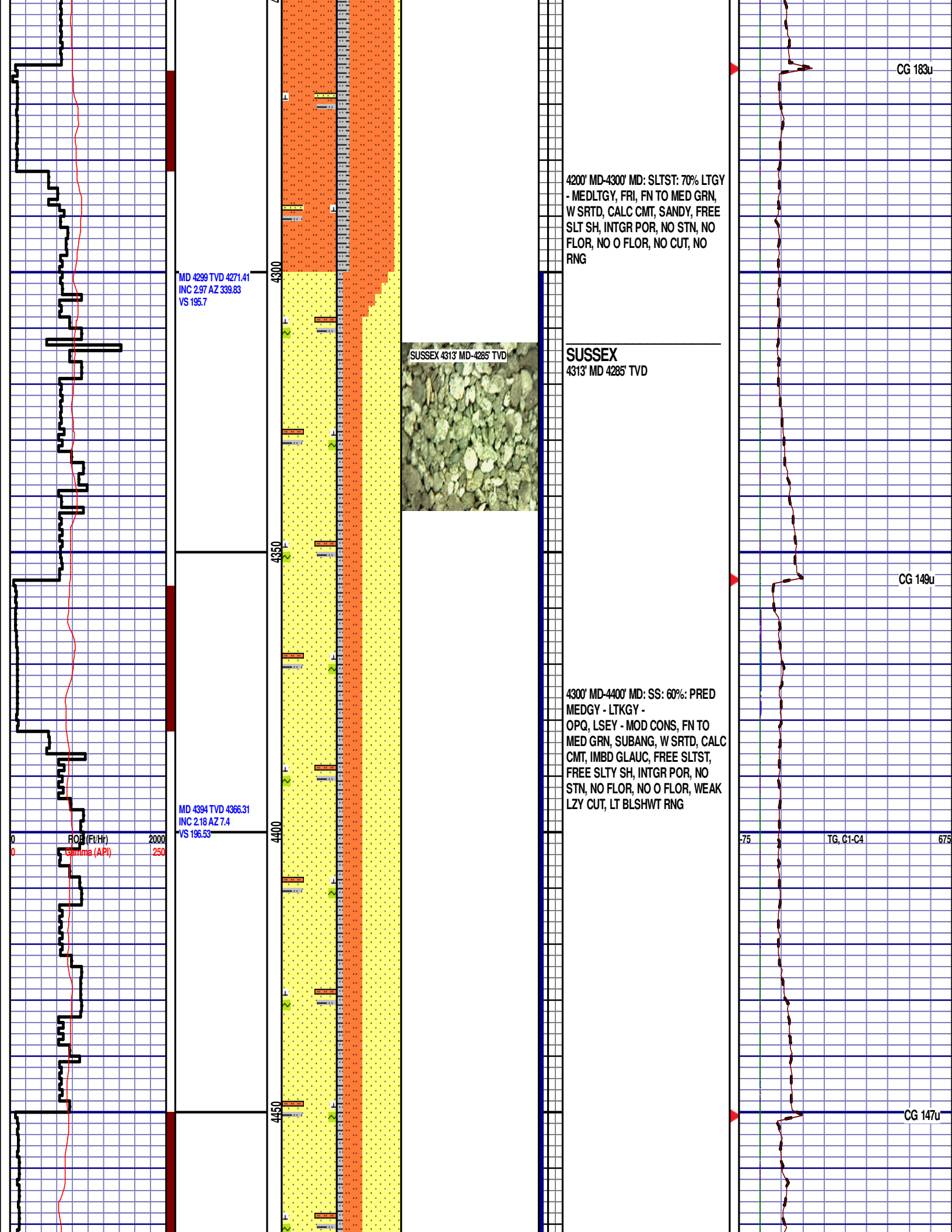
CG 123u

CG 151u

75

TG, C1-C4

675



MD 4489 TVD 4461.28  
INC 1.16 AZ 78.27  
VS 195.47

MD 4583 TVD 4555.27  
INC 0.11 AZ 199.38  
VS 194.57

MD 4678 TVD 4650.27  
INC 0.26 AZ 59.05  
VS 194.42

4400' MD-4500' MD: SS: 60%: PRED  
MEDGY - LTKGY -  
OPQ, LSEY - MOD CONS, FN TO  
MED GRN, SUBANG, W SRTD, CALC  
CMT, IMBD GLAUC, FREE SLTST,  
FREE SLTY SH, INTGR POR, NO  
STN, NO FLOR, NO O FLOR, WEAK  
LZY CUT, LT BLSHWT RNG

SUSSEX 4500' MD-4600' MD

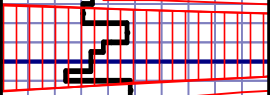
4500' MD-4600' MD: SLTST: 70% LTGY  
- MEDLTGY, FRI, FN TO MED GRN,  
W SRTD, CALC CMT, SANDY, FREE  
SLT SH, INTGR POR, NO STN, NO  
FLOR, NO O FLOR, WEAK LZY CUT,  
LT BLSHWT RNG

4600' MD-4700' MD: SLTST: 75% LTGY  
- MEDLTGY, FRI, FN TO MED GRN,  
W SRTD, CALC CMT, SANDY, FREE

CG 184u

TG, C1-C4

CG 321u



12:01AM  
2/9/2014  
DAY 03  
2209 FT/24HRS  
WOB 2.4K  
PP 2720  
RPM 80  
SPM 67/67

MD 4773 TVD 4745.27  
INC 0.37 AZ 251.12  
VS 194.52

ROP (Ft/Hr) 2000  
Gamma (API) 250

MD 4868 TVD 4840.27  
INC 0.66 AZ 228.88  
VS 195.2

SLT SH, INTGR POR, NO STN, NO  
FLOR, NO O FLOR, WEAK LZY CUT,  
LT BLSHWT RNG

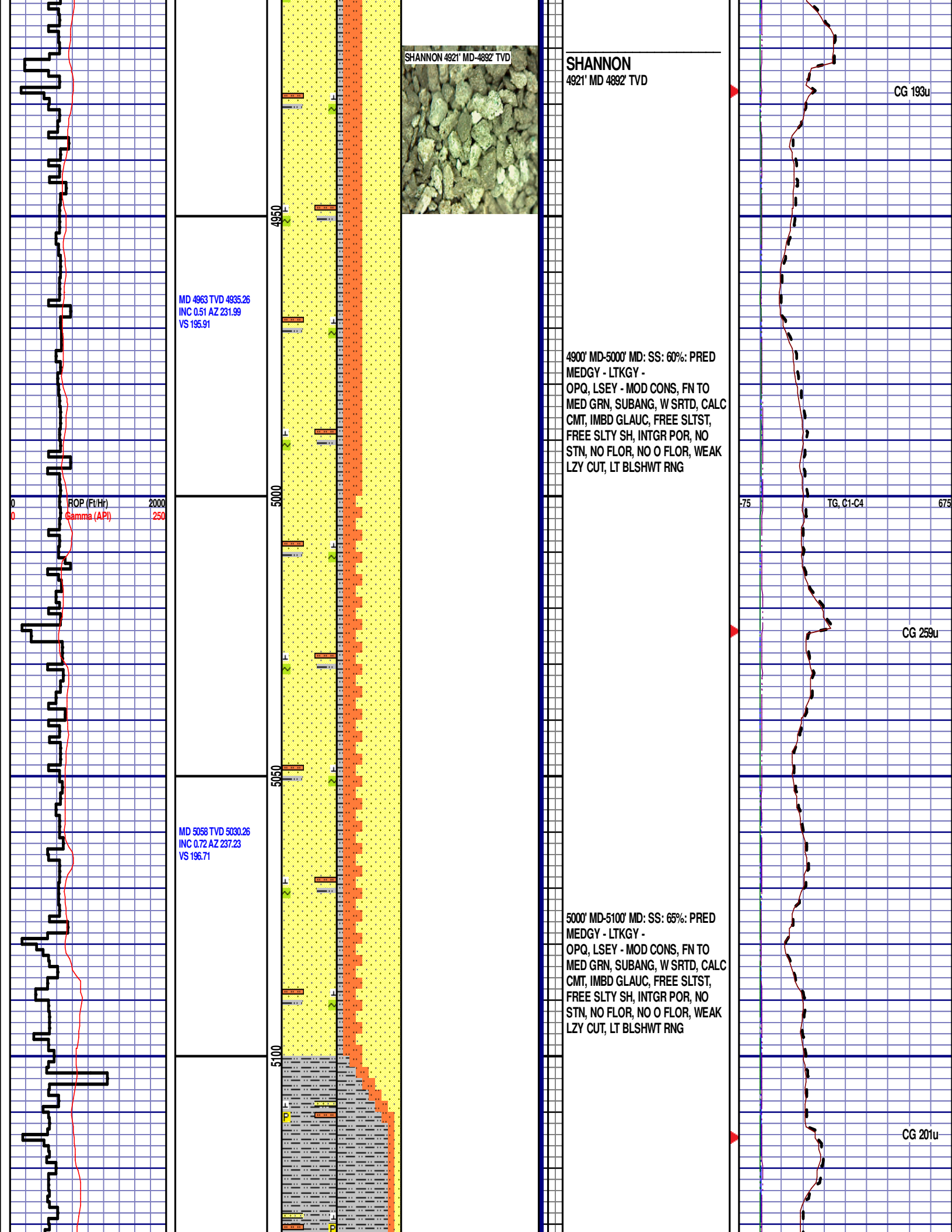
4700' MD-4800' MD: SLTST: 80% LTGY  
- MEDLTGY, FRI, FN TO MED GRN,  
W SRTD, CALC CMT, SANDY, FREE  
SLT SH, INTGR POR, NO STN, NO  
FLOR, NO O FLOR, WEAK LZY CUT,  
LT BLSHWT RNG

4800' MD-4900' MD: SLTST: 70% LTGY  
- MEDLTGY, FRI, FN TO MED GRN,  
W SRTD, CALC CMT, SANDY, FREE  
SLT SH, INTGR POR, NO STN, NO  
FLOR, NO O FLOR, WEAK LZY CUT,  
LT BLSHWT RNG

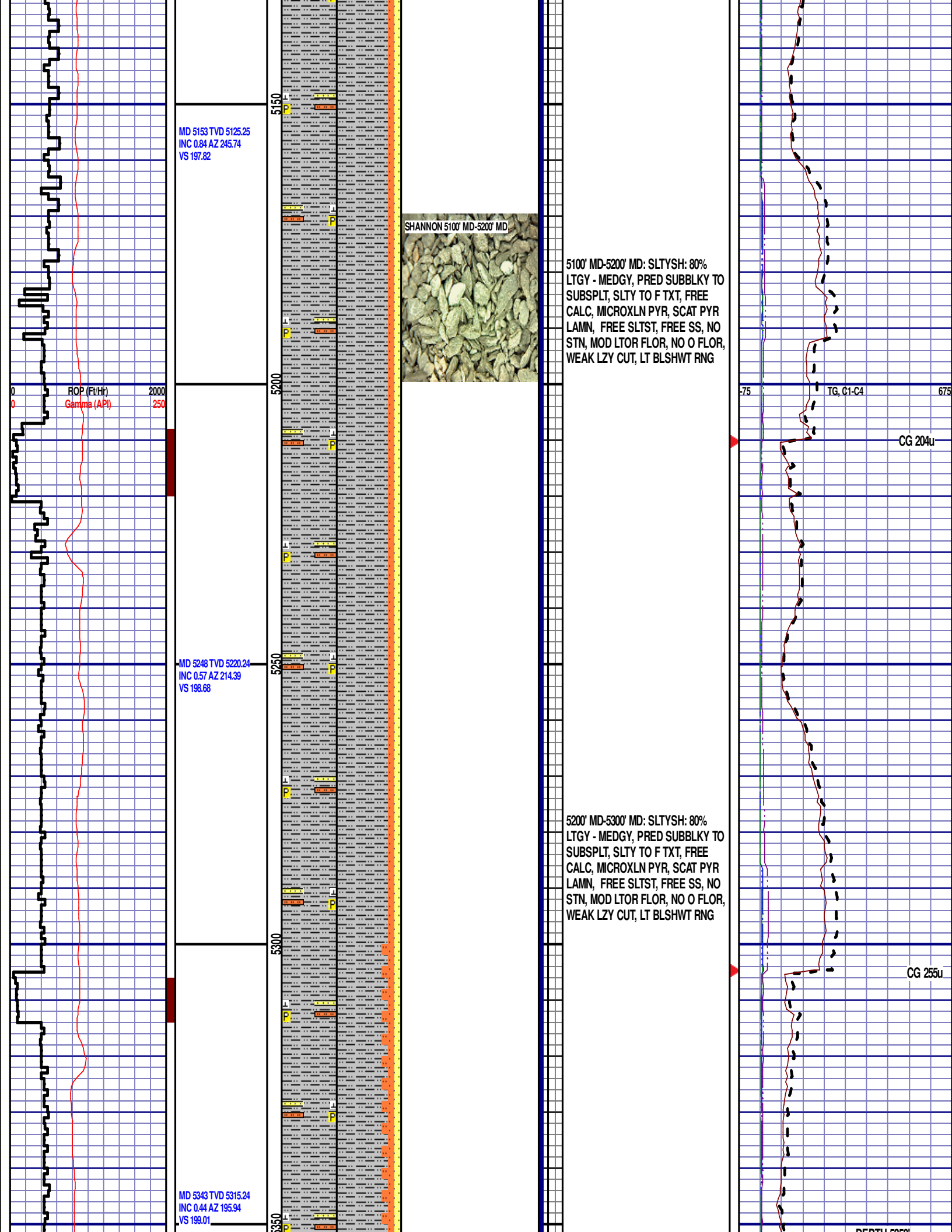
CG 164u

75 TG, C1-C4 675

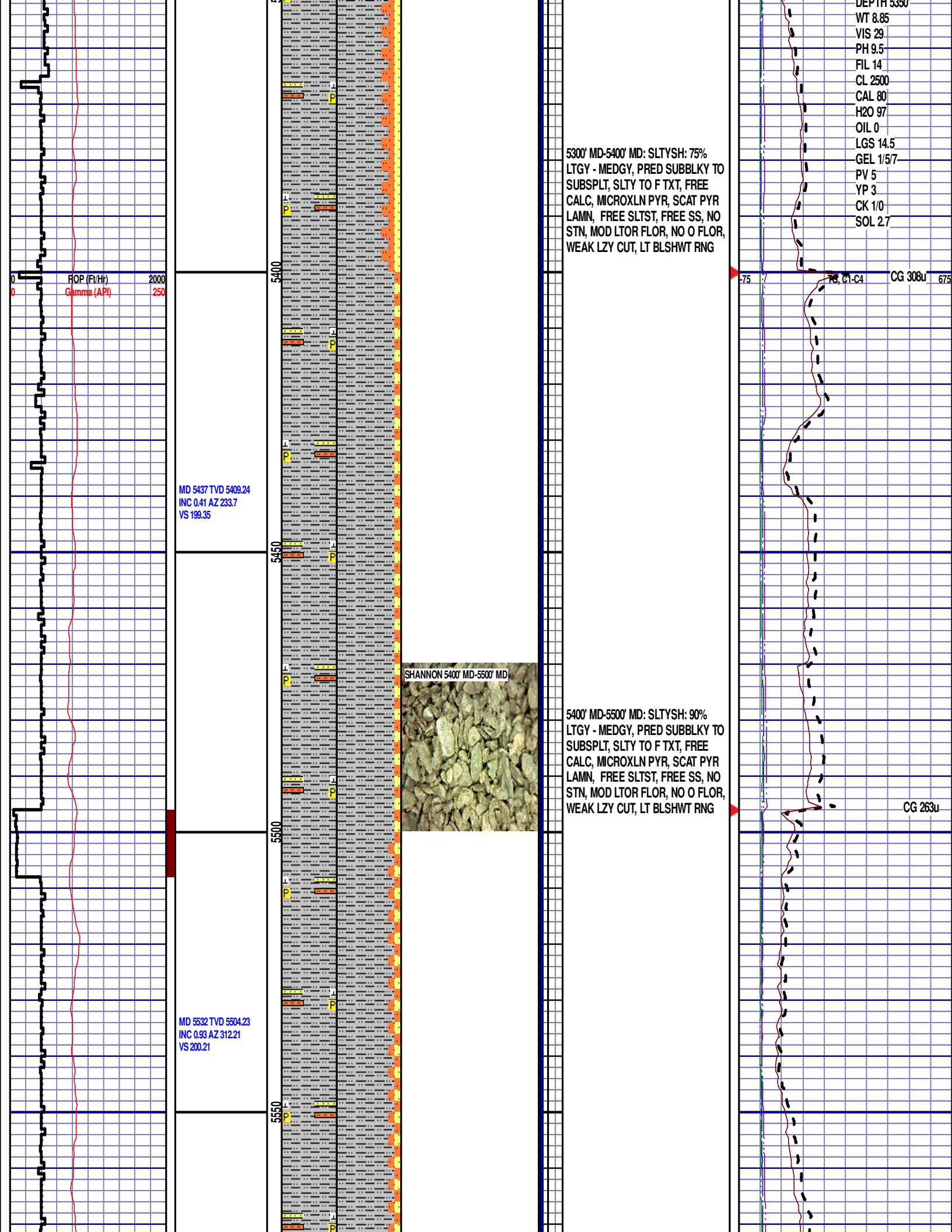
CG 237u

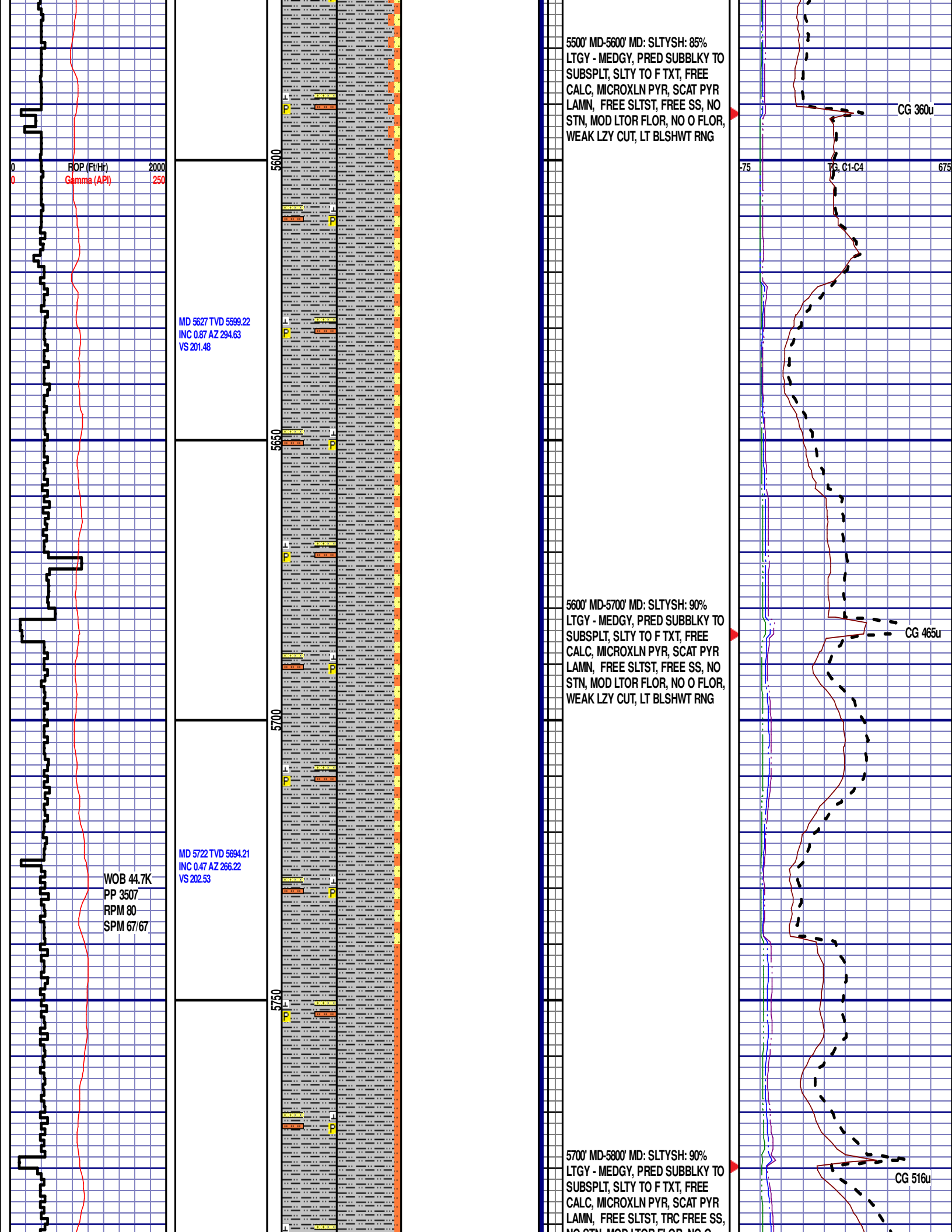


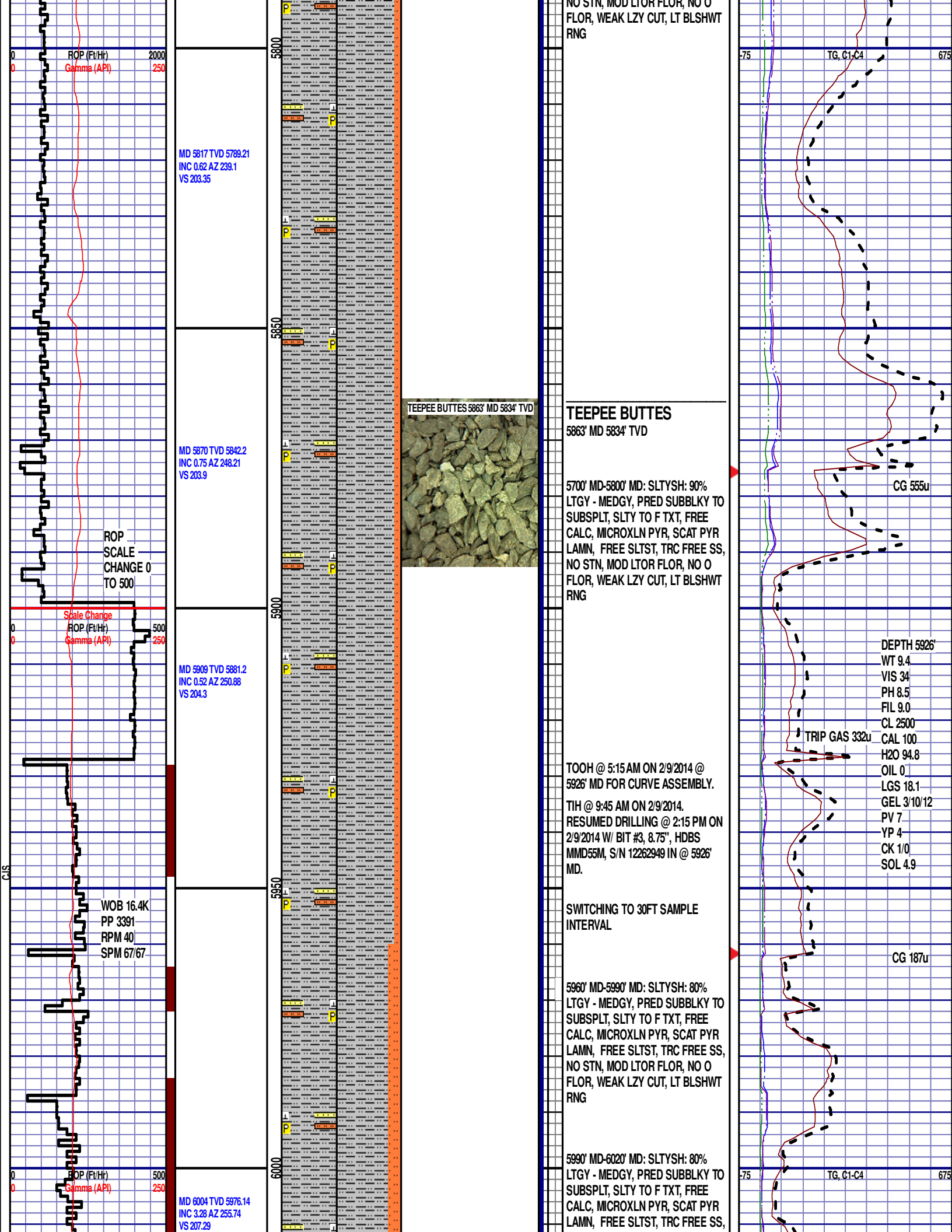


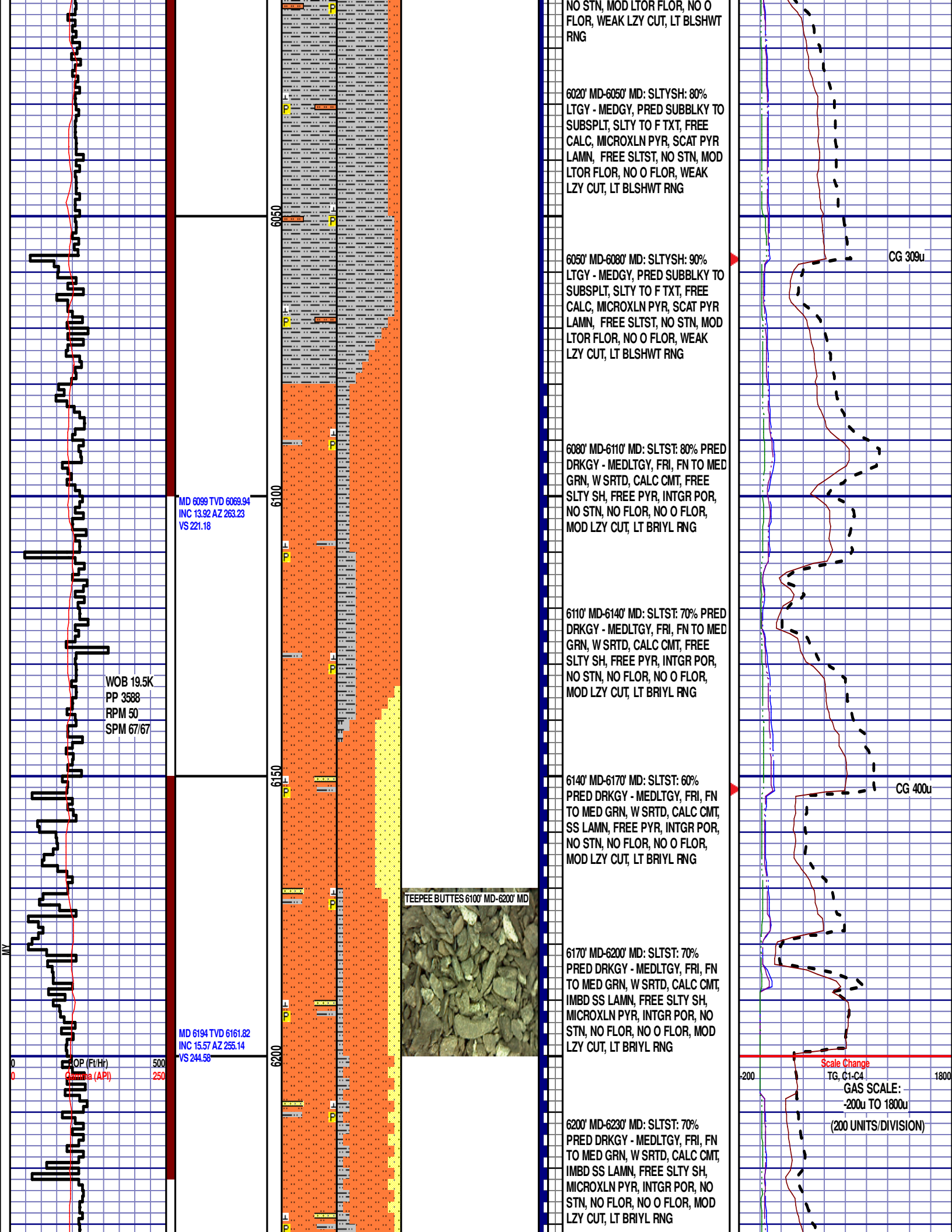


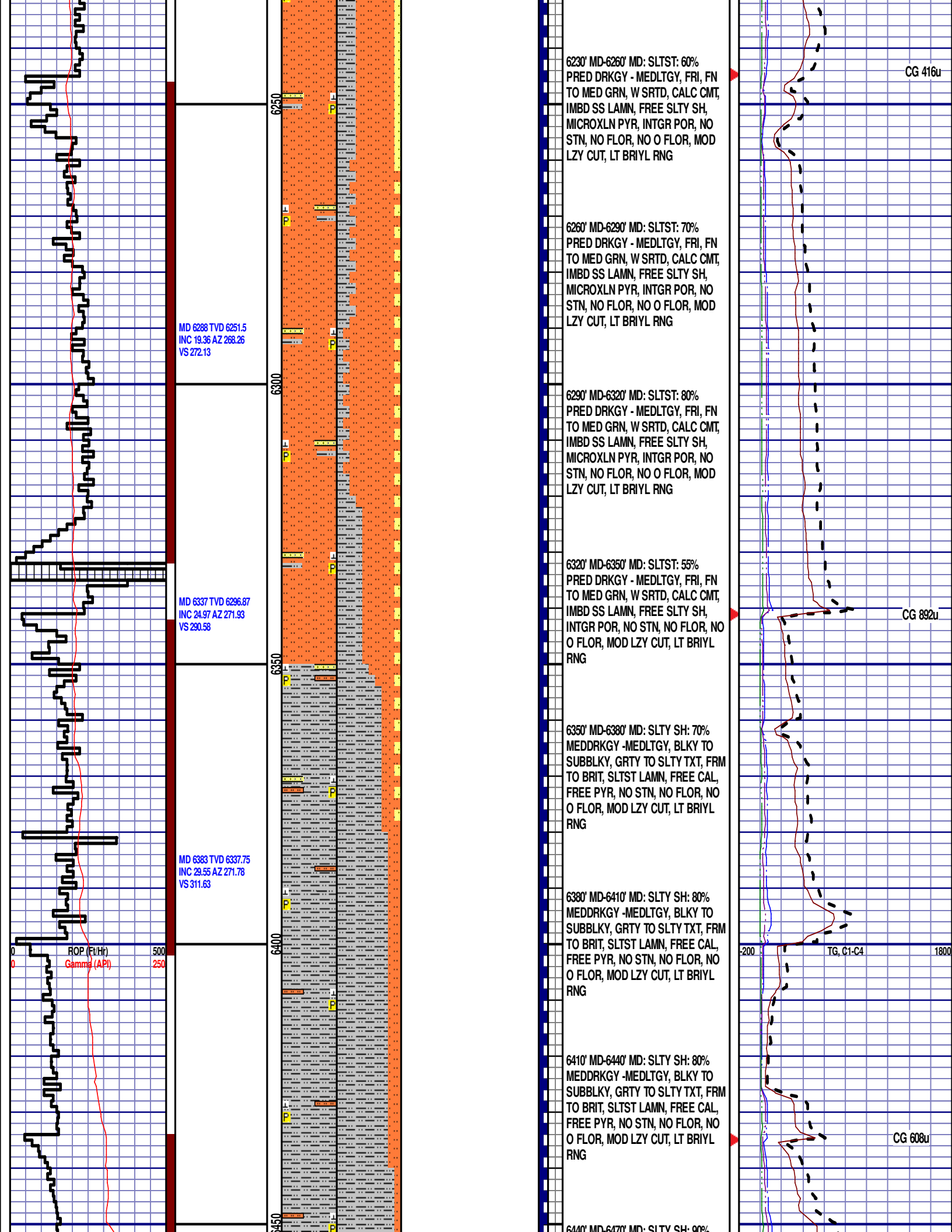




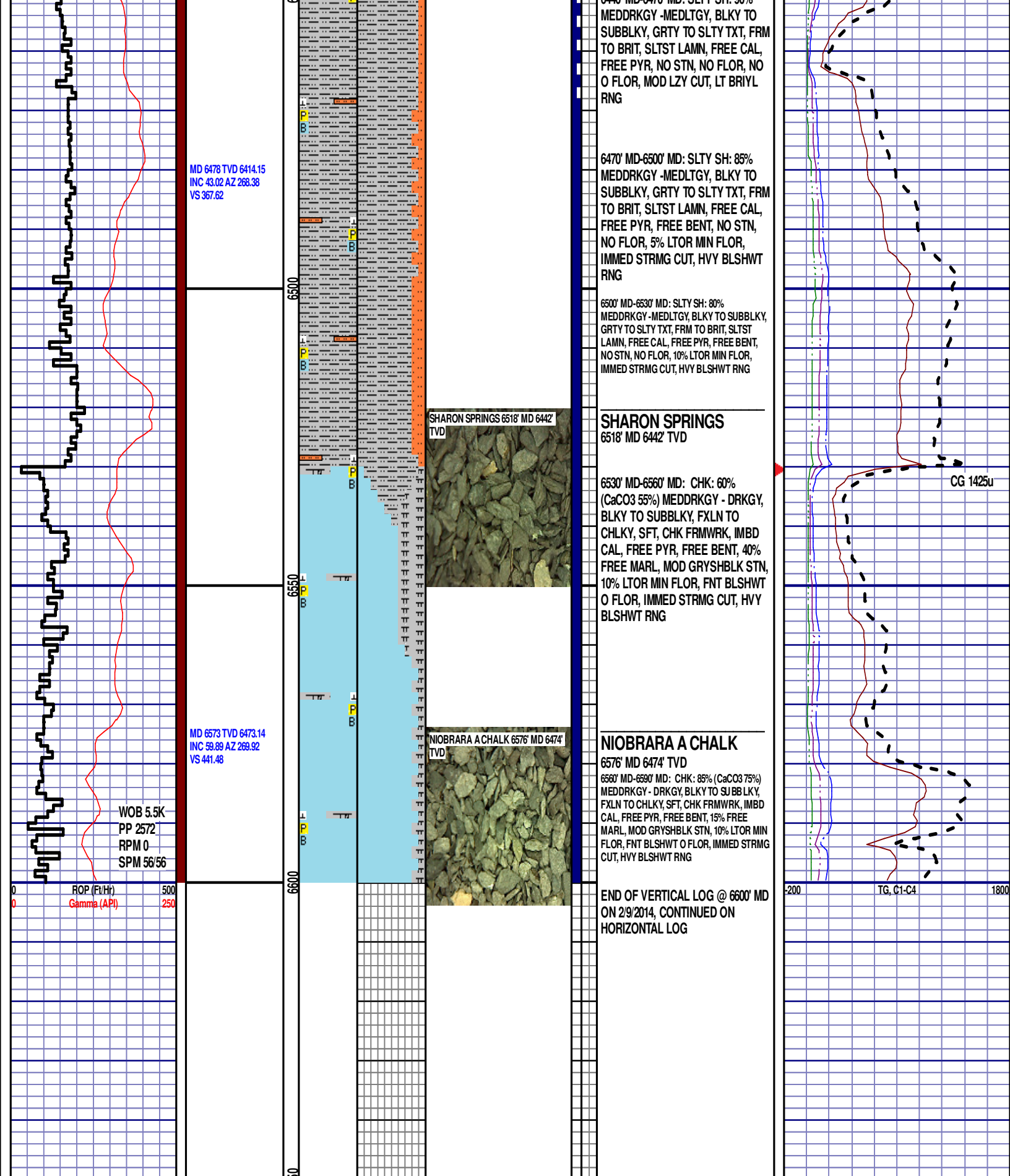












MD 6478 TVD 6414.15  
INC 43.02 AZ 268.38  
VS 367.62

MD 6573 TVD 6473.14  
INC 59.89 AZ 269.92  
VS 441.48

WOB 5.5K  
PP 2572  
RPM 0  
SPM 56/56

ROP (Ft/Hr)  
Gamma (API)

6500

6550

6600

SHARON SPRINGS 6518' MD 6442'  
TVD

NIOBRARA A CHALK 6576' MD 6474'  
TVD

6470' MD-6500' MD: SLTY SH: 85%  
MEDDRKGY - MEDLTGY, BLKY TO  
SUBBLKY, GRTY TO SLTY TXT, FRM  
TO BRIT, SLTST LAMN, FREE CAL,  
FREE PYR, NO STN, NO FLOR, NO  
O FLOR, MOD LZY CUT, LT BRIYL  
RNG

6500' MD-6530' MD: SLTY SH: 80%  
MEDDRKGY - MEDLTGY, BLKY TO SUBBLKY,  
GRTY TO SLTY TXT, FRM TO BRIT, SLTST  
LAMN, FREE CAL, FREE PYR, FREE BENT,  
NO STN, NO FLOR, 10% LTOR MIN FLOR,  
IMMED STRMG CUT, HVY BLSHWT  
RNG

### SHARON SPRINGS 6518' MD 6442' TVD

6530' MD-6560' MD: CHK: 60%  
(CaCO3 55%) MEDDRKGY - DRKGY,  
BLKY TO SUBBLKY, FXLN TO  
CHLKY, SFT, CHK FRMWRK, IMBD  
CAL, FREE PYR, FREE BENT, 40%  
FREE MARL, MOD GRYSBLK STN,  
10% LTOR MIN FLOR, FNT BLSHWT  
O FLOR, IMMED STRMG CUT, HVY  
BLSHWT RNG

### NIOBRARA A CHALK 6576' MD 6474' TVD

6560' MD-6590' MD: CHK: 85% (CaCO3 75%)  
MEDDRKGY - DRKGY, BLKY TO SUBBLKY,  
FXLN TO CHLKY, SFT, CHK FRMWRK, IMBD  
CAL, FREE PYR, FREE BENT, 15% FREE  
MARL, MOD GRYSBLK STN, 10% LTOR MIN  
FLOR, FNT BLSHWT O FLOR, IMMED STRMG  
CUT, HVY BLSHWT RNG

END OF VERTICAL LOG @ 6600' MD  
ON 2/9/2014, CONTINUED ON  
HORIZONTAL LOG

CG 1425u

-200 TG, C1-C4 1800