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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 6650' MD

Start Date: October 13, 2013

Release Date: October 17, 2013

Well Information

Well Name: Wells Ranch
AE20-64HN

Location: 20-T6N-R62W
1756' FSL, 215' FWL

County: Weld
State: Colorado

Drilling Rig: H&P 343

Total Depth: 10665' MD

TD Date: October 17, 2013

Formation: Niobrara B Chalk

KB Elevation: 4809'

GR Elevation: 4785'

API Number: 05-123-37210-0000

ROCK TYPES

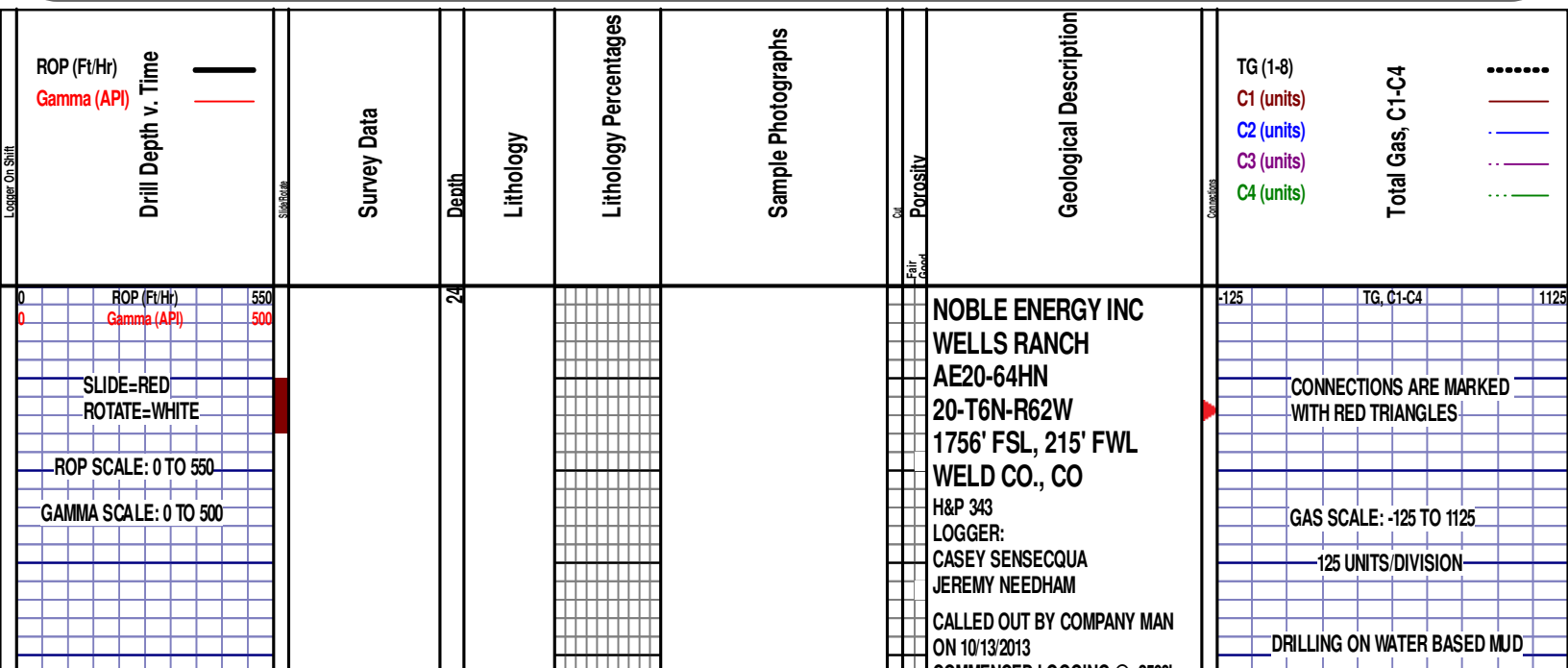
shale
Anhy
Bent
Brec
Cht
Clyst
Coal

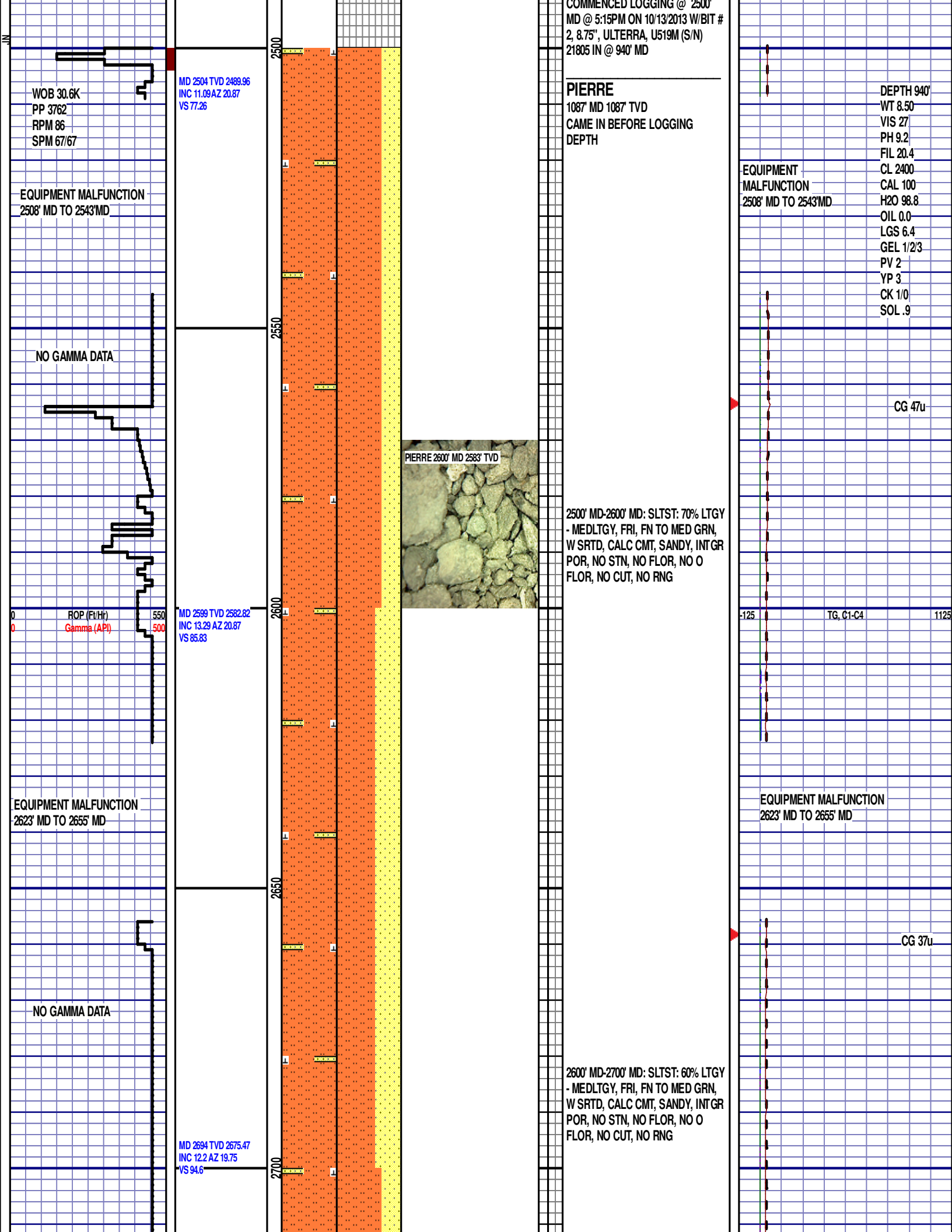
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Dol
Gyp
Igne
Lmst
Meta
Mrlist

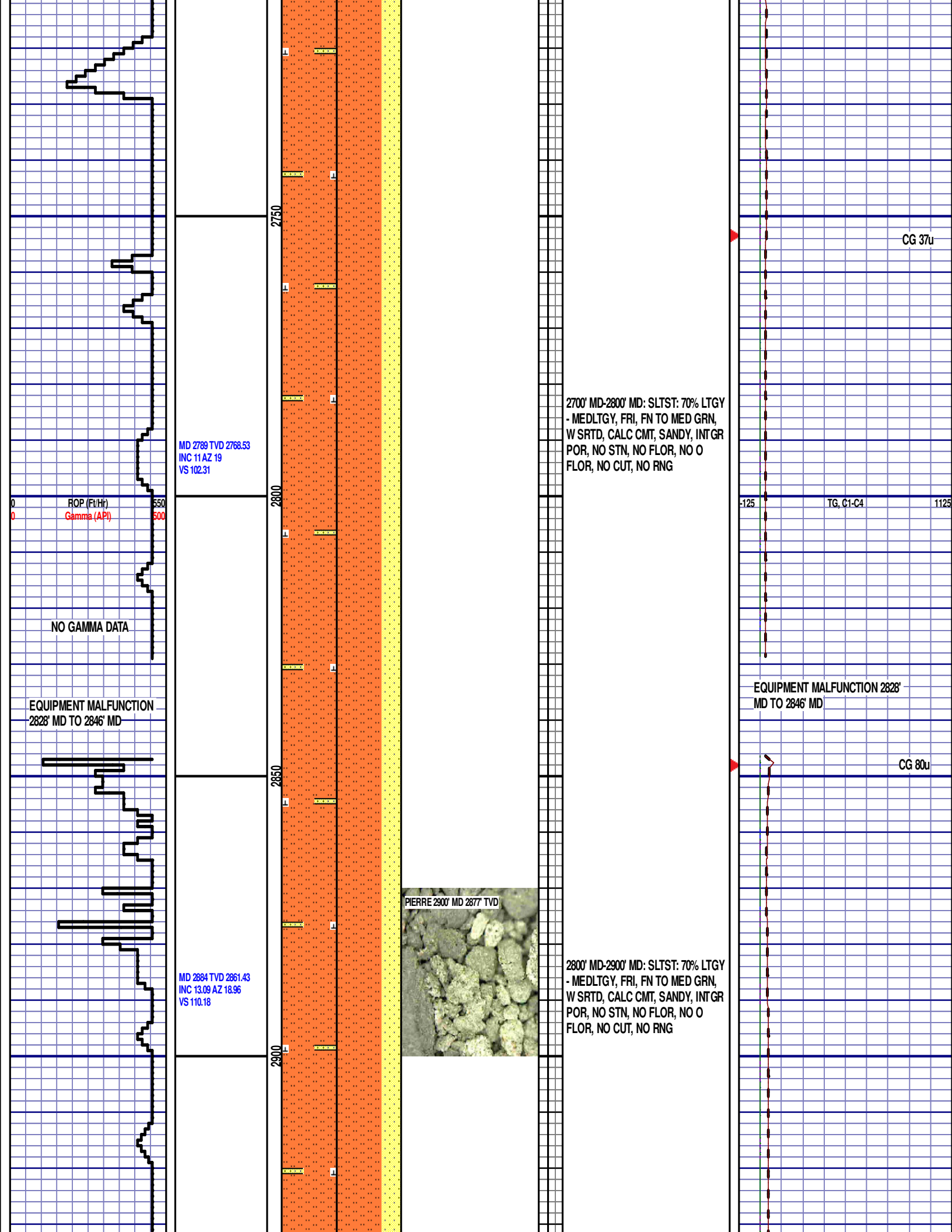
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Shale
Shcol
Shgy
Sltst
Ss
Till

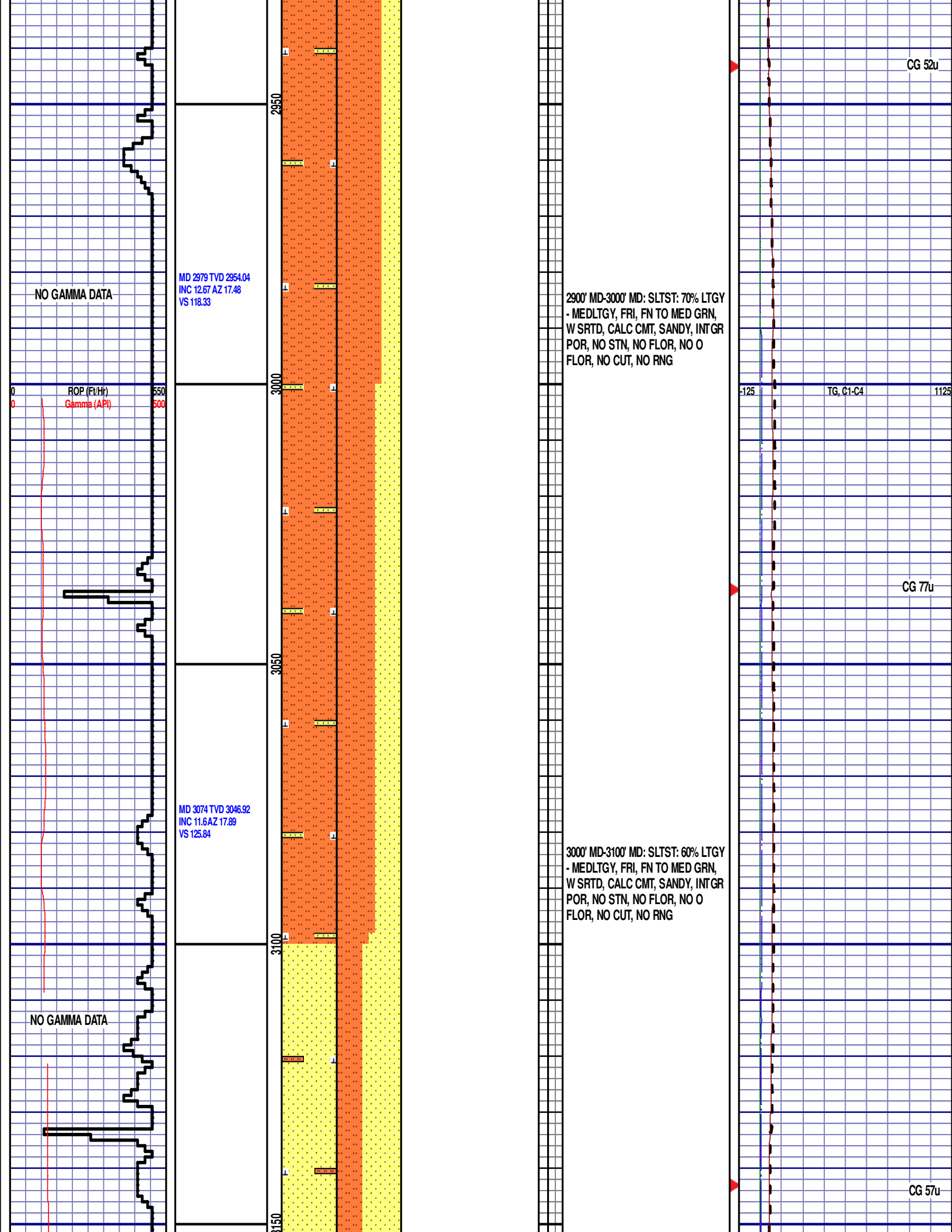
gw
lmywash
ogw
olmywash
oshly gw
shly gw
sdygw

hvyrcrbsh
nosmpl
Lsdetrst
sltst
sdy sh









NO GAMMA DATA

MD 3169 TVD 3140.23
INC 10.02 AZ 16.33
VS 132.39

ROP (Ft/Hr)
Gamma (API)

MD 3264 TVD 3233.96
INC 8.76 AZ 15.14
VS 137.74

MD 3359 TVD 3328.05
INC 7.02 AZ 14.89
VS 142.08

PIERRE 3200' MD 3168' TVD



3100' MD-3200' MD: SS: 60%: PRED
MEDGY - LTKGY -
OPQ, MOD CONS, FN TO MED GRN,
SUBANG, W TO MODY SRTD, CALC
CMT, SILTY, INTGR POR, NO STN,
NO FLOR, NO O FLOR, NO CUT, NO
RNG

3200' MD-3300' MD: SS: 60%: PRED
MEDGY - LTKGY -
OPQ, MOD CONS, FN TO MED GRN,
SUBANG, W TO MODY SRTD, CALC
CMT, SILTY, INTGR POR, NO STN,
NO FLOR, NO O FLOR, NO CUT, NO
RNG

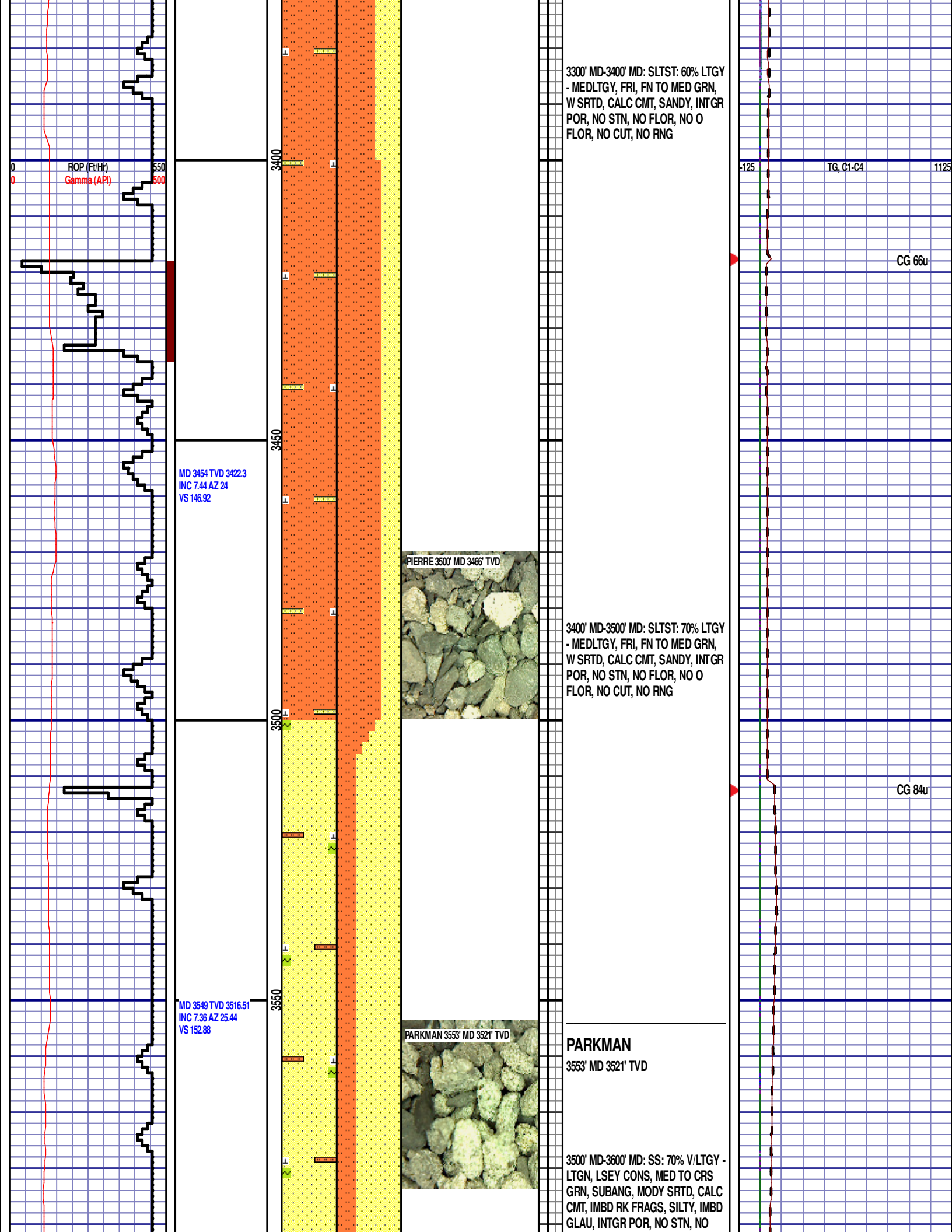
-125

TG, C1-C4

1125

CG 56u

CG 58u



3300' MD-3400' MD: SLTST: 60% 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

-125 TG, C1-C4 1125

CG 66u

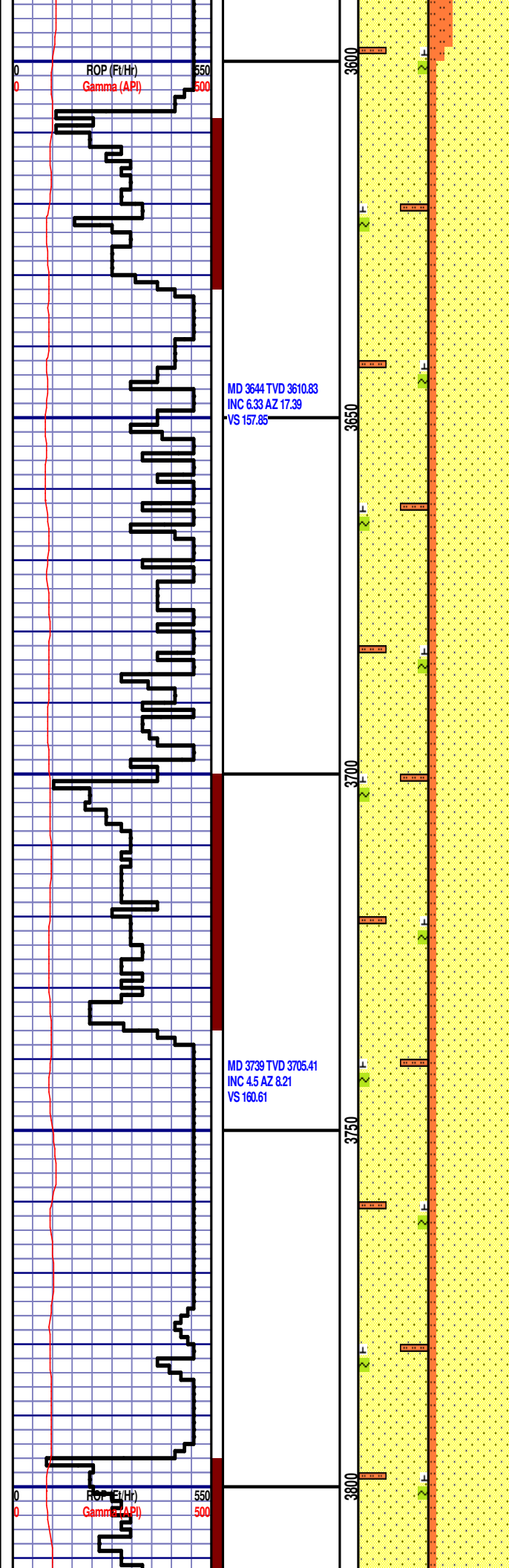
3400' MD-3500' MD: SLTST: 70% LTGY
- MEDLTGY, FRI, FN TO MED GRN,
W SRTD, CALC CMT, SANDY, INTGR
POR, NO STN, NO FLOR, NO O
FLOR, NO CUT, NO RNG

CG 84u

PARKMAN

3553' MD 3521' TVD

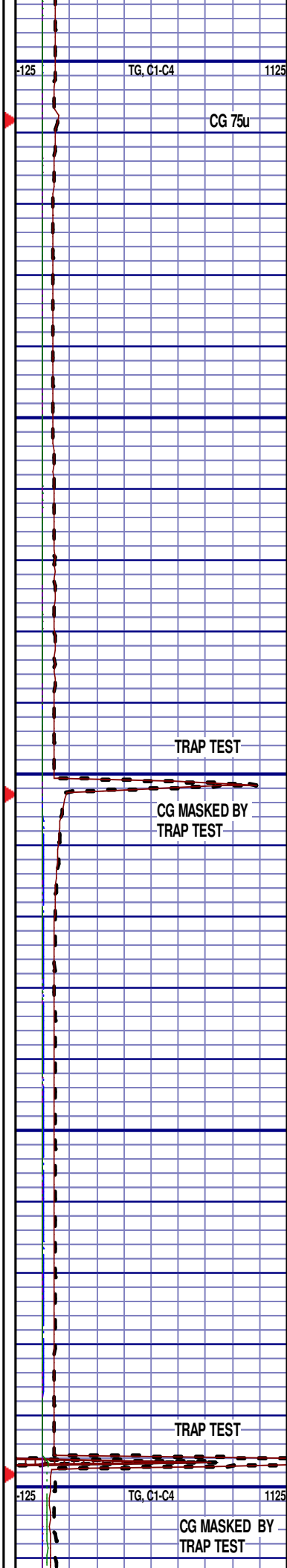
3500' MD-3600' MD: SS: 70% V/LTGY -
LTGN, LSEY CONS, MED TO CRS
GRN, SUBANG, MODY SRTD, CALC
CMT, IMBD RK FRAGS, SILTY, IMBD
GLAU, INTGR POR, NO STN, NO



MIN FLOR, NO O FLOR, NO CUT, NO
RNG

3600' MD-3700' MD: SS: 90% V/LTGY -
LTGN, LSEY CONS, MED TO CRS
GRN, SUBANG, MODY SRTD, CALC
CMT, IMBD RK FRAGS, SILTY, IMBD
GLAU, INTGR POR, NO STN, NO
MIN FLOR, NO O FLOR, NO CUT, NO
RNG

3700' MD-3800' MD: SS: 90% V/LTGY -
LTGN, LSEY CONS, MED TO CRS
GRN, SUBANG, MODY SRTD, CALC
CMT, IMBD RK FRAGS, SILTY, IMBD
GLAU, INTGR POR, NO STN, NO
MIN FLOR, NO O FLOR, NO CUT, NO
RNG



MD 3834 TVD 3800.24
INC 2.35 AZ 338.88
VS 160.87

WOB 7.9K
PP 3813
RPM 80
SPM 67/67

MD 3929 TVD 3895.14
INC 3.02 AZ 319.12
VS 158.82

ROP (Ft/Hr)
Gamma (API)

MD 4023 TVD 3989.07
INC 1.02 AZ 293.42
VS 156.61



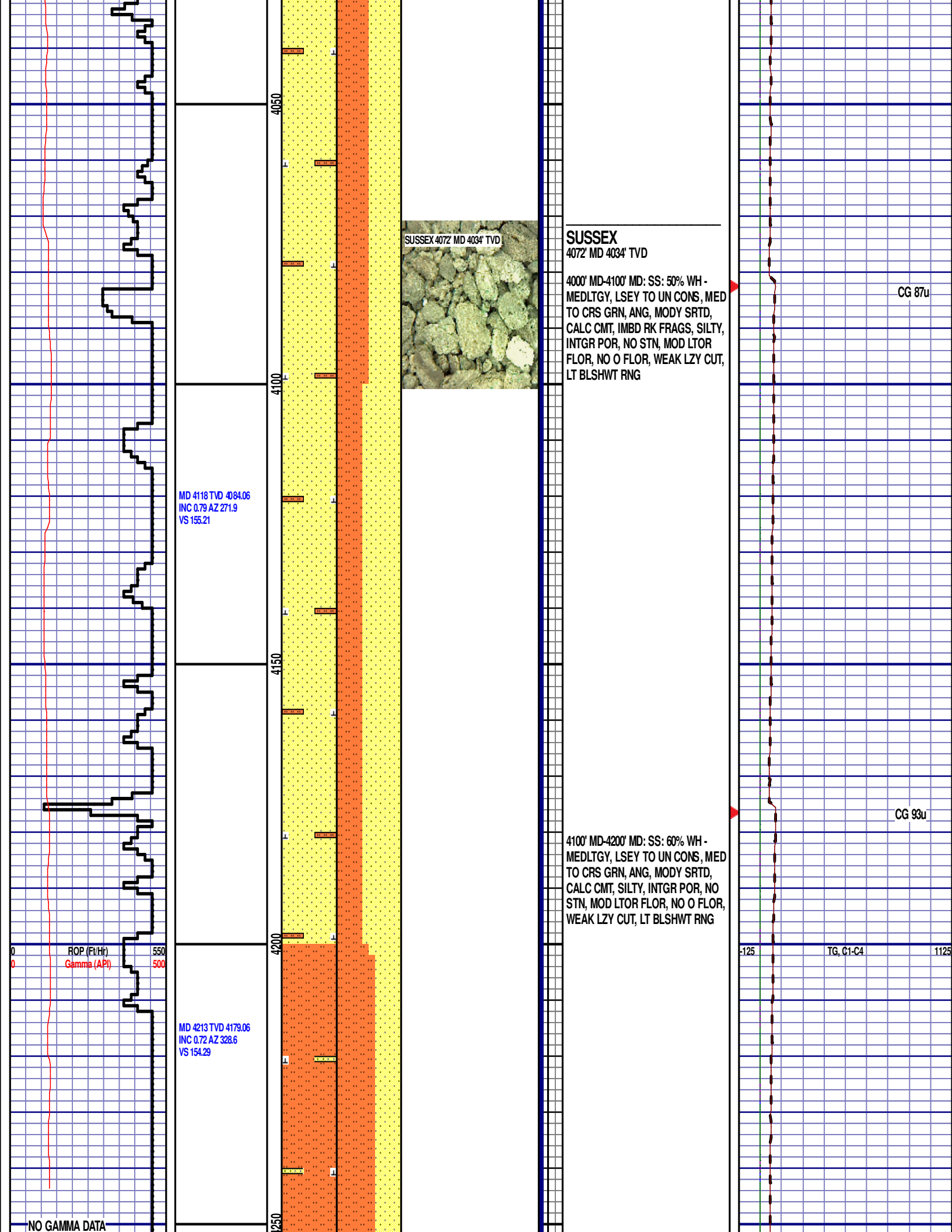
3800' MD-3900' MD: SS: 90% V/LTGY -
LTGN, LSEY CONS, MED TO CRS
GRN, SUBANG, MODY SRTD, CALC
CMT, IMBD RK FRAGS, SILTY, IMBD
GLAU, INTGR POR, NO STN, NO
MIN FLOR, NO O FLOR, NO CUT, NO
RNG

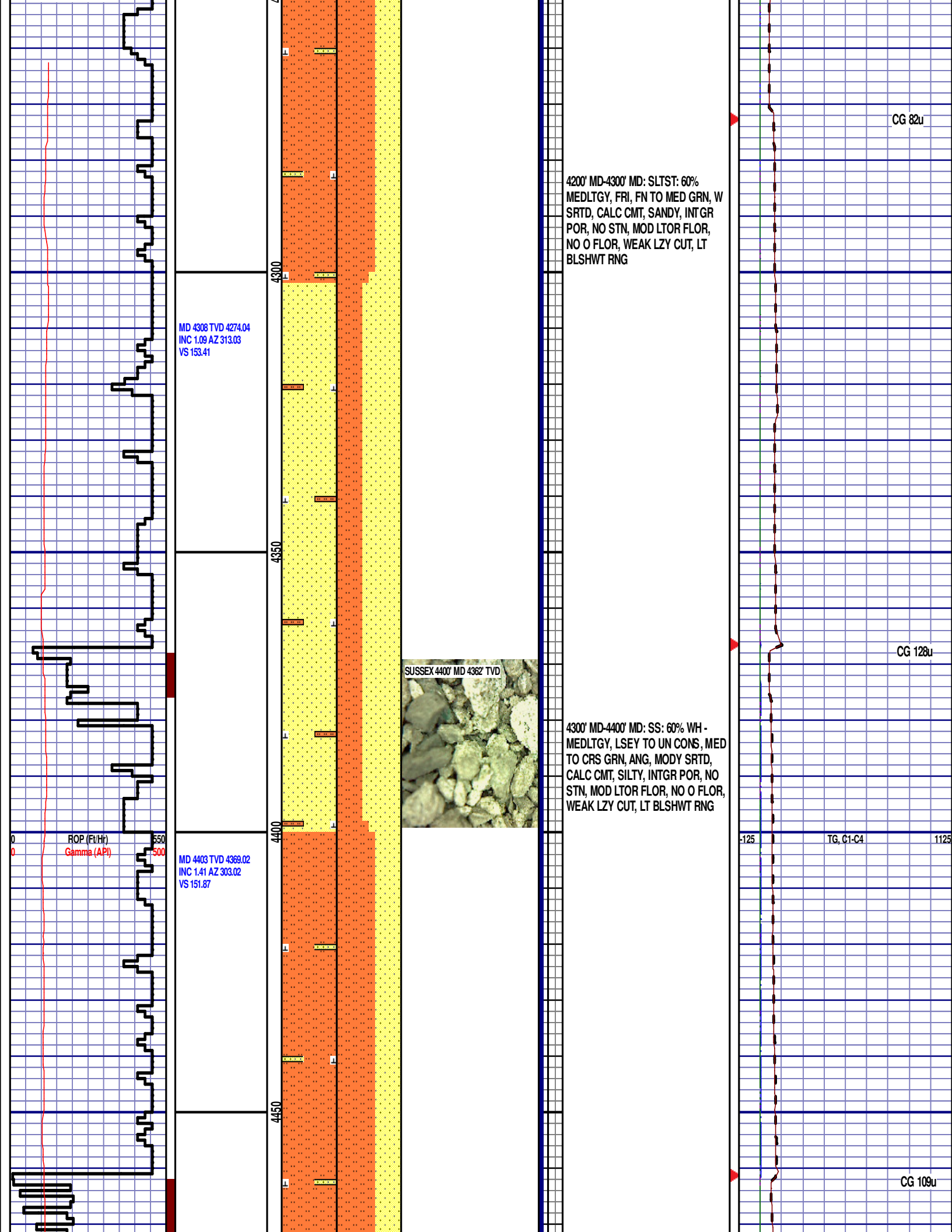
CG 82u

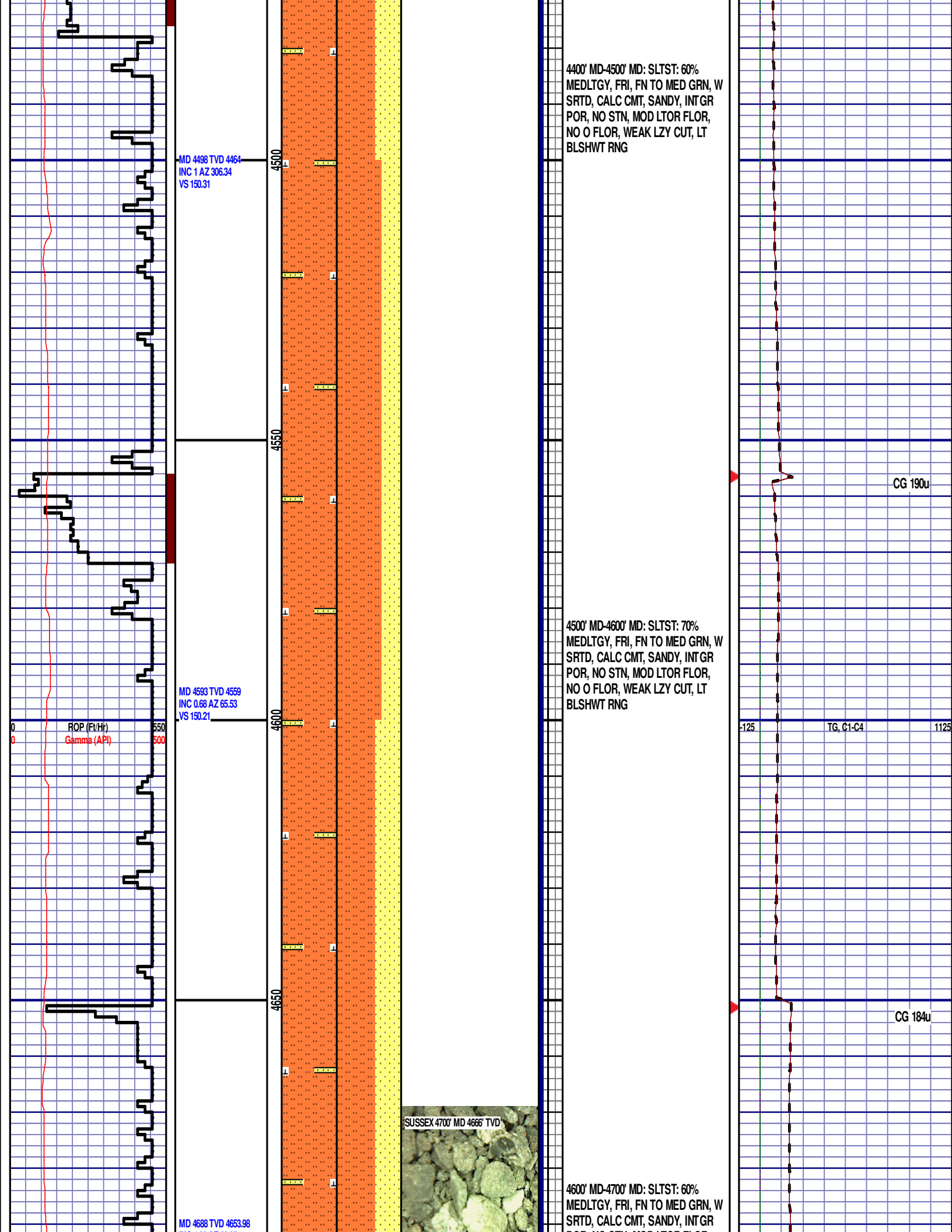
3900' MD-4000' MD: SS: 70% V/LTGY -
LTGN, LSEY CONS, MED TO CRS
GRN, SUBANG, MODY SRTD, CALC
CMT, IMBD RK FRAGS, SILTY, IMBD
GLAU, INTGR POR, NO STN, NO
MIN FLOR, NO O FLOR, NO CUT, NO
RNG

CG 88u

-125 TG, C1-C4 1125





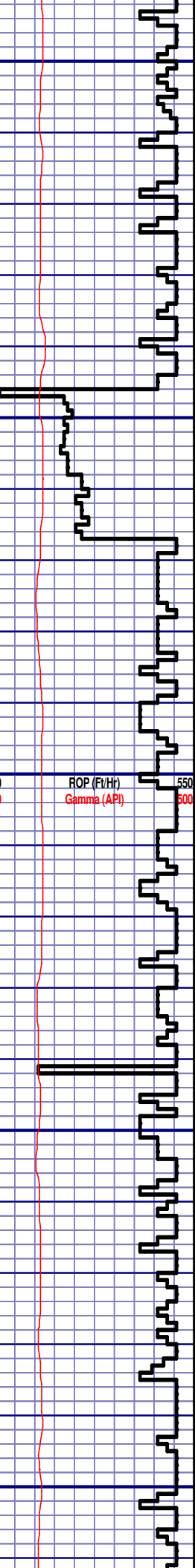


INC 1.38 AZ 69.35
VS 151.84

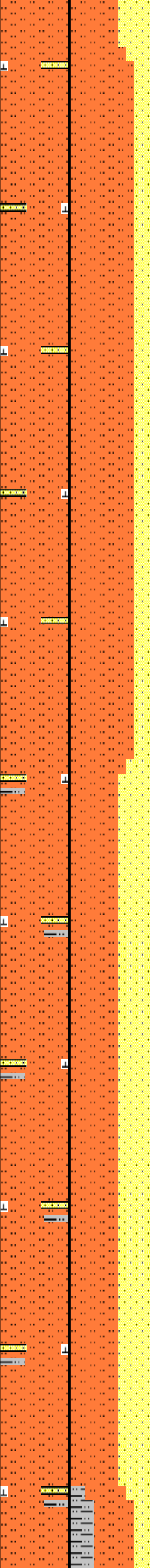
MD 4783 TVD 4748.95
INC 1.65 AZ 137.31
VS 153.78

MD 4878 TVD 4843.93
INC 0.88 AZ 129.65
VS 155.16

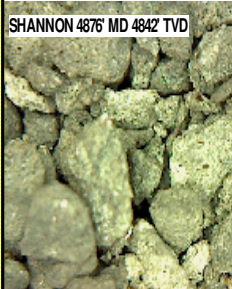
ROP (Ft/Hr)
Gamma (API)



4700
4750
4800
4850
4900



SHANNON 4876' MD 4842' TVD



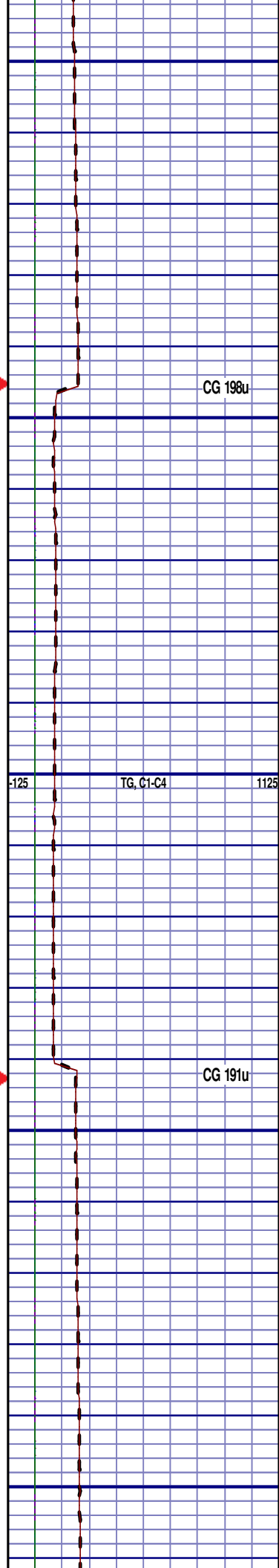
POR, NO STN, MOD LTOR FLOR,
NO O FLOR, WEAK LZY CUT, LT
BLSHWT RING

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

SHANNON

4876' MD 4842' TVD

4800' MD-4900' MD: SLTST: 60%
MEDLTGY, FRI, FN TO MED GRN, W
SRTD, CALC CMT, SANDY, FREE
SLTYSH, INTGR POR, NO STN, MOD
LTOR FLOR, NO O FLOR, WEAK
LZY CUT, LT BLSHWT RING



CG 198u

TG, C1-C4

CG 191u

12:01 AM
10/14/13
DAY 02
FT/24HRS
4005

WOB 6.4K
PP 3208
RPM 0
SPM 67/66

MD 4973 TVD 4938.92
INC 0.36 AZ 152.19
VS 155.8

ROP (Ft/Hr)
Gamma (API)

MD 5068 TVD 5033.92
INC 0.44 AZ 150.71
VS 156.07

4950

5000

5050

5100

4900' MD-5000' MD: SLTST: 50%
MEDLTGY, FRI, FN TO MED GRN, W
SRTD, CALC CMT, SANDY, FREE
SLTYSH, INTGR POR, NO STN, MOD
LTOR FLOR, NO O FLOR, WEAK
LZY CUT, LT BLSHWT RNG

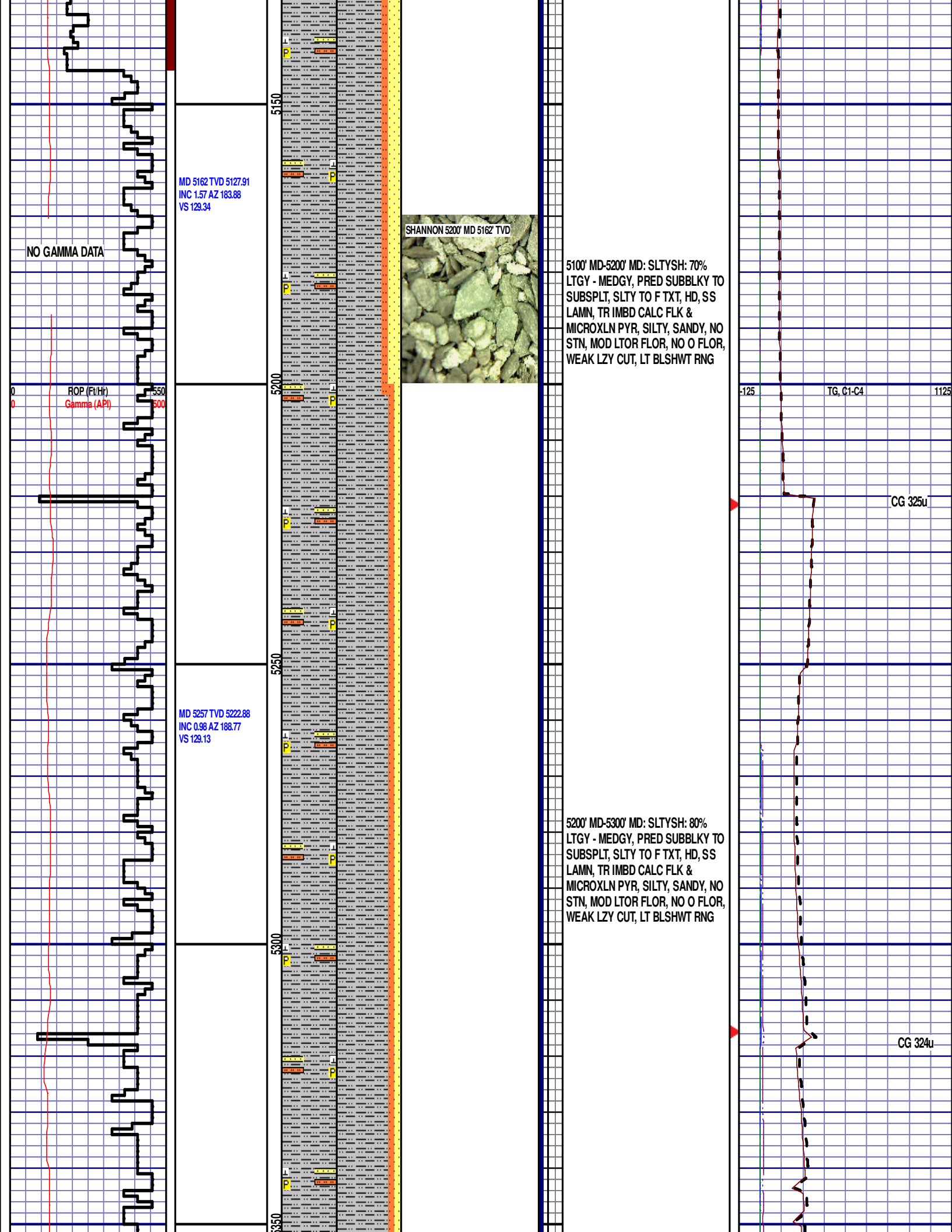
5000' MD-5100' MD: SLTYSH: 70%
LTGY - MEDGY, PRED SUBBLKY TO
SUBSPLT, SLTY TO F TXT, HD, SS
LAMN, TR IMBD CALC FLK &
MICROXLN PYR, SILTY, SANDY, NO
STN, MOD LTOR FLOR, NO O FLOR,
WEAK LZY CUT, LT BLSHWT RNG

CG 224u

TG, C1-C4

CG 147u

CG 278u



MD 5352 TVD 5317.87
INC 1.08 AZ 181.7
VS 155.38

NO GAMMA DATA

ROP (Ft/Hr)
Gamma (API)

MD 5447 TVD 5412.85
INC 1.01 AZ 232.93
VS 154.58

MD 5542 TVD 5507.84
INC 0.96 AZ 201.4
VS 153.53

5400

5450

5500

5550

SHANNON 5500' MD 5470' TVD



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, SILTY, SANDY, NO
STN, MOD LTOR FLOR, NO O FLOR,
WEAK LZY CUT, LT BLSHWT RNG

5400' MD-5500' MD: SLTYSH: 70%
LTGY - MEDGY, PRED SUBBLKY TO
SUBSPLT, SLTY TO F TXT, HD, SS
LAMN, TR IMBD CALC FLK &
MICROXLN PYR, SILTY, SANDY, NO
STN, MOD LTOR FLOR, NO O FLOR,
WEAK LZY CUT, LT BLSHWT RNG

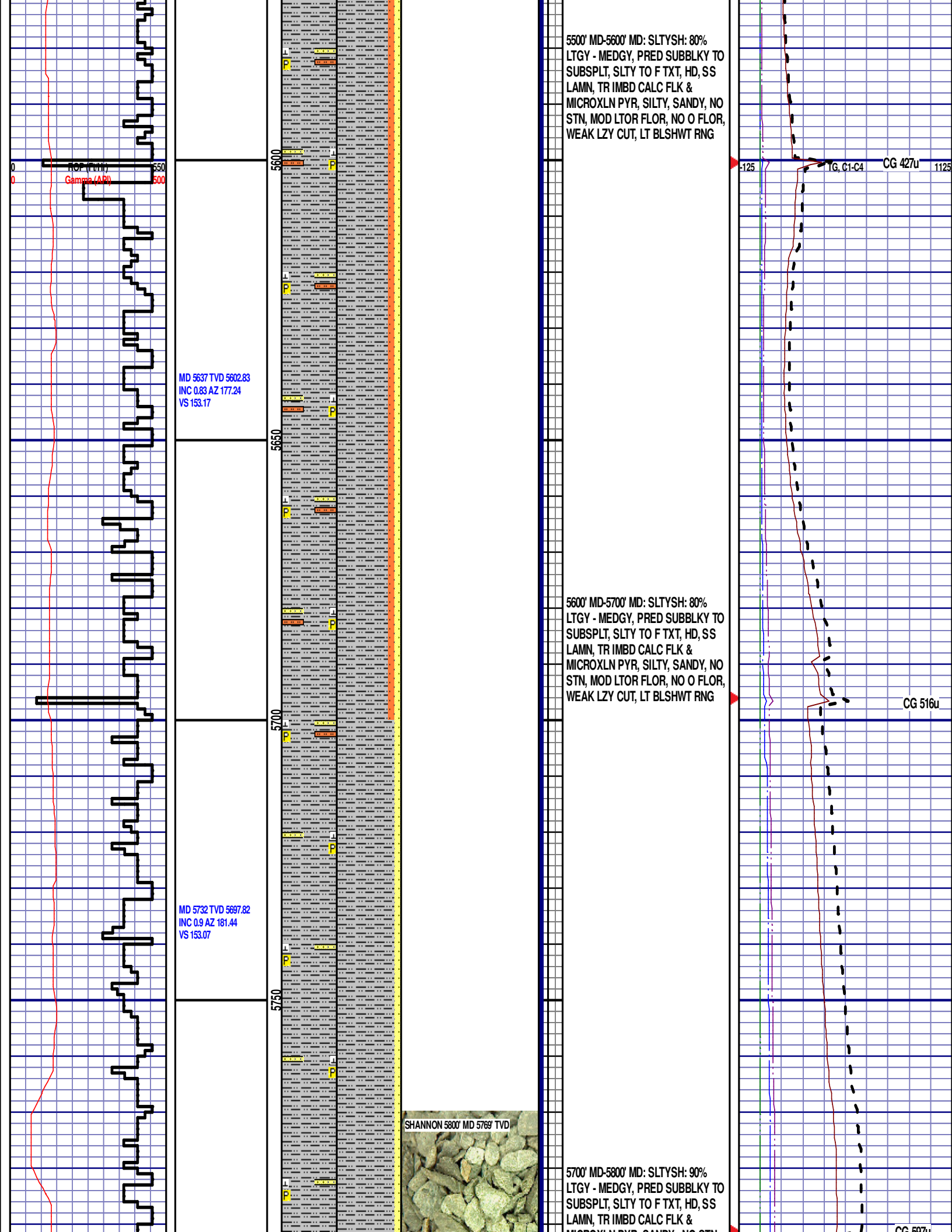
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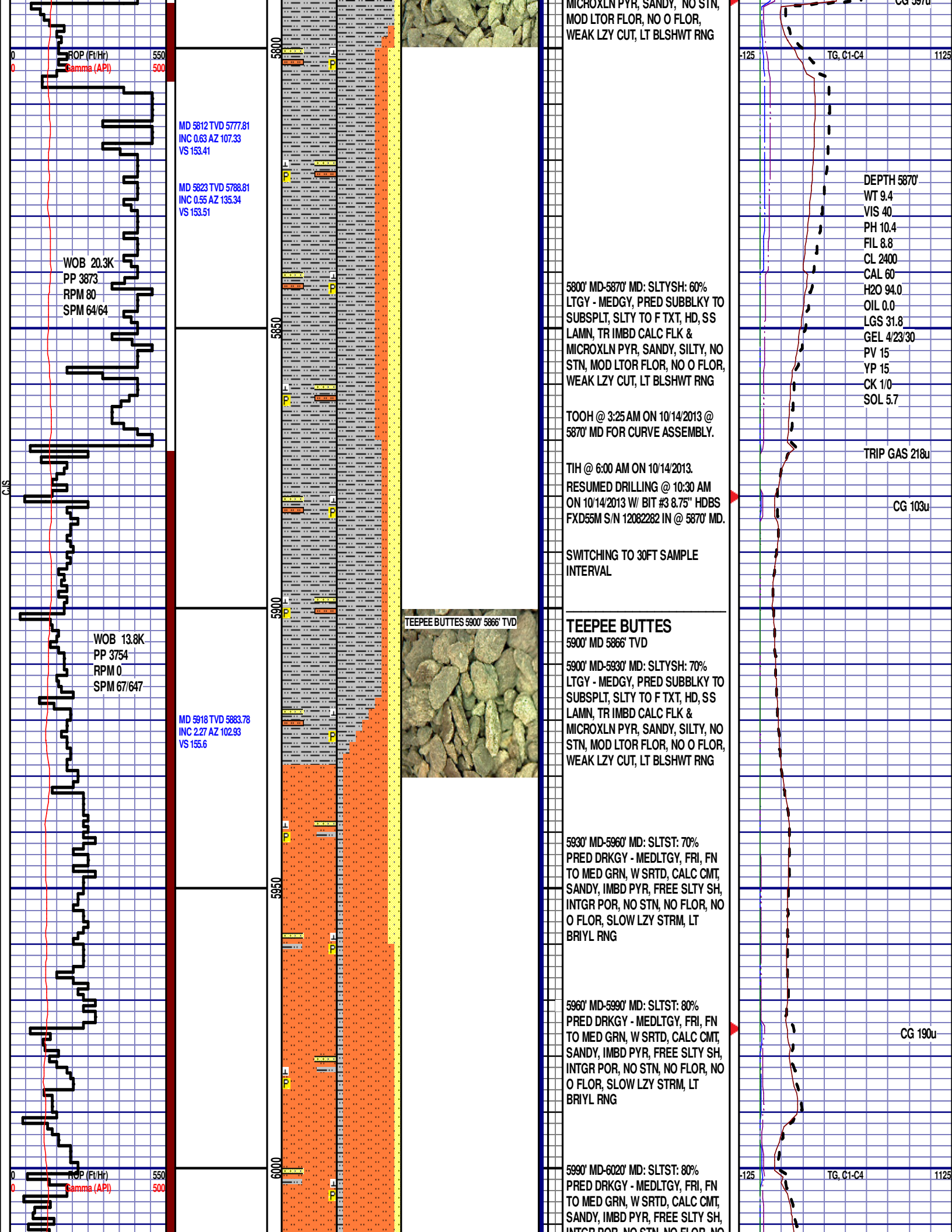
TG, C1-C4

1125

CG 291u

CG 286u





MD 6013 TVD 5978.21
INC 9.62 AZ 92.35
VS 165.29

MD 6108 TVD 6070.78
INC 16.13 AZ 81.47
VS 186.36

MD 6203 TVD 6160.08
INC 23.57 AZ 76.89
VS 218.34

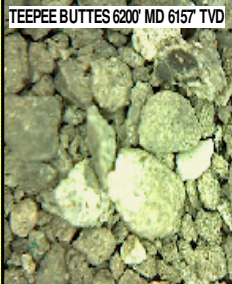
6050

6100

6150

6200

TEEPEE BUTTES 6200' MD 6157' TVD



6020' MD-6050' MD: SLTST: 80%
PRED DRKGY - MEDLTGY, FRI, FN
TO MED GRN, W SRTD, CALC CMT,
SANDY, IMBD PYR, FREE SLTY SH,
INTGR POR, NO STN, NO FLOR, NO
O FLOR, SLOW LZY STRM, LT
BRIYL RNG

6050' MD-6080' MD: SLTST: 80%
PRED DRKGY - MEDLTGY, FRI, FN
TO MED GRN, W SRTD, CALC CMT,
SANDY, IMBD PYR, FREE SLTY SH,
INTGR POR, NO STN, NO FLOR, NO
O FLOR, SLOW LZY STRM, LT
BRIYL RNG

6080' MD-6110' MD: SLTST: 70% PRED
DRKGY - MEDLTGY, FRI, FN TO MED
GRN, W SRTD, CALC CMT, SANDY,
IMBD PYR, FREE SLTY SH, INTGR
POR, NO STN, NO FLOR, NO O
FLOR, SLOW LZY STRM, LT BRIYL
RNG

6110' MD-6140' MD: SLTST: 80% PRED
DRKGY - MEDLTGY, FRI, FN TO MED
GRN, W SRTD, CALC CMT, SANDY,
IMBD PYR, FREE SLTY SH, INTGR
POR, NO STN, NO FLOR, NO O
FLOR, SLOW LZY STRM, LT BRIYL
RNG

6140' MD-6170' MD: SLTST: 70%
PRED DRKGY - MEDLTGY, FRI, FN
TO MED GRN, W SRTD, CALC CMT,
SANDY, IMBD PYR, FREE SLTY SH,
INTGR POR, NO STN, NO FLOR, NO
O FLOR, SLOW LZY STRM, LT
BRIYL RNG

6170' MD-6200' MD: SLTST: 60%
PRED DRKGY - MEDLTGY, FRI, FN
TO MED GRN, W SRTD, CALC CMT,
SANDY, IMBD PYR, FREE SLTY SH,
INTGR POR, NO STN, NO FLOR, NO
O FLOR, SLOW LZY STRM, LT
BRIYL RNG

6200' MD-6230' MD: SLTST: 70%
PRED DRKGY - MEDLTGY, FRI, FN
TO MED GRN, W SRTD, CALC CMT,
SANDY, IMBD PYR, FREE SLTY SH,
INTGR POR, NO STN, NO FLOR, NO
O FLOR, SLOW LZY STRM, LT
BRIYL RNG

CG 206u

CG 154u

-125 TG, C1-C4 1125

DEPTH 6203'

WT 9.95

VIS 36

PH 9.7

FIL 8.0

CL 2300

CAL 60

H2O 91.0

OIL 0.0

LGS 49.1

