



7136 South Yale Avenue, Suite 414

Tulsa, Oklahoma 74136-6378

phone 918.925.9739

fax 866.534.4559

WWW.HZMUD.COM/25

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 &
Jeremy Needham

Log Interval: 2500' MD to 6750' MD

Start Date: October 19, 2013

Release Date: October 24, 2013

Well Information

Well Name: Wells Ranch
AE20-65-1HN

Location: 20-T6N-R62W
1793' FSL, 215' FWL

County: Weld
State: Colorado

Drilling Rig: H&P 343

Total Depth: 11077' MD

TD Date: October 24, 2013

Formation: Niobrara C Chalk

KB Elevation: 4809'

GR Elevation: 4785'

API Number: 05-123-37221-0000

ROCK TYPES

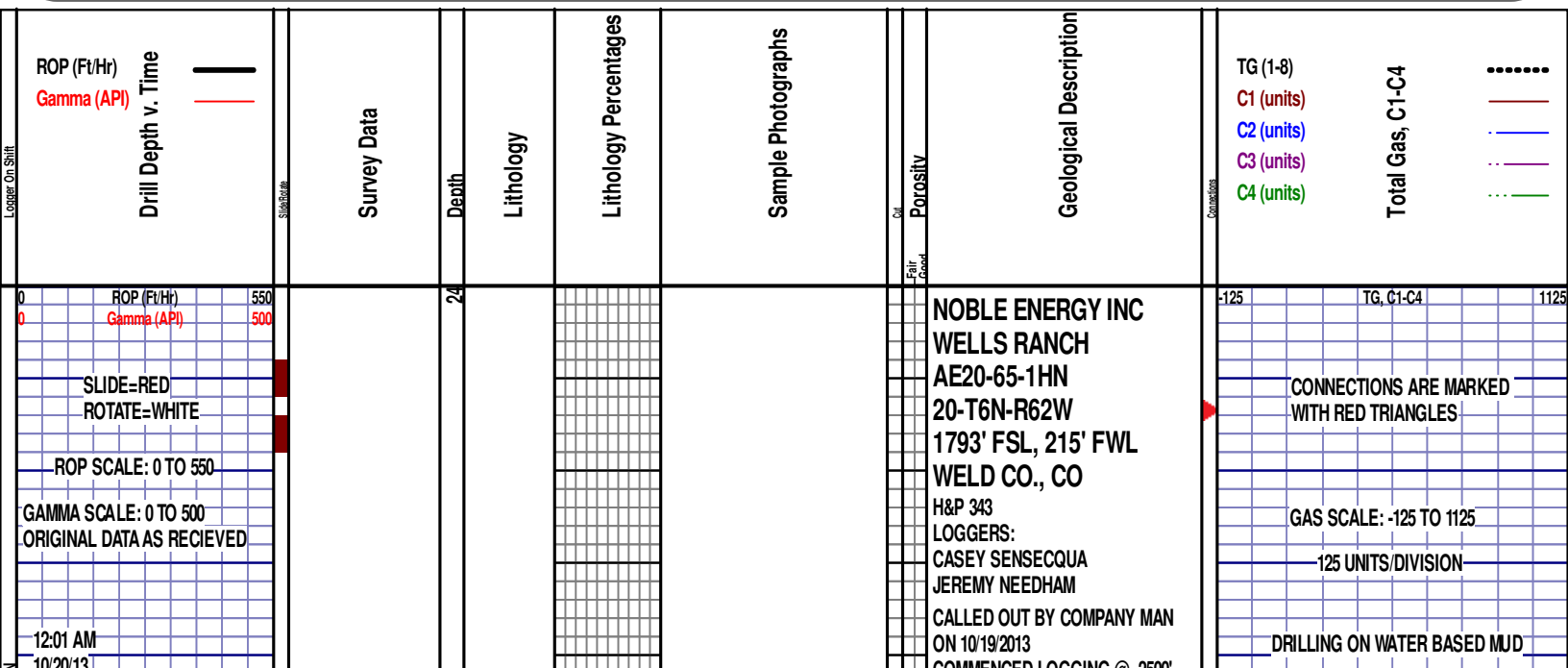
shale
Anhy
Bent
Brec
Cht
Clyst
Coal

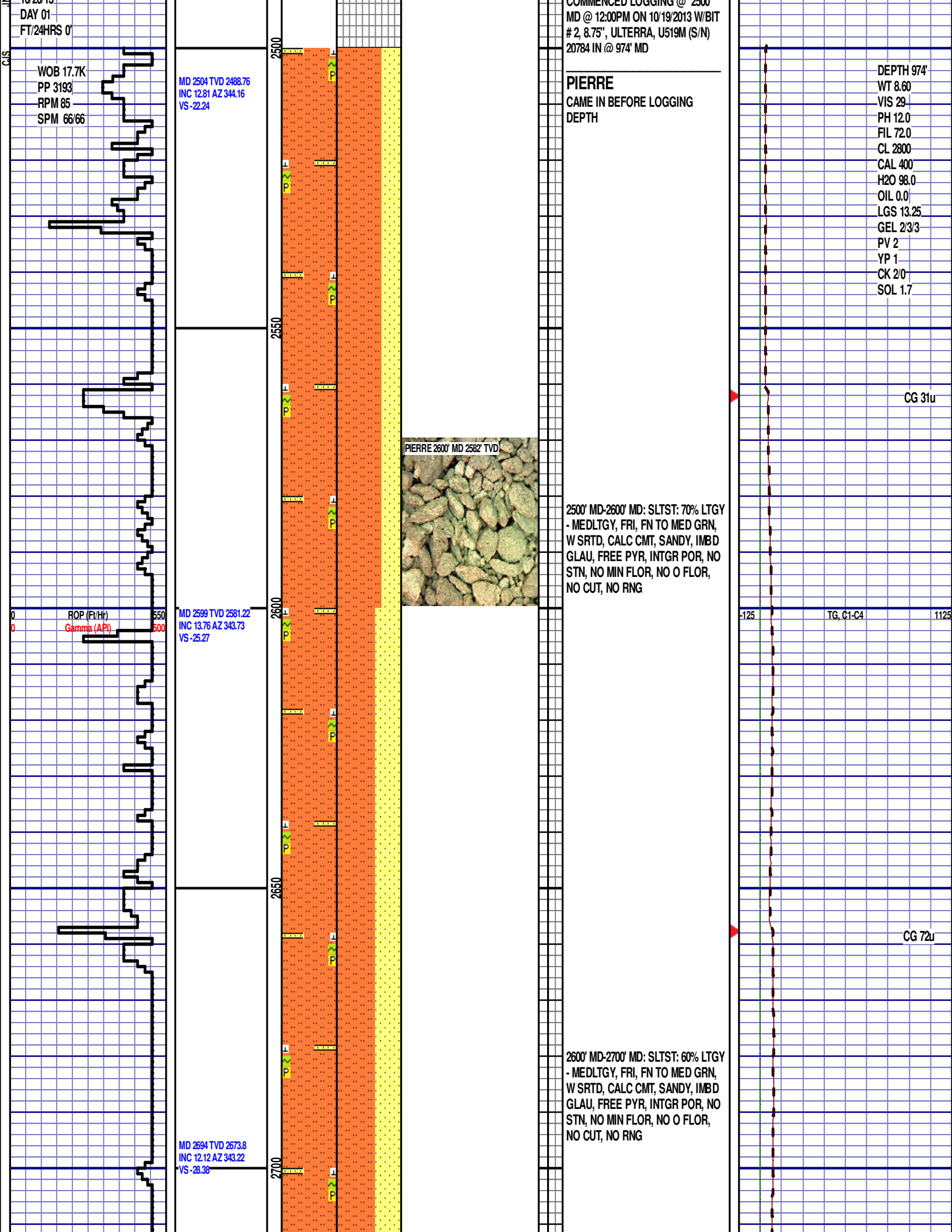
Congl
Dol
Gyp
Igne
Lmst
Meta
Mrlist

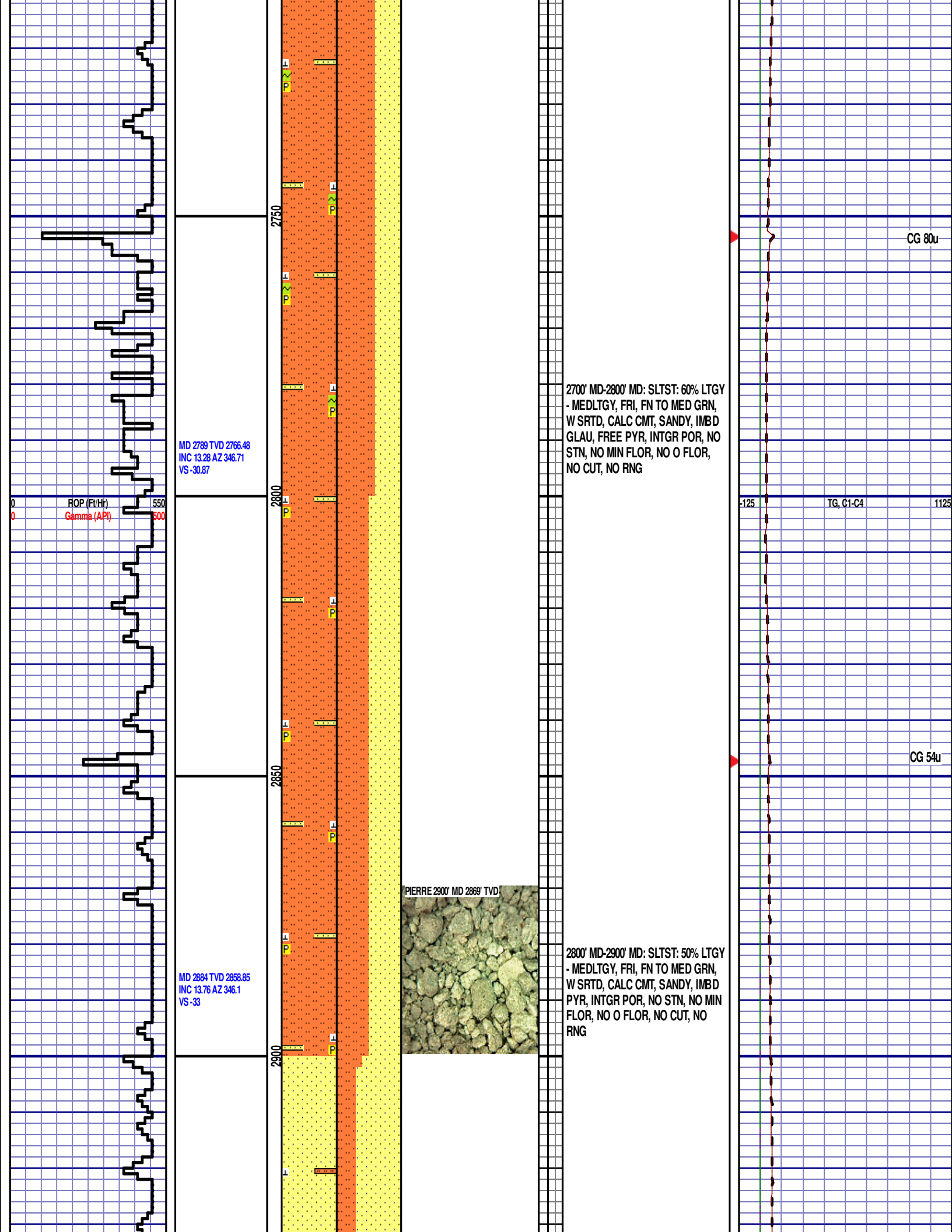
Salt
Shale
Shcol
Shgy
Sltst
Ss
Till

gw
lmywash
ogw
olmywash
oshly gw
shly gw
sdygw

hvyrcrbsh
nosmpl
Lsdetrst
sltst
sdy sh





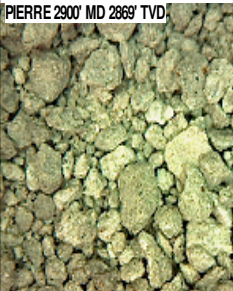


MD 2789 TVD 2766.48
INC 13.28 AZ 346.71
VS-30.87

ROP (Ft/Hr)
Gamma (API)

MD 2884 TVD 2858.85
INC 13.76 AZ 346.1
VS-33

2700' MD-2800' MD: SLTST: 60% LTGY
- MEDLTGY, FRI, FN TO MED GRN,
W SRTD, CALC CMT, SANDY, IMBD
GLAU, FREE PYR, INTGR POR, NO
STN, NO MIN FLOR, NO O FLOR,
NO CUT, NO RNG

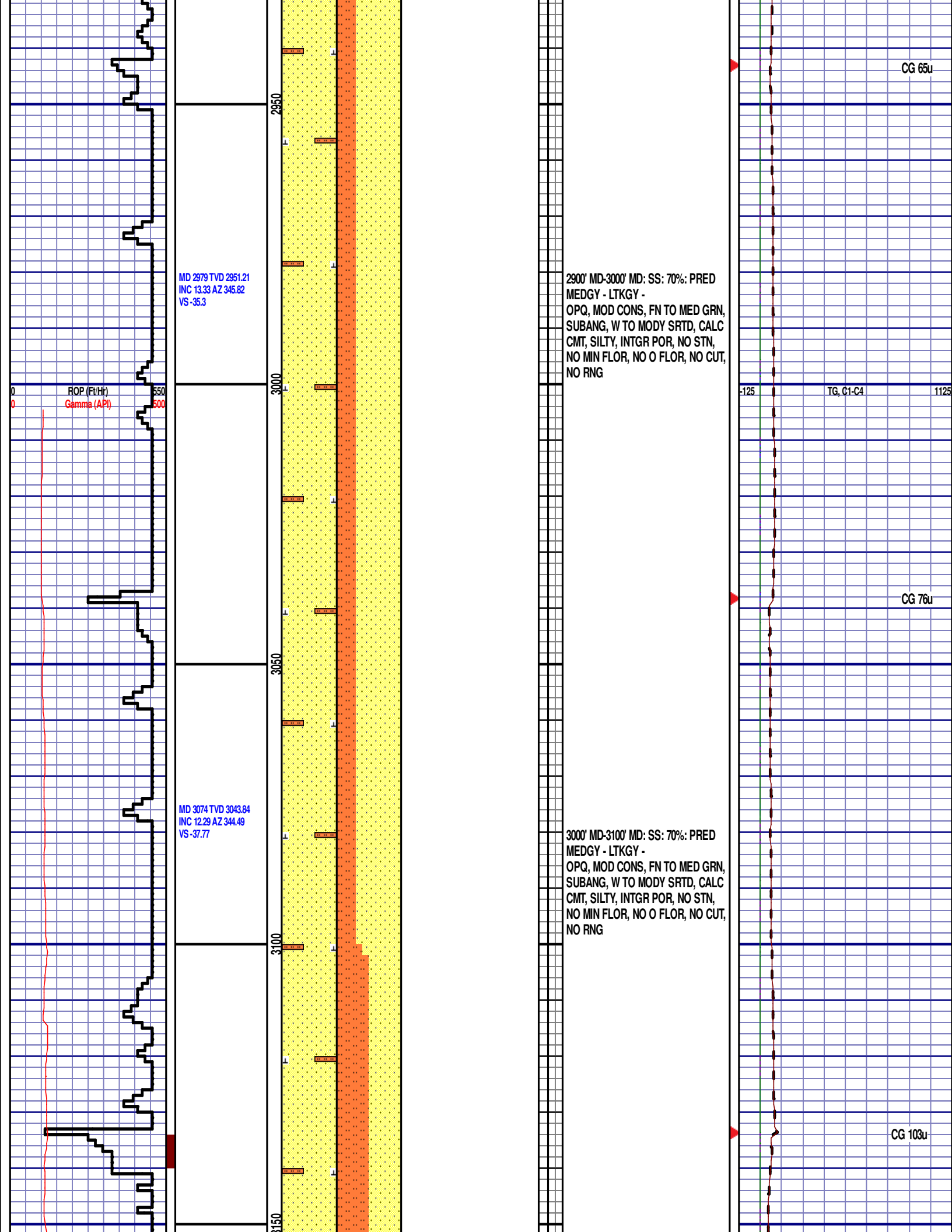


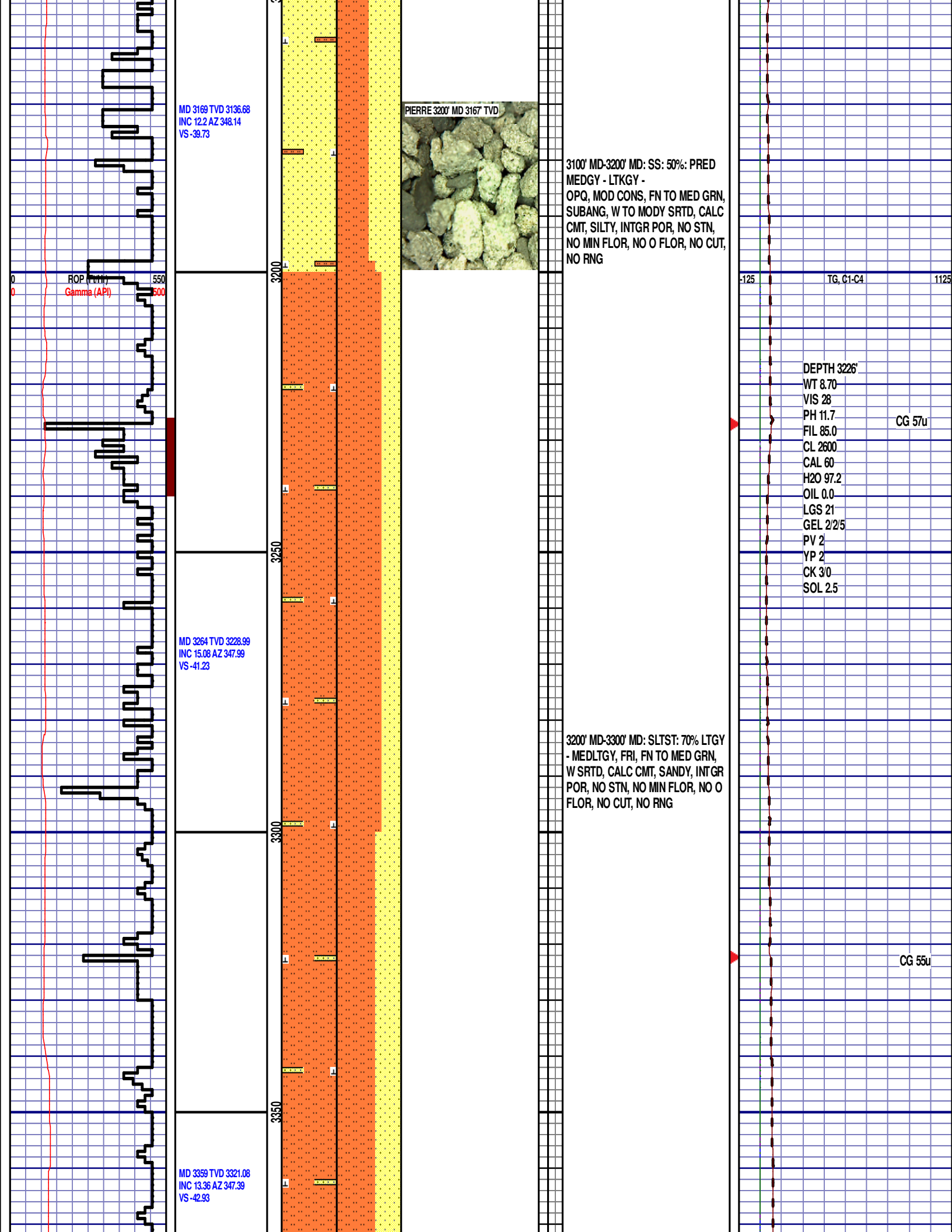
2800' MD-2900' MD: SLTST: 50% LTGY
- MEDLTGY, FRI, FN TO MED GRN,
W SRTD, CALC CMT, SANDY, IMBD
PYR, INTGR POR, NO STN, NO MIN
FLOR, NO O FLOR, NO CUT, NO
RNG

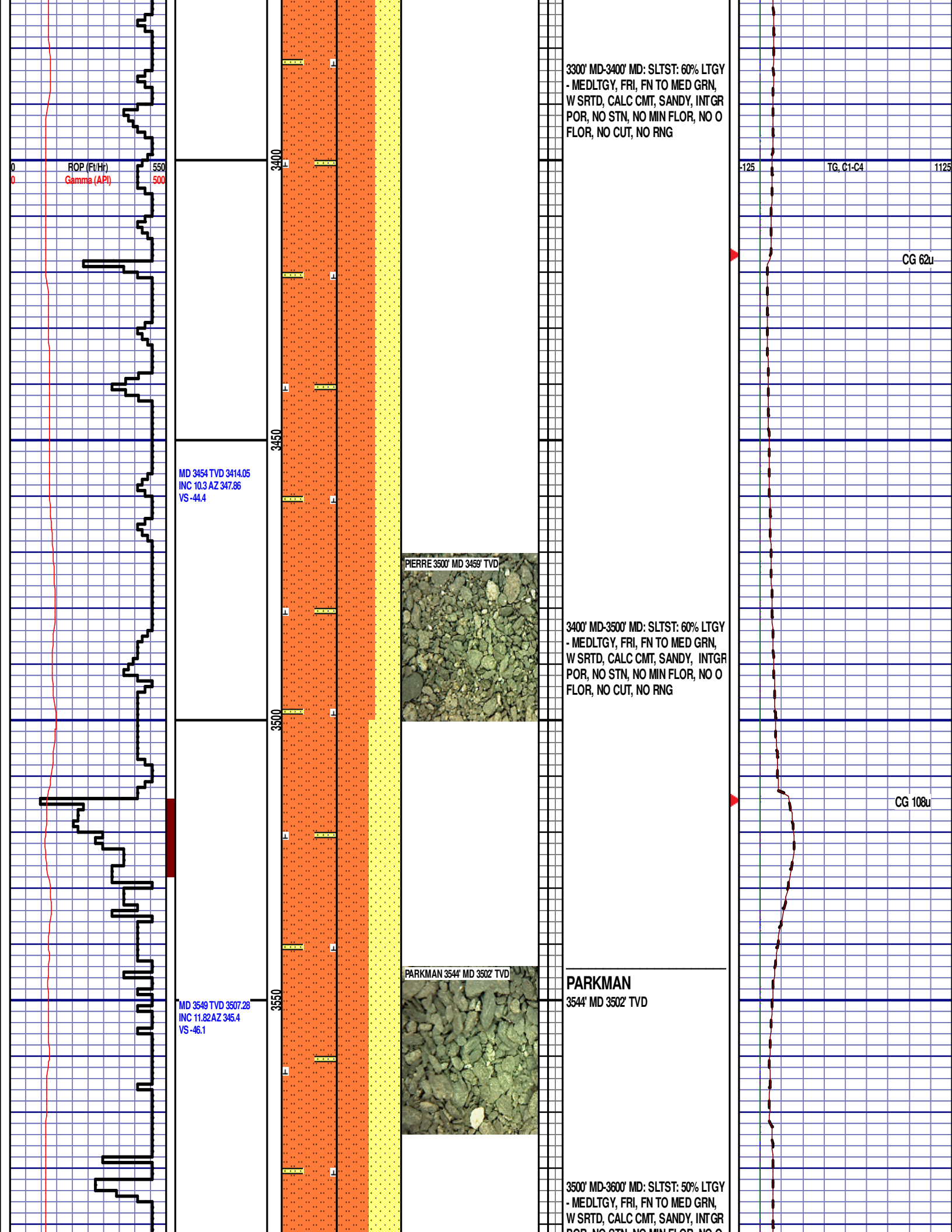
CG 80u

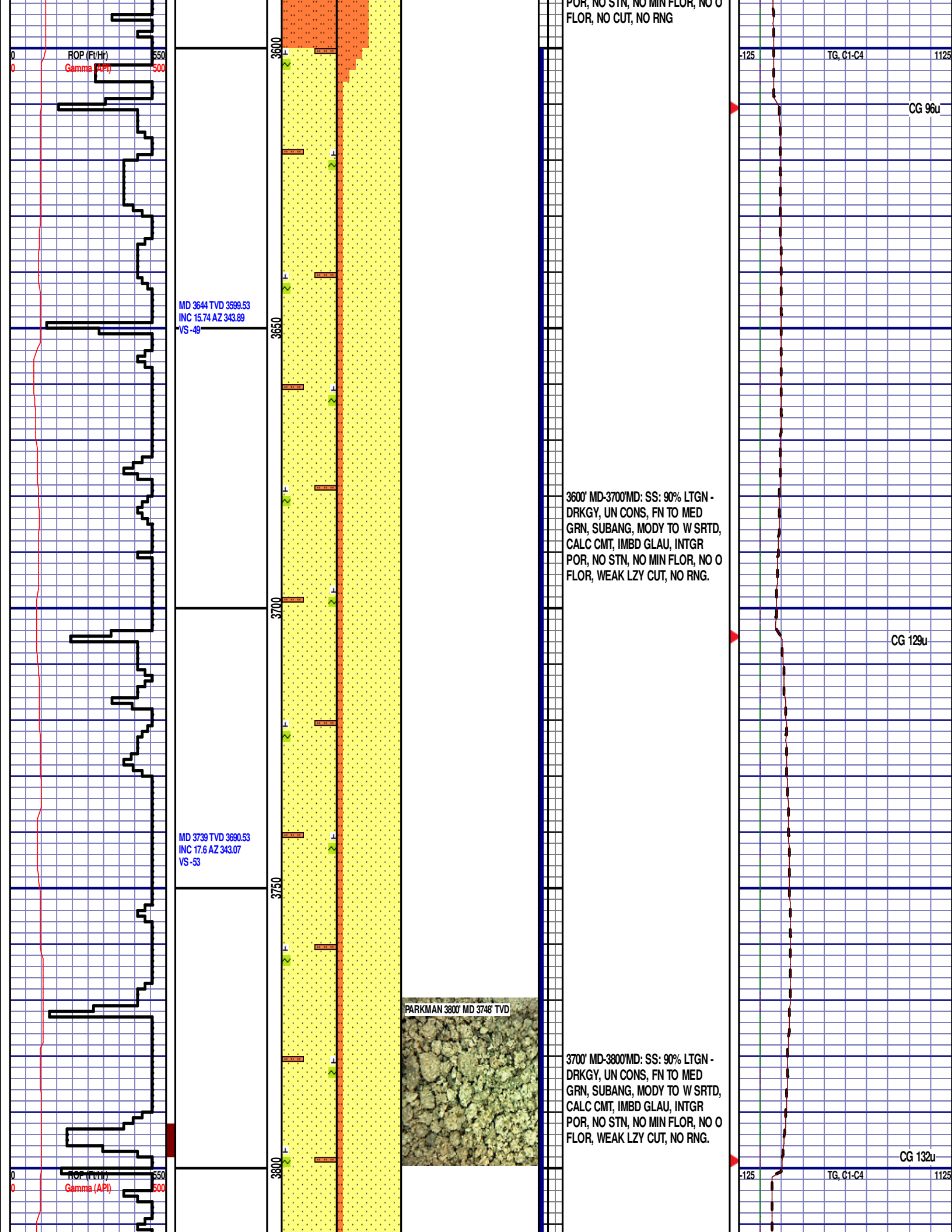
TG, C1-C4

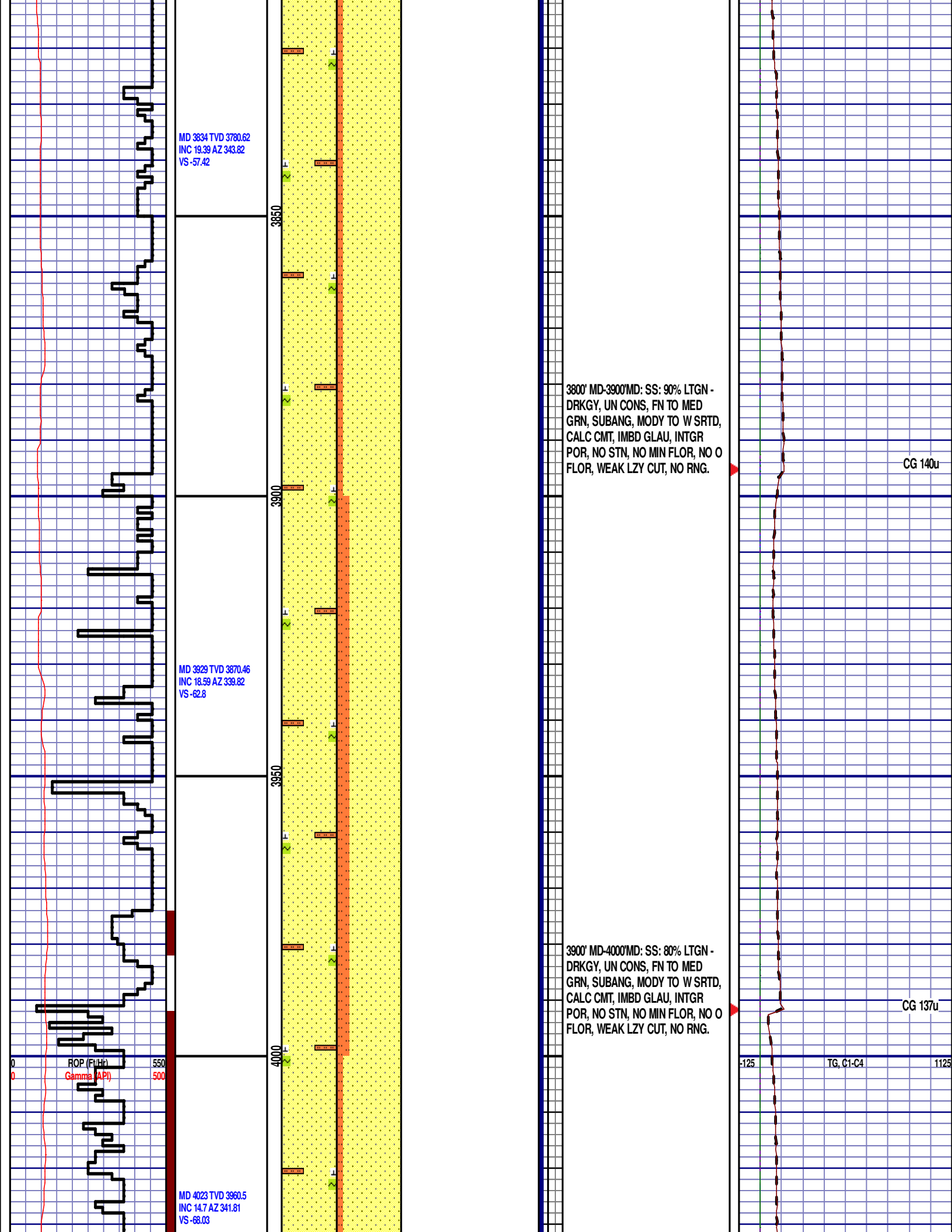
CG 54u

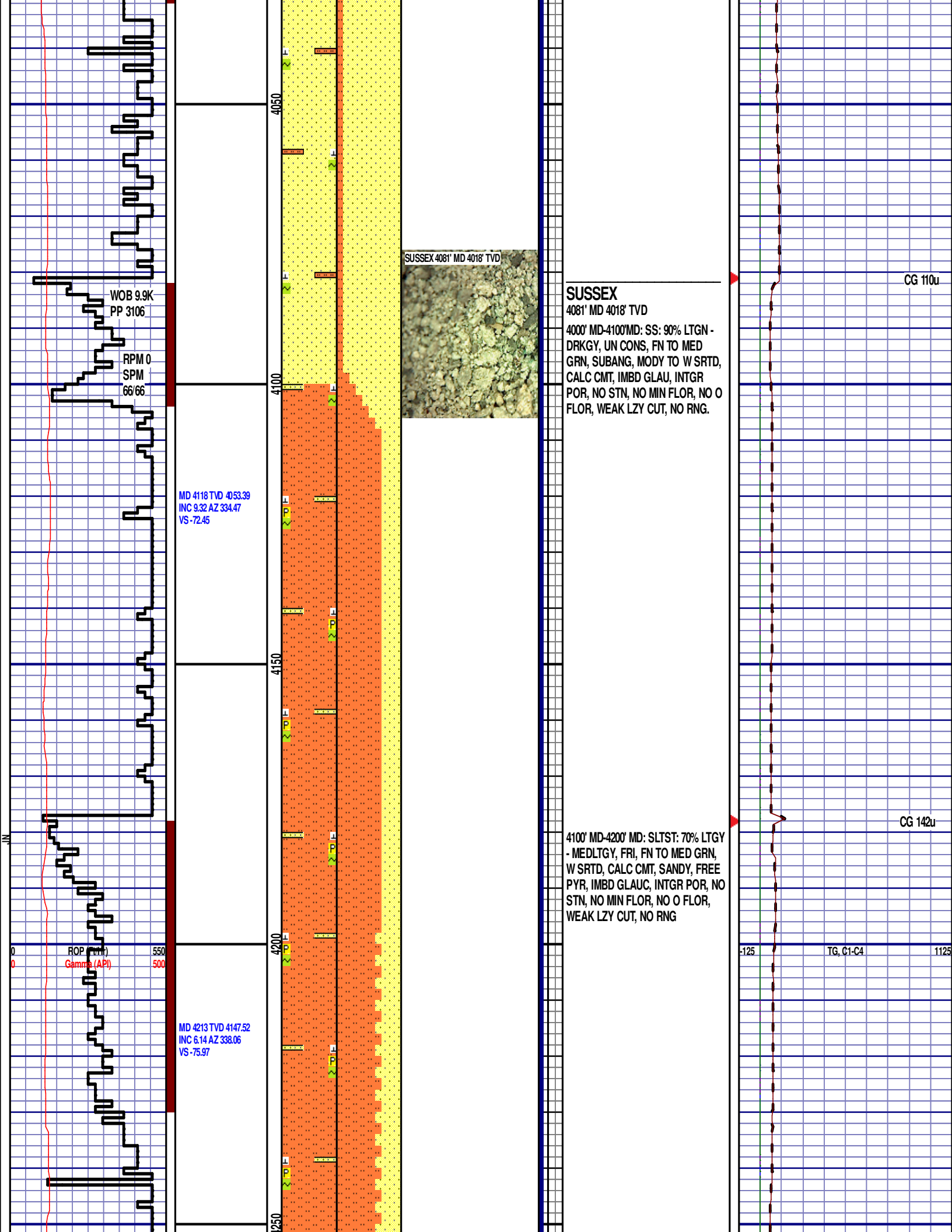












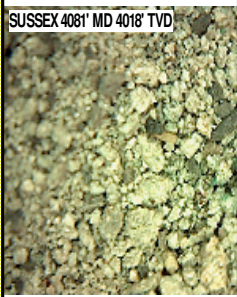
WOB 9.9K
PP 3106

RPM 0
SPM
66/66

MD 4118 TVD 4053.39
INC 9.32 AZ 334.47
VS -72.45

ROP (m/hr)
Gamma (API) 550/500

MD 4213 TVD 4147.52
INC 6.14 AZ 338.06
VS -75.97



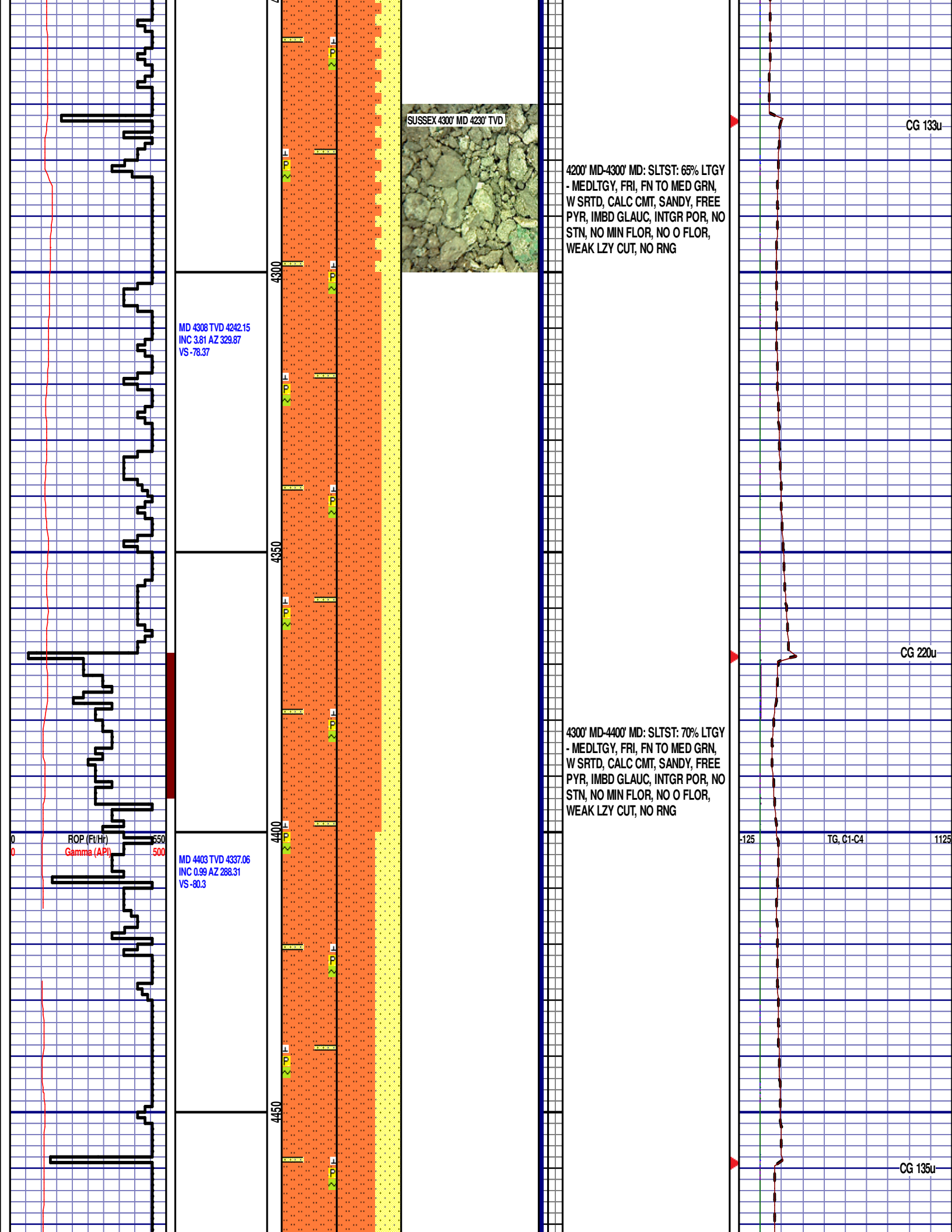
SUSSEX
4081' MD 4018' TVD
4000' MD-4100' MD: SS: 90% LTGN -
DRKGY, UN CONS, FN TO MED
GRN, SUBANG, MODY TO W SRTD,
CALC CMT, IMBD GLAU, INTGR
POR, NO STN, NO MIN FLOR, NO O
FLOR, WEAK LZY CUT, NO RNG.

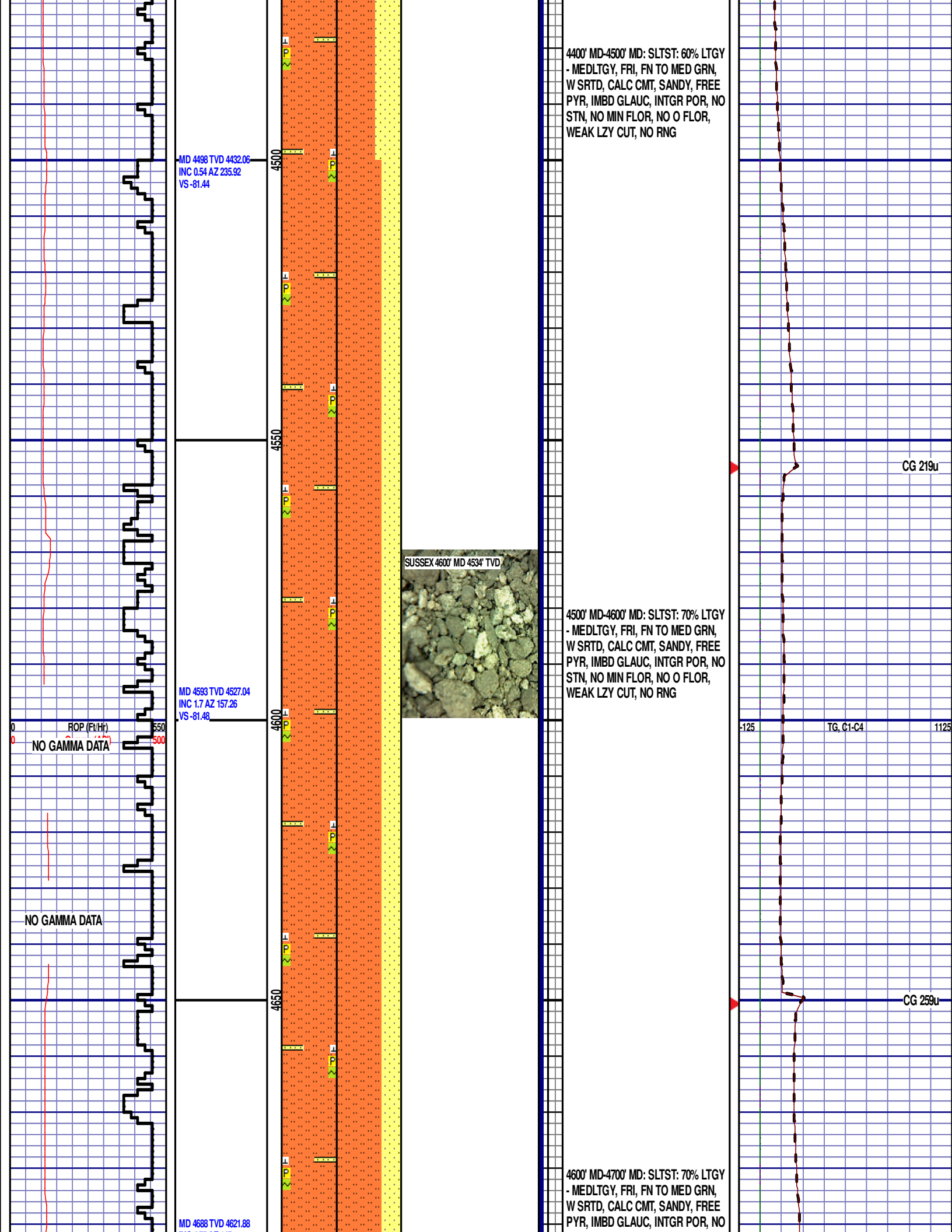
4100' MD-4200' MD: SLTST: 70% LTGY
- MEDLTGY, FRI, FN TO MED GRN,
W SRTD, CALC CMT, SANDY, FREE
PYR, IMBD GLAUC, INTGR POR, NO
STN, NO MIN FLOR, NO O FLOR,
WEAK LZY CUT, NO RNG

CG 110u

CG 142u

TG, C1-C4





INC 4.75 AZ 147
VS -79.47

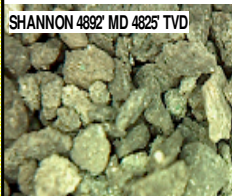
NO GAMMA DATA

MD 4783 TVD 4716.59
INC 4.25 AZ 143.61
VS -76.14

ROP (Ft/Hr)
Gamma (API)

MD 4878 TVD 4811.43
INC 2.33 AZ 163.36
VS -74.19

SHANNON 4892' MD 4825' TVD



STN, NO MIN FLOR, NO O FLOR,
WEAK LZY CUT, NO RNG

4700' MD-4800' MD: SLTST: 70% LTGY
- MEDLTGY, FRI, FN TO MED GRN,
W SRTD, CALC CMT, SANDY, FREE
PYR, IMBD GLAUC, INTGR POR, NO
STN, NO MIN FLOR, NO O FLOR,
WEAK LZY CUT, NO RNG

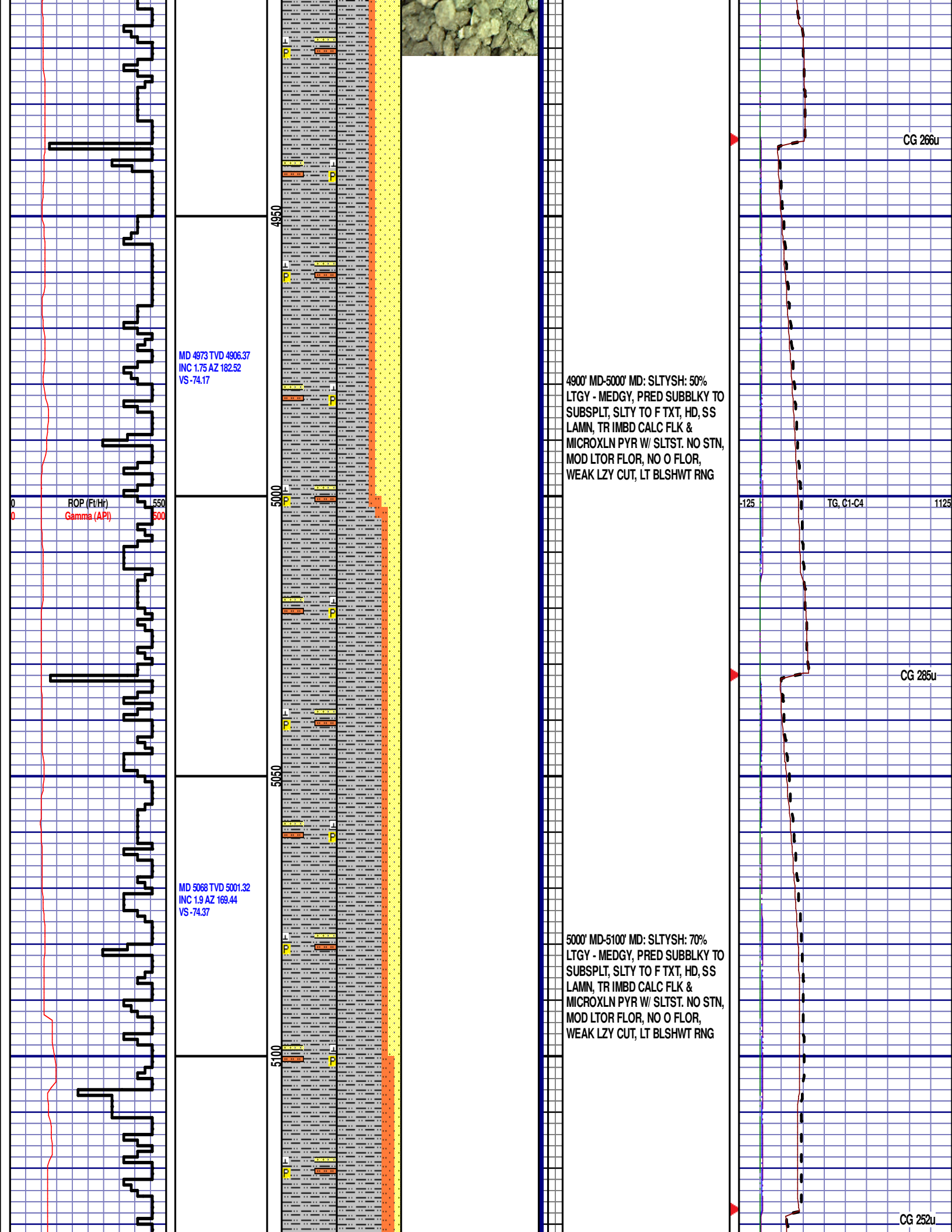
4800' MD-4900' MD: SLTST: 60% LTGY
- MEDLTGY, FRI, FN TO MED GRN,
W SRTD, CALC CMT, SANDY, FREE
PYR, IMBD GLAUC, INTGR POR, NO
STN, NO MIN FLOR, NO O FLOR,
WEAK LZY CUT, NO RNG

SHANNON
4892' MD 4825' TVD

CG 251u

TG, C1-C4

CG 173u



NO GAMMA DATA

MD 5163 TVD 5096.29
INC 1.22 AZ 157.18
VS -74.05

ROP (Ft/Hr)
Gamma (API)

550
600

MD 5258 TVD 5191.27
INC 0.65 AZ 179.98
VS -73.86

5150

5200

5250

5300

5350

SHANNON 5200' MD 5135' TVD



5100' MD-5200' MD: SLTYSH: 70%
LTGY - MEDGY, PRED SUBBLKY TO
SUBSPLT, SLTY TO F TXT, HD, SS
LAMN, TR IMBD CALC FLK &
MICROXLN PYR W/ SLTST. NO STN,
MOD LTOR FLOR, NO O FLOR,
WEAK LZY CUT, LT BLSHWT RNG

5200' MD-5300' MD: SLTYSH: 80%
LTGY - MEDGY, PRED SUBBLKY TO
SUBSPLT, SLTY TO F TXT, HD, SS
LAMN, TR IMBD CALC FLK &
MICROXLN PYR W/ SLTST. NO STN,
MOD LTOR FLOR, NO O FLOR,
WEAK LZY CUT, LT BLSHWT RNG

-125

TG, C1-C4

1125

CG 318u

CG 413u

MD 5352 TVD 5285.27
INC 0.78 AZ 206.73
VS -74.3

ROP (Ft/Hr)
Gamma (API)

MD 5447 TVD 5380.26
INC 0.65 AZ 189.93
VS -74.84

WOB 10.8K
PP 4004
RPM 85
SPM 66/65

MD 5542 TVD 5475.25
INC 0.74 AZ 125.12
VS -74.55

5300' MD-5400' MD: SLTYSH: 80%
LTGY - MEDGY, PRED SUBBLKY TO
SUBSPLT, SLTY TO F TXT, HD, SS
LAMN, TR IMBD CALC FLK &
MICROXLN PYR W/ SLTST. NO STN,
MOD LTOR FLOR, NO O FLOR,
WEAK LZY CUT, LT BLSHWT RNG

SHANNON 5500' MD 5433' TVD

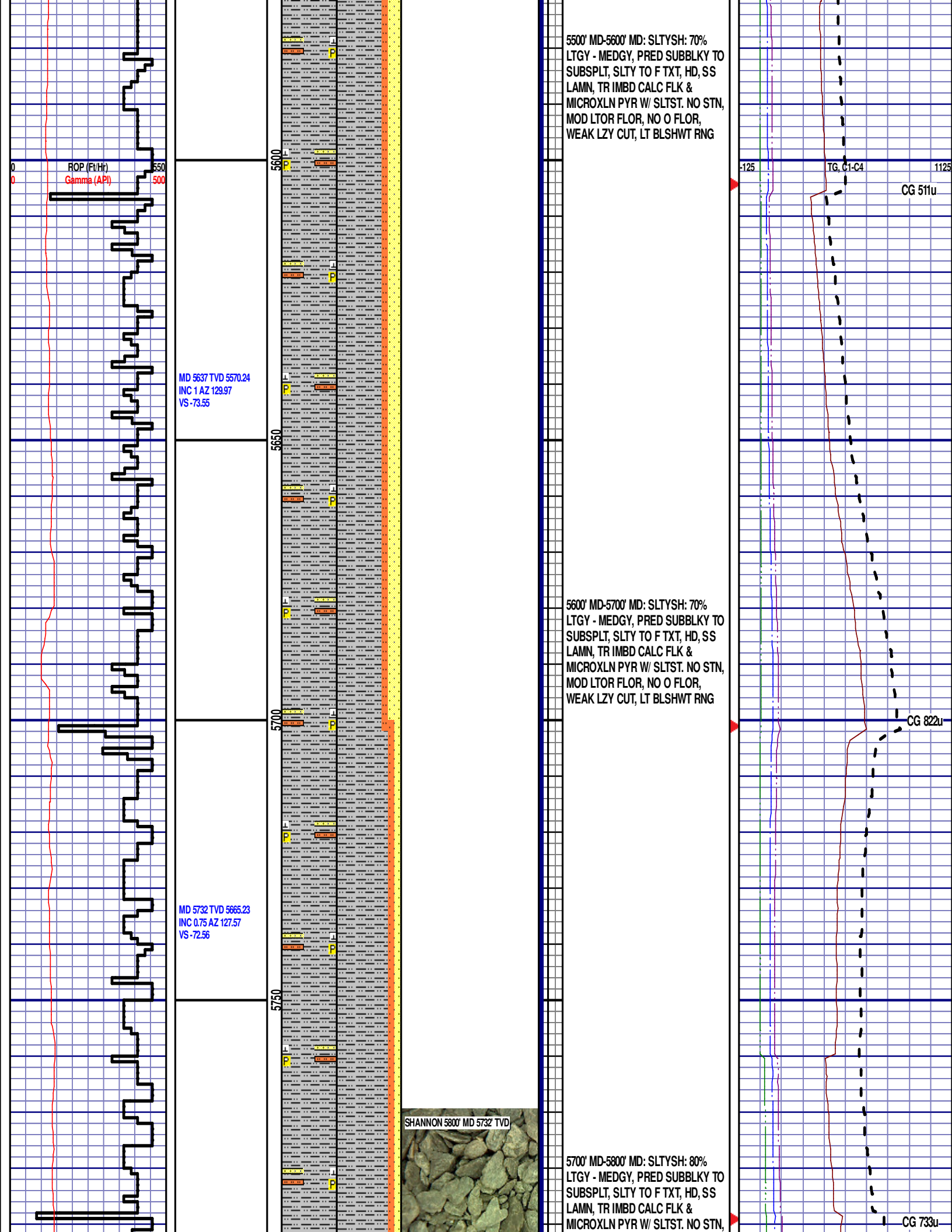


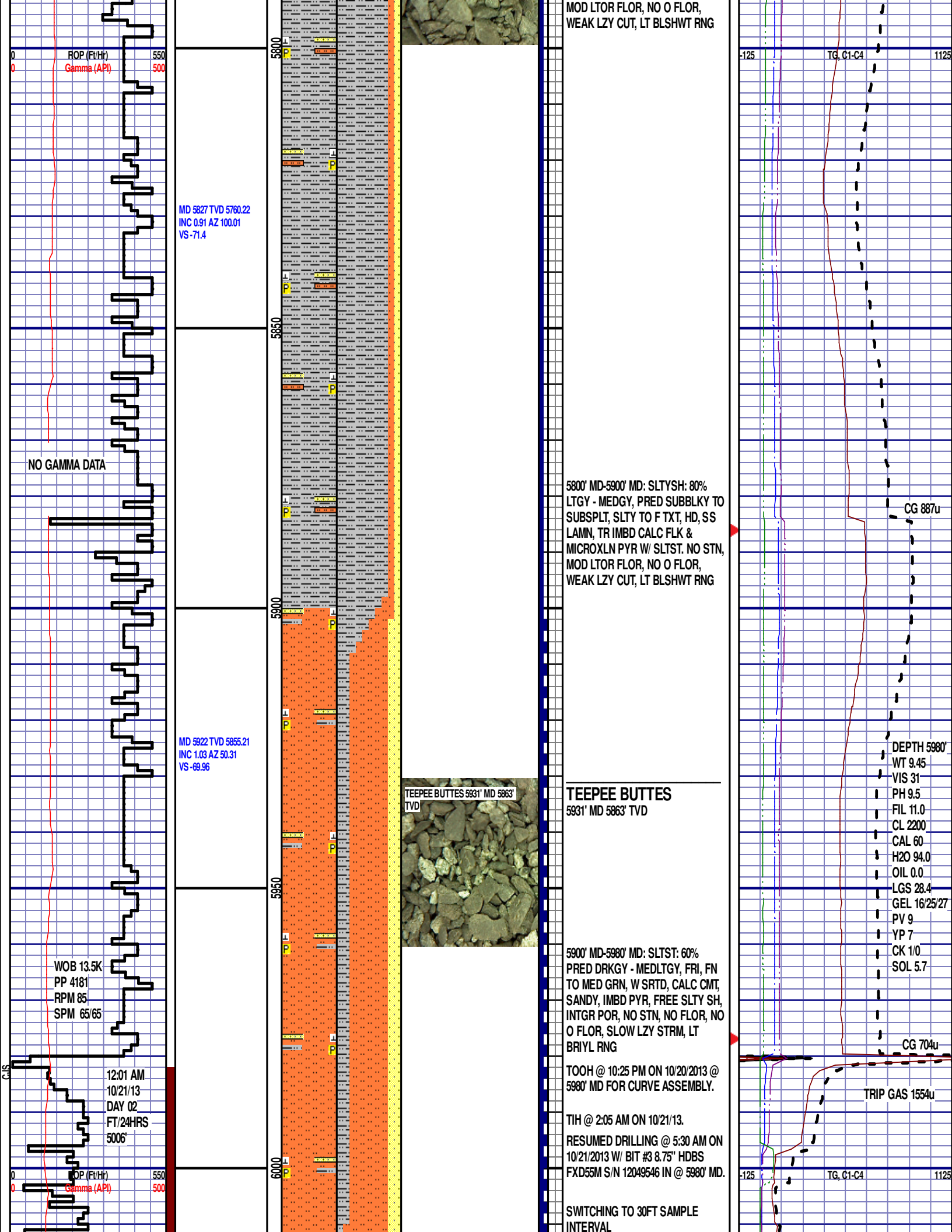
5400' MD-5500' MD: SLTYSH: 80%
LTGY - MEDGY, PRED SUBBLKY TO
SUBSPLT, SLTY TO F TXT, HD, SS
LAMN, TR IMBD CALC FLK &
MICROXLN PYR W/ SLTST. NO STN,
MOD LTOR FLOR, NO O FLOR,
WEAK LZY CUT, LT BLSHWT RNG

-125 TO C1-C4 1125

CG 470u

CG 459u





MD 6013 TVD 5946.18
INC 1.84 AZ 70.32
VS -67.82

WOB 33K
PP 2928
RPM 0
SPM 112/0

MD 6108 TVD 6040.71
INC 8.84 AZ 87.26
VS -59.04

MD 6203 TVD 6134.26
INC 11.17 AZ 85.87
VS -42.59

6050

6100

6150

6200

6010' MD-6040' MD: SLTST: 70%
PRED DRKGY - MEDLTGY, FRI, FN
TO MED GRN, W SRTD, CALC CMT,
IMBD PYR, SS LAMN, FREE SLTY
SH, INTGR POR, NO STN, NO FLOR,
NO O FLOR, SLOW LZY STRM, LT
BRIYL RNG

6040' MD-6070' MD: SLTST: 70%
PRED DRKGY - MEDLTGY, FRI, FN
TO MED GRN, W SRTD, CALC CMT,
IMBD PYR, SS LAMN, FREE SLTY
SH, INTGR POR, NO STN, NO FLOR,
NO O FLOR, SLOW LZY STRM, LT
BRIYL RNG

6070' MD-6100' MD: SLTST: 70%
PRED DRKGY - MEDLTGY, FRI, FN
TO MED GRN, W SRTD, CALC CMT,
IMBD PYR, SS LAMN, INTGR POR,
NO STN, NO FLOR, NO O FLOR,
SLOW LZY STRM, LT BRIYL RNG

6100' MD-6130' MD: SLTST: 60%
PRED DRKGY - MEDLTGY, FRI, FN
TO MED GRN, W SRTD, CALC CMT,
IMBD PYR, SS LAMN, INTGR POR,
NO STN, NO FLOR, NO O FLOR,
SLOW LZY STRM, LT BRIYL RNG

6130' MD-6160' MD: SLTST: 60%
PRED DRKGY - MEDLTGY, FRI, FN
TO MED GRN, W SRTD, CALC CMT,
IMBD PYR, SS LAMN, INTGR POR,
NO STN, NO FLOR, NO O FLOR,
SLOW LZY STRM, LT BRIYL RNG

6160' MD-6190' MD: SLTST: 60%
PRED DRKGY - MEDLTGY, FRI, FN
TO MED GRN, W SRTD, CALC CMT,
IMBD PYR, SS LAMN, INTGR POR,
NO STN, NO FLOR, NO O FLOR,
SLOW LZY STRM, LT BRIYL RNG

6190' MD-6220' MD: SLTST: 65%
PRED DRKGY - MEDLTGY, FRI, FN
TO MED GRN, W SRTD, CALC CMT,
IMBD PYR, SS LAMN, INTGR POR,
NO STN, NO FLOR, NO O FLOR,
SLOW LZY STRM, LT BRIYL RNG

6220' MD-6250' MD: SLTST: 60%

CG 179u

CG 259u

TEEPEE BUTTES 6220' MD 6151' TVD



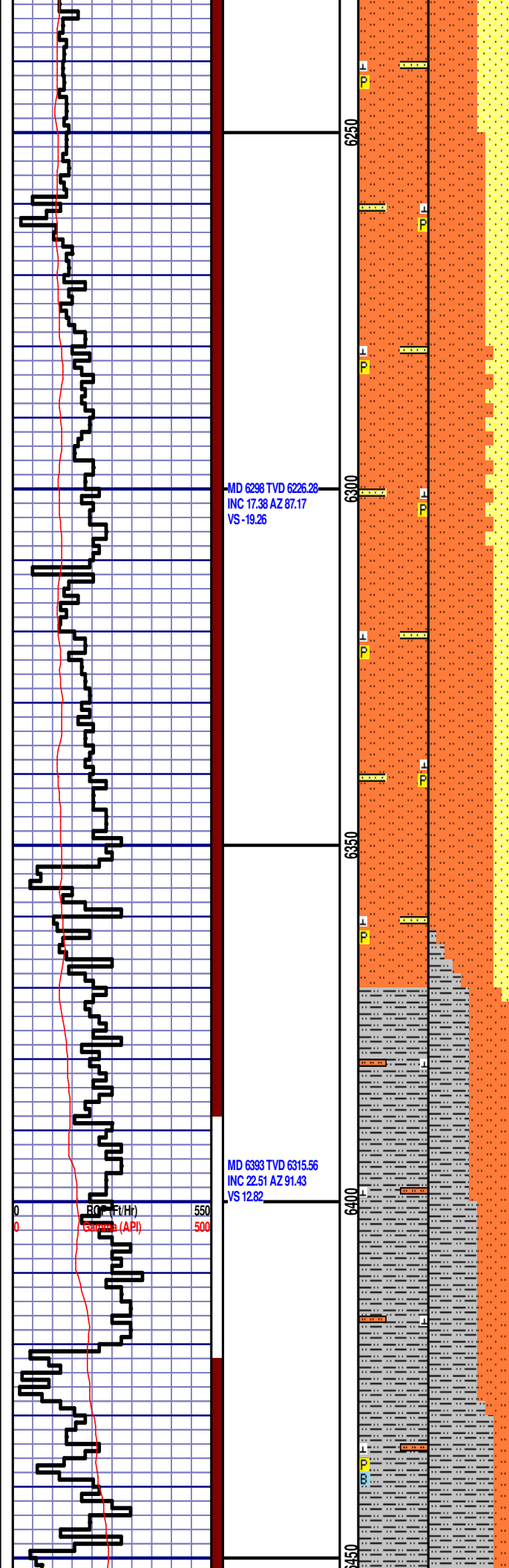
-125

TG, C1-C4

1125

ROP (Ft/Hr)
Gamma (API)

550
500



6250' MD-6280' MD: SLTST: 70%
PRED DRKGY - MEDLTGY, FRI, FN
TO MED GRN, W SRTD, CALC CMT,
IMBD PYR, SS LAMN, INTGR POR,
NO STN, NO FLOR, NO O FLOR,
SLOW LZY STRM, LT BRIYL RNG

6250' MD-6280' MD: SLTST: 70%
PRED DRKGY - MEDLTGY, FRI, FN
TO MED GRN, W SRTD, CALC CMT,
IMBD PYR, SS LAMN, INTGR POR,
NO STN, NO FLOR, NO O FLOR,
SLOW LZY STRM, LT BRIYL RNG

6280' MD-6310' MD: SLTST: 75%
PRED DRKGY - MEDLTGY, FRI, FN
TO MED GRN, W SRTD, CALC CMT,
IMBD PYR, SS LAMN, INTGR POR,
NO STN, NO FLOR, NO O FLOR,
SLOW LZY STRM, LT BRIYL RNG

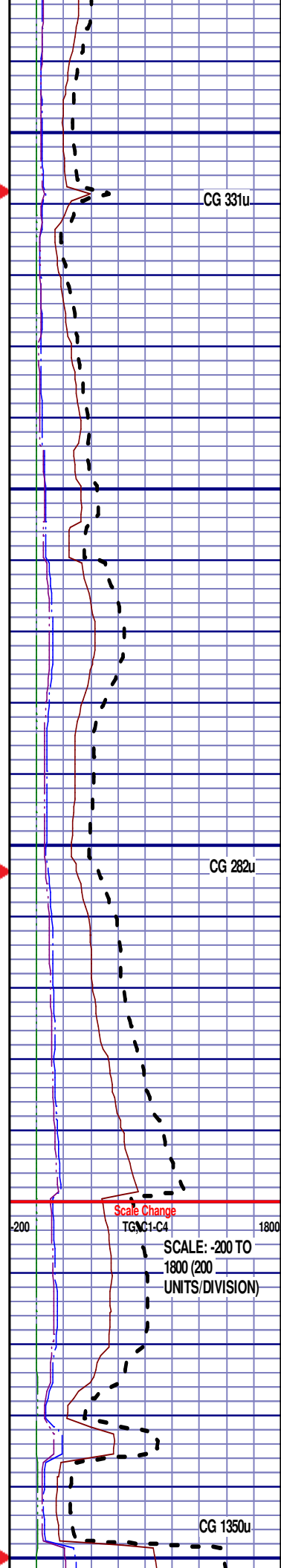
6310' MD-6340' MD: SLTST: 80%
PRED DRKGY - MEDLTGY, FRI, FN
TO MED GRN, W SRTD, CALC CMT,
IMBD PYR, SS LAMN, INTGR POR,
NO STN, NO FLOR, NO O FLOR,
SLOW LZY STRM, LT BRIYL RNG

6340' MD-6370' MD: SLTST: 80%
PRED DRKGY - MEDLTGY, FRI, FN
TO MED GRN, W SRTD, CALC CMT,
IMBD PYR, SS LAMN, INTGR POR,
NO STN, NO FLOR, NO O FLOR,
SLOW LZY STRM, LT BRIYL RNG

6370' MD-6400' MD: SLTY SH: 50%
MEDDRKGY - MEDLTGY, BLKY TO
SUBBLKY, GRTY TO SLTY TXT, FRM
TO BRIT, SLTST LAMN, FREE CAL,
NO STN, 5% FLOR, NO O FLOR,
SLOW LZY STRM, LT BRIYL RNG

6400' MD-6430' MD: SLTY SH: 60%
MEDDRKGY - MEDLTGY, BLKY TO
SUBBLKY, GRTY TO SLTY TXT, FRM
TO BRIT, SLTST LAMN, FREE CAL,
NO STN, 5% FLOR, NO O FLOR,
SLOW LZY STRM, LT BRIYL RNG

6430' MD-6460' MD: SLTY SH: 80%
MEDDRKGY - MEDLTGY, BLKY TO
SUBBLKY, GRTY TO SLTY TXT, FRM
TO BRIT, IMBD SLTST LAMN, FREE
CAL, FREE PYR, FREE BENT, NO



WOB 39K
PP 3176
RPM 0
SPM 0/112

MD 6488 TVD 6401.99
INC 26.5 AZ 92.09
VS 51.62

MD 6583 TVD 6482.16
INC 38.1 AZ 89.99
VS 101.67

ROP (Ft/Hr)
Gamma (API)

550
500

SHARON SPRINGS 6451' MD 6369'
TVD



NIOBRARA A CHALK 6521' MD 6431'
TVD



NIOBRARA A MARL 6553' MD 6458'
TVD



NIOBRARA B CHALK 6627' MD 6515'
TVD



STN, 20% FLOR, NO O FLOR, FAST
STRMG CUT, FNT DRKYL RNG

SHARON SPRINGS

6478' MD 6393' TVD

TOOH @ 11:45 AM ON 10/21/2013 @
6513' MD FOR MOTOR CHANGE.

TIH @ 2:50 PM ON 10/21/13.
RESUMED DRILLING @ 5:45 PM ON
10/21/2013 W/ BIT RR #3 8.75" HDBS
FXD55M S/N 12049546 IN @ 5980' MD.

NIOBRARA A CHALK

6521' MD 6431' TVD

6520' MD-6550' MD: CHK: 55% V/LTGY
- MEDGY -DRKGY, BLKY TO
SUBBLKY, IMBD PYRC SPEC, FREE
BENT, OCC FREE CAL, FREE SH,
MOD GYSHBLK STN, 5% LTOR
FLOR, FNT BLSHWT O FLOR,
IMMED STRMG CUT

NIOBRARA A MARL

6553' MD 6458' TVD

6550' MD-6580' MD:MRL: 45%
MEDDRKGY - DRKGY,
BLKY TO SUBBLKY, FXLN TO
CHLKY, FRM TO FRI, CHK FRMWRK,
IMBD CAL, FREE PYR, FREE BENT,
FREE CHALK, TT - PP POR, NO
STN, 10% LTOR FLOR, FNT BLSHWT
O FLOR, IMMED STRMG CUT

6580' MD-6610' MD:MRL: 45%
MEDDRKGY - DRKGY,
BLKY TO SUBBLKY, FXLN TO
CHLKY, FRM TO FRI, CHK FRMWRK,
IMBD CAL, FREE PYR, FREE BENT,
FREE CHALK, TT - PP POR, NO
STN, 10% LTOR FLOR, FNT BLSHWT
O FLOR, IMMED STRMG CUT

NIOBRARA B CHALK

6627' MD 6515' TVD

6640' MD-6670' MD: CHK: 65% V/LTGY
- MEDGY -DRKGY, BLKY TO
SUBBLKY, FXLN TO CHLKY, SFT,
IMBD PYRC SPEC, OCC FREE CAL,
IMBD SH, FREE BENT, TR
GRYSHBLK STN, 5% LTOR MIN
FLOR, FNT BLSHWT O FLOR,
IMMED STRMG CUT, BRIYL RNG

DEPTH
6513'
WT 10.25
VIS 36'
PH 9.5
FIL 8.0
CL 2500
CAL 80
H2O 91.0
OIL 0.0
LGS 28.6
GEL
5/26/37
PV 12
YP 11
CK 1/0
SOL 8.7

Scale Change

TG, C1-C4

SCALE: -350 TO
3150 (350
UNITS/DIVISION)

TG 472u

CG 2677u

TG, C1-C4

3150

CG
2707u

MD 6678 TVD 6548.06
INC 53.72 AZ 86.64
VS 169.28

WOB 41.4K
PP 3469
RPM 0
SPM 58/57

6700

6750

00

NIOBRARA B MARL 6683' MD 6551'
TVD



NIOBRARA B MARL
6683' MD 6551' TVD

6700' MD-6730' MD: MRL: 45%
MEDDRKGY - DRKGY, BLKY TO
SUBBLKY, FXLN TO CHLKY, FRM
TO FRI, CHK FRMWRK, IMBD CAL,
FREE PYR, FREE BENT, TT - PP
POR, TR GRYSHBLK STN, 5% LTOR
MIN FLOR, FNT BLSHWT O FLOR,
IMMED STRMG CUT, BRIYL PNG

6730' MD-6750' MD: MRL: 45%
MEDDRKGY - DRKGY, BLKY TO
SUBBLKY, FXLN TO CHLKY, FRM
TO FRI, CHK FRMWRK, IMBD CAL,
FREE PYR, FREE BENT, TT - PP
POR, TR GRYSHBLK STN, 5% LTOR
MIN FLOR, FNT BLSHWT O FLOR,
IMMED STRMG CUT, BRIYL PNG

END OF VERTICAL LOG @ 6750' MD
ON 10/21/13, CONTINUED ON
HORIZONTAL LOG

CG
2003u