



7136 South Yale Avenue, Suite 414

Tulsa, Oklahoma 74136-6378

phone 918.925.9739

fax 866.534.4559

WWW.HZMUD.COM

Customer Information

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

Geologist: Renee Clackler
Noble Energy Inc.

Mud Logging Details

Logger: Sam Stelzer &
Scott Haney

Log Interval: 2500' MD to 6800' MD

Start Date: June 15, 2015

Release Date: June 21, 2015

Well Information

Well Name: Wells Ranch AA11-676

Location: 10/11-T6N-R63W
725' FNL, 215' FEL

County: Weld
State: Colorado

Drilling Rig: H&P 321

Total Depth: 13878' MD

TD Date: June 21, 2015

Formation: Niobrara C Chalk

KB Elevation: 4887'

GR Elevation: 4857'

API Number: 05-123-41212-0000

ROCK TYPES

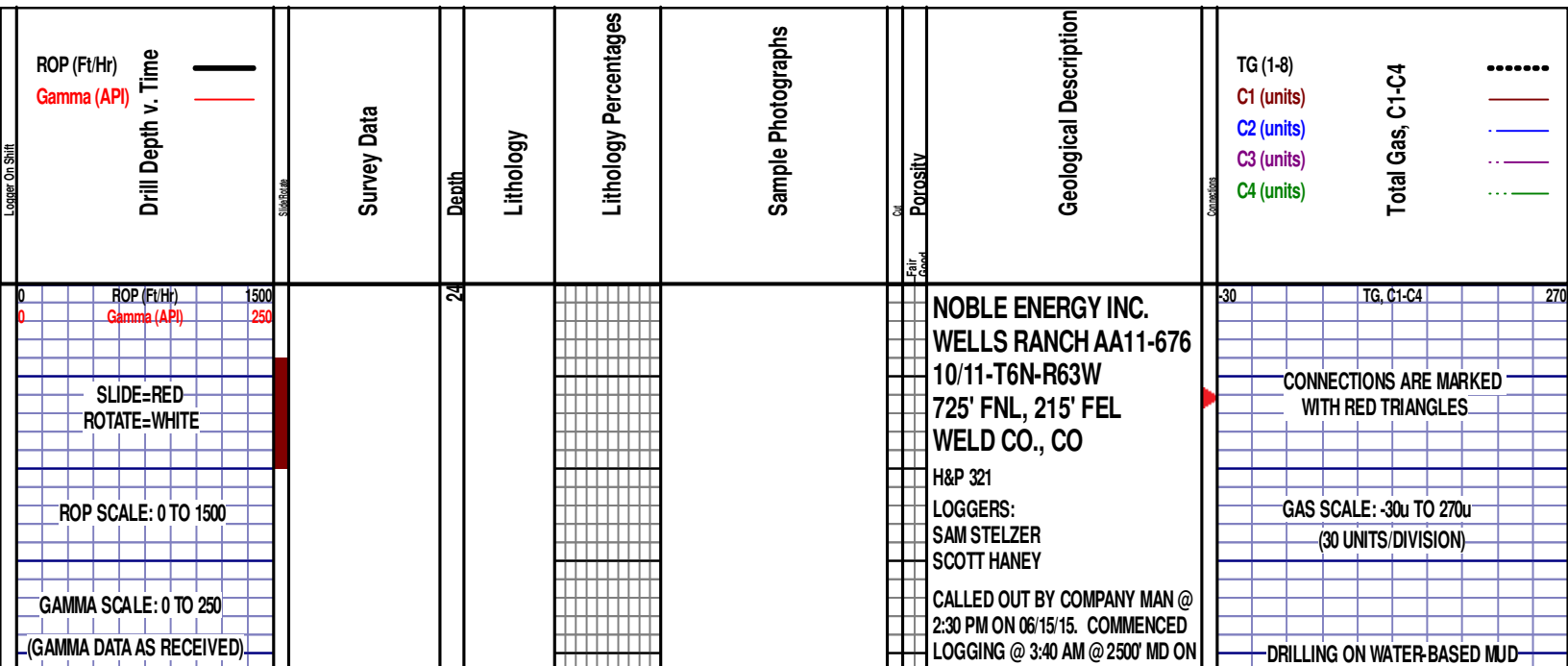
Siltysh
Anhy
Bent
Brec
Cht
Clyst
Coal

Congl
Dol
Gyp
Igne
Lmst
Meta
Chk

Mrlst
Salt
Shale
Shcol
Shgy
Sltst
Ss

Till
gw
lmywash
ogw
olmywash
oshly gw
shly gw

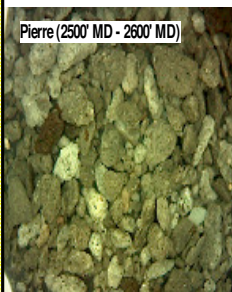
sdylgw
hvyrcrbsh
NO SMPL
nosmpl
Lsdetrit
sltst
sdy sh



12:01 AM
06/16/2015
DAY 02
1250
FT/24HRS
WOB 25.5K
PP 3050
RPM 60
SPM 79/79

PIERRE
BEFORE LOGGING DEPTH

MD 2589 TVD 2582.48
INC 7.91 AZ 126.57
VS -70.22



2500' MD-2600' MD: SLTST: 60% LTGY
- MEDLTGY, FRI, FN TO MED GRN,
W SRTD, CALC CMT, TRC PYR, TRC
IMBD GLAU, FREE SS, FREE
SLTYSH, INTGR POR, NO STN, NO
FLOR, NO O FLOR, NO CUT, NO
RNG

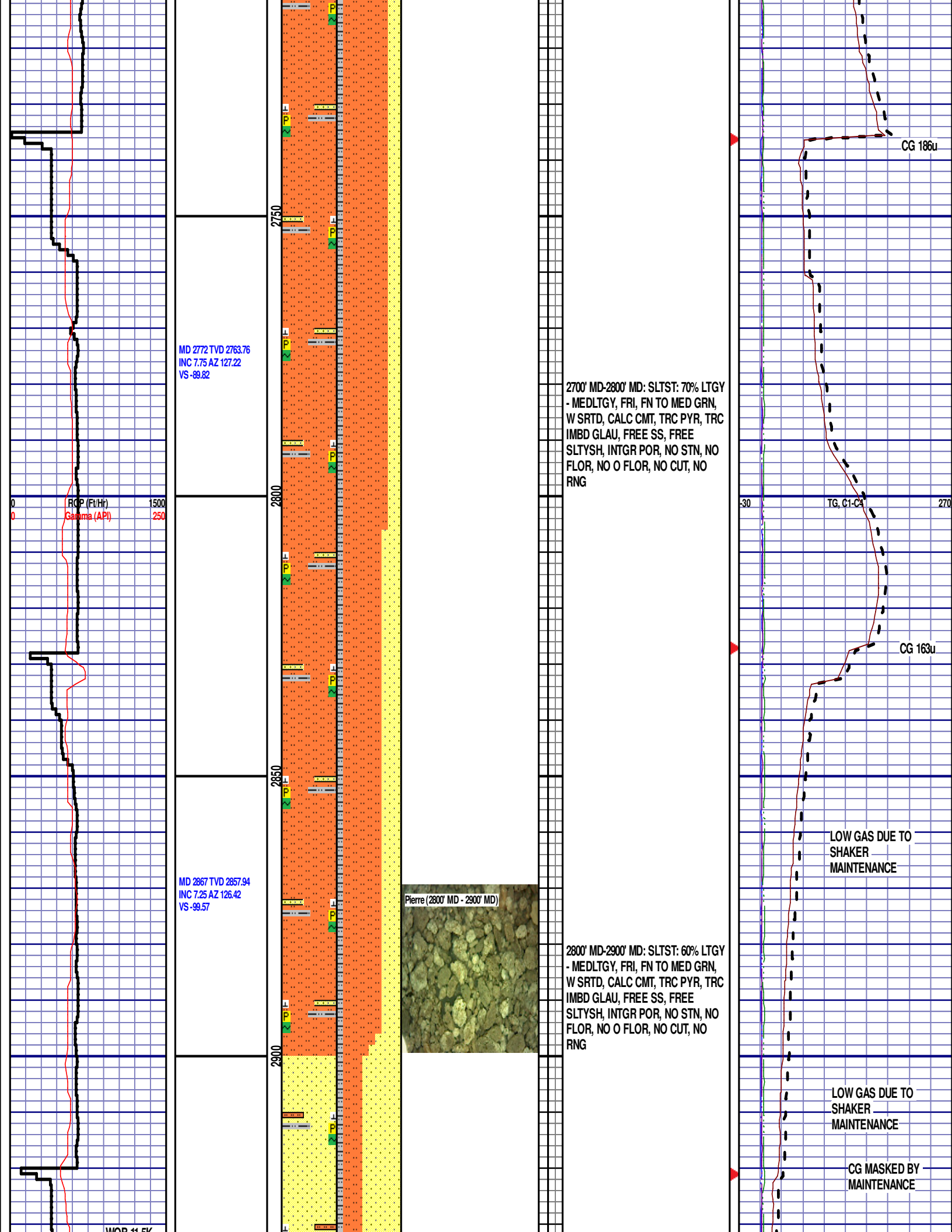
MD 2680 TVD 2672.61
INC 7.89 AZ 127.34
VS -80.04

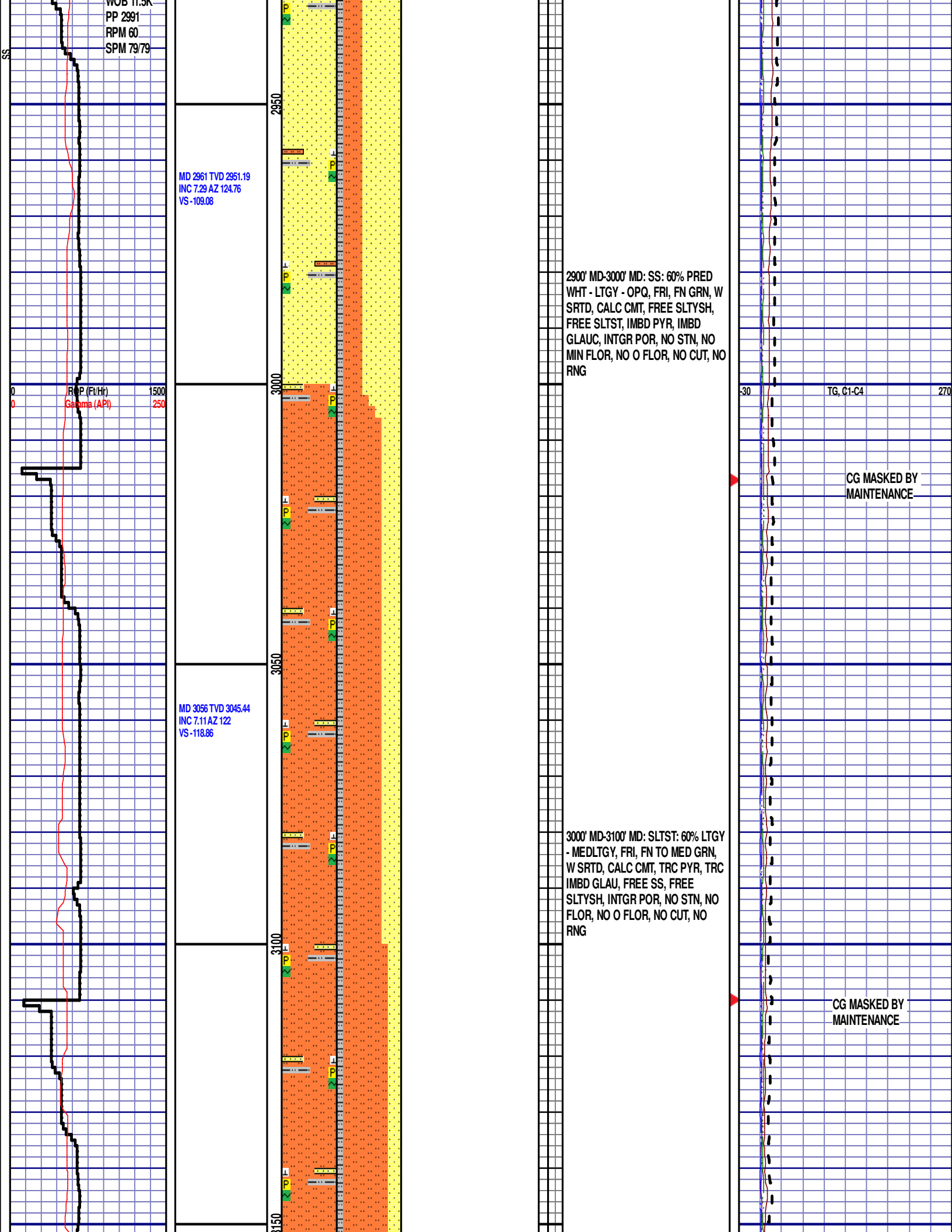
2600' MD-2700' MD: SLTST: 60% LTGY
- MEDLTGY, FRI, FN TO MED GRN,
W SRTD, CALC CMT, TRC PYR, TRC
IMBD GLAU, FREE SS, FREE
SLTYSH, INTGR POR, NO STN, NO
FLOR, NO O FLOR, NO CUT, NO
RNG

CG 172u

TG C1-C4

CG 173u





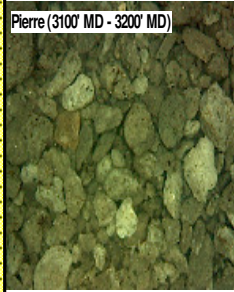
MD 3151 TVD 3139.71
INC 7.08 AZ 119.83
VS -128.78

ROP (Ft/Hr)
Gamma (API)

MD 3246 TVD 3234
INC 6.99 AZ 117.67
VS -138.84

MD 3340 TVD 3327.16
INC 8.35 AZ 130.82
VS -148.9

Pierre (3100' MD - 3200' MD)



3100' MD-3200' MD: SLTST: 70% LTGY
- MEDLTGY, FRI, FN TO MED GRN,
W SRTD, CALC CMT, TRC PYR, TRC
IMBD GLAU, FREE SS, FREE
SLTYSH, INTGR POR, NO STN, NO
FLOR, NO O FLOR, NO CUT, NO
RNG

3200' MD-3300' MD: SLTST: 60% LTGY
- MEDLTGY, FRI, FN TO MED GRN,
W SRTD, CALC CMT, TRC PYR, TRC
IMBD GLAU, FREE SS, FREE
SLTYSH, INTGR POR, NO STN, NO
FLOR, NO O FLOR, NO CUT, NO
RNG

FLOW RETURNED
TO SHAKER

TG, C1-C4

CG 253u

CG 273

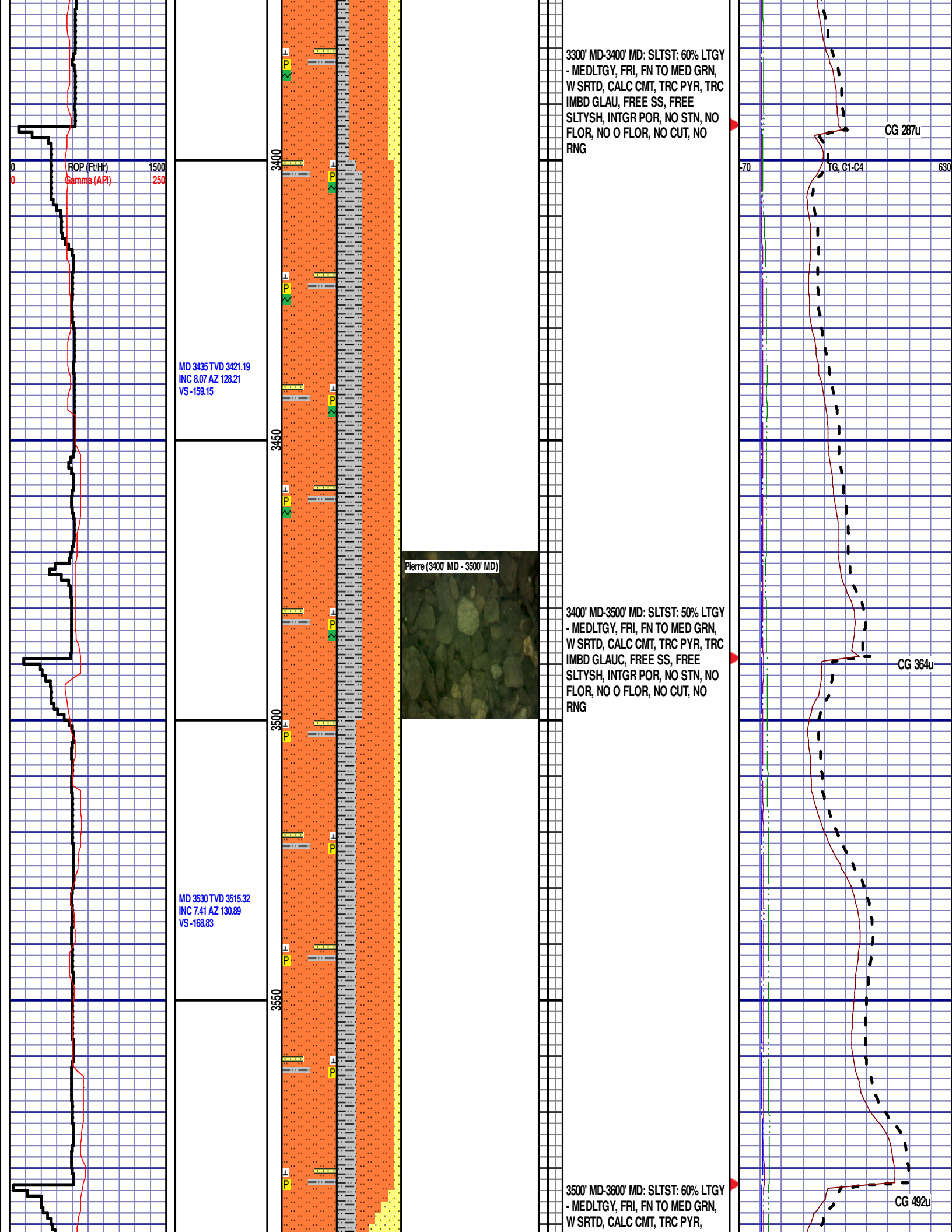
Scale Change

TG, C1-C4

GAS SCALE CHANGE:

-70u TO 630u

(70 UNITS/ DIVISION)



ROP (Fe/Hr)
Gamma (API)

1500
250

MD 3435 TVD 3421.19
INC 8.07 AZ 128.21
VS -159.15

3400

3450

3500

3550

Pierre (3400' MD - 3500' MD)

3300' MD-3400' MD: SLTST: 60% LTGY
- MEDLTGY, FRI, FN TO MED GRN,
W SRTD, CALC CMT, TRC PYR, TRC
IMBD GLAU, FREE SS, FREE
SLTYSH, INTGR POR, NO STN, NO
FLOR, NO O FLOR, NO CUT, NO
RNG

CG 287u

TG, C1-C4

630

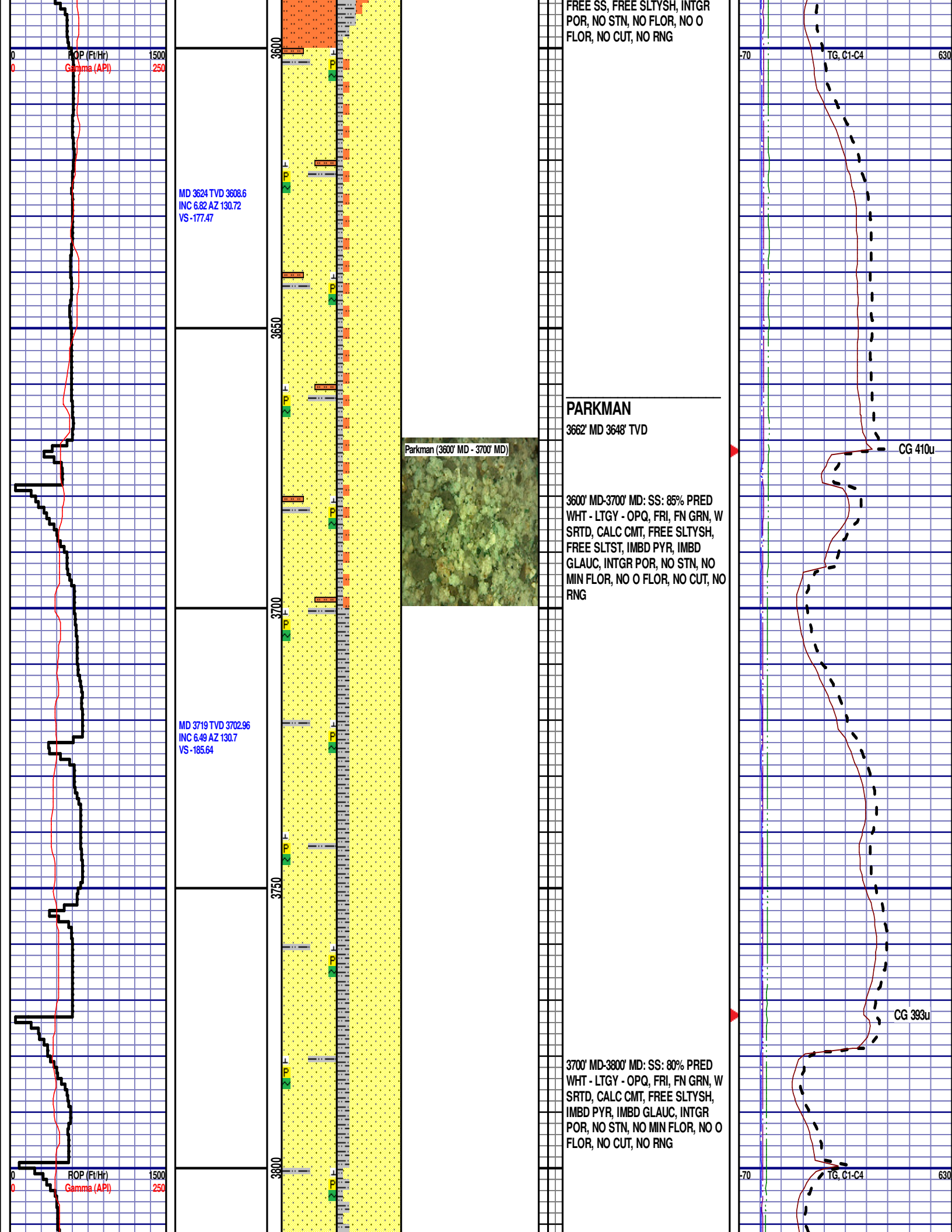
3400' MD-3500' MD: SLTST: 50% LTGY
- MEDLTGY, FRI, FN TO MED GRN,
W SRTD, CALC CMT, TRC PYR, TRC
IMBD GLAUC, FREE SS, FREE
SLTYSH, INTGR POR, NO STN, NO
FLOR, NO O FLOR, NO CUT, NO
RNG

CG 364u

MD 3530 TVD 3515.32
INC 7.41 AZ 130.89
VS -168.83

3500' MD-3600' MD: SLTST: 60% LTGY
- MEDLTGY, FRI, FN TO MED GRN,
W SRTD, CALC CMT, TRC PYR,

CG 492u



MD 3814 TVD 3797.35
INC 6.5 AZ 130.56
VS -193.63

MD 3908 TVD 3890.74
INC 6.51 AZ 129.99
VS -201.59

MD 4003 TVD 3985.11
INC 6.67 AZ 129.46
VS -209.82

3850

3900

3950

4000

Parkman (3900' MD - 4000' MD)

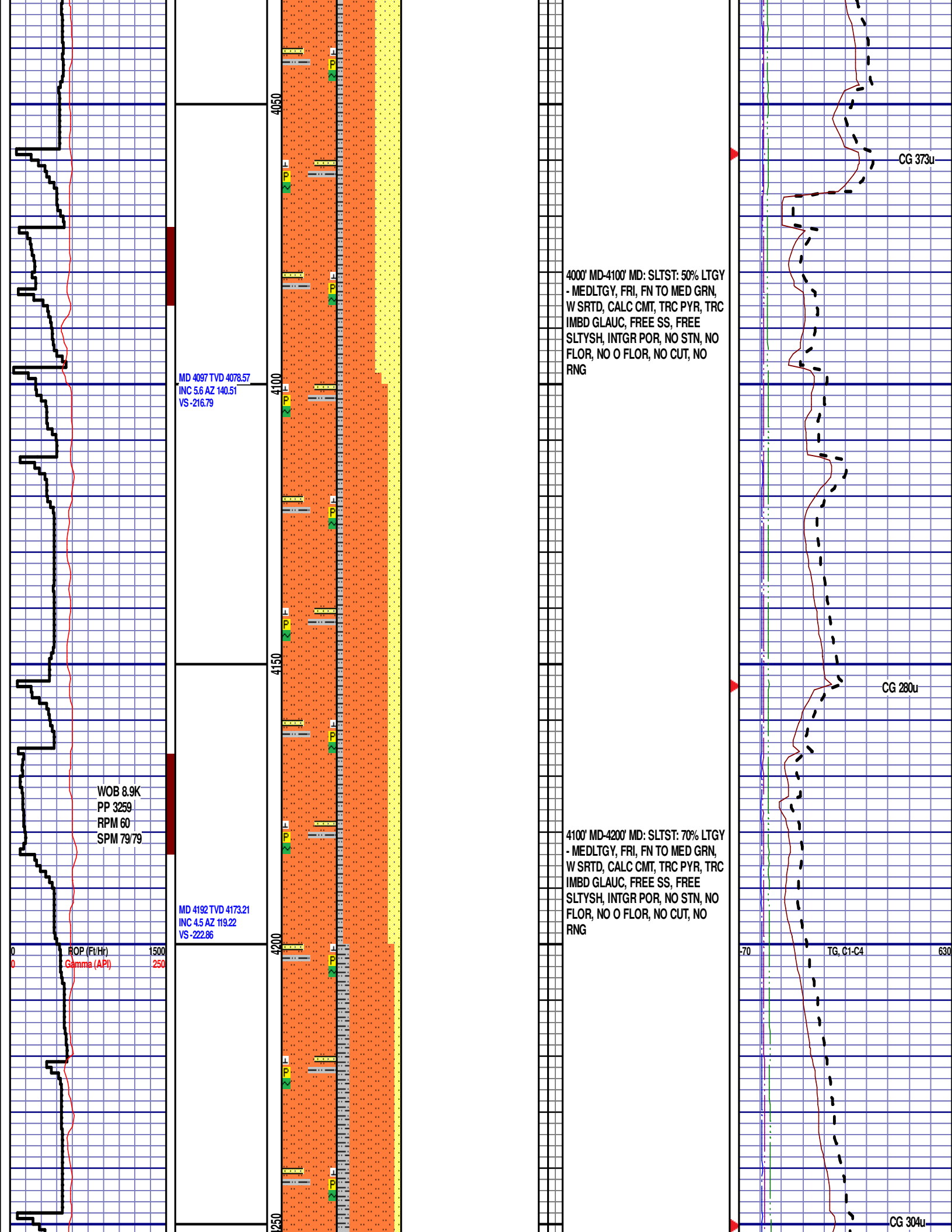
3800' MD-3900' MD: SS: 85% PRED
WHT - LTGY - OPQ, FRI, FN GRN, W
SRTD, CALC CMT, FREE SLTYSH,
IMBD PYR, IMBD GLAUC, INTGR
POR, NO STN, NO MIN FLOR, NO O
FLOR, NO CUT, NO RNG

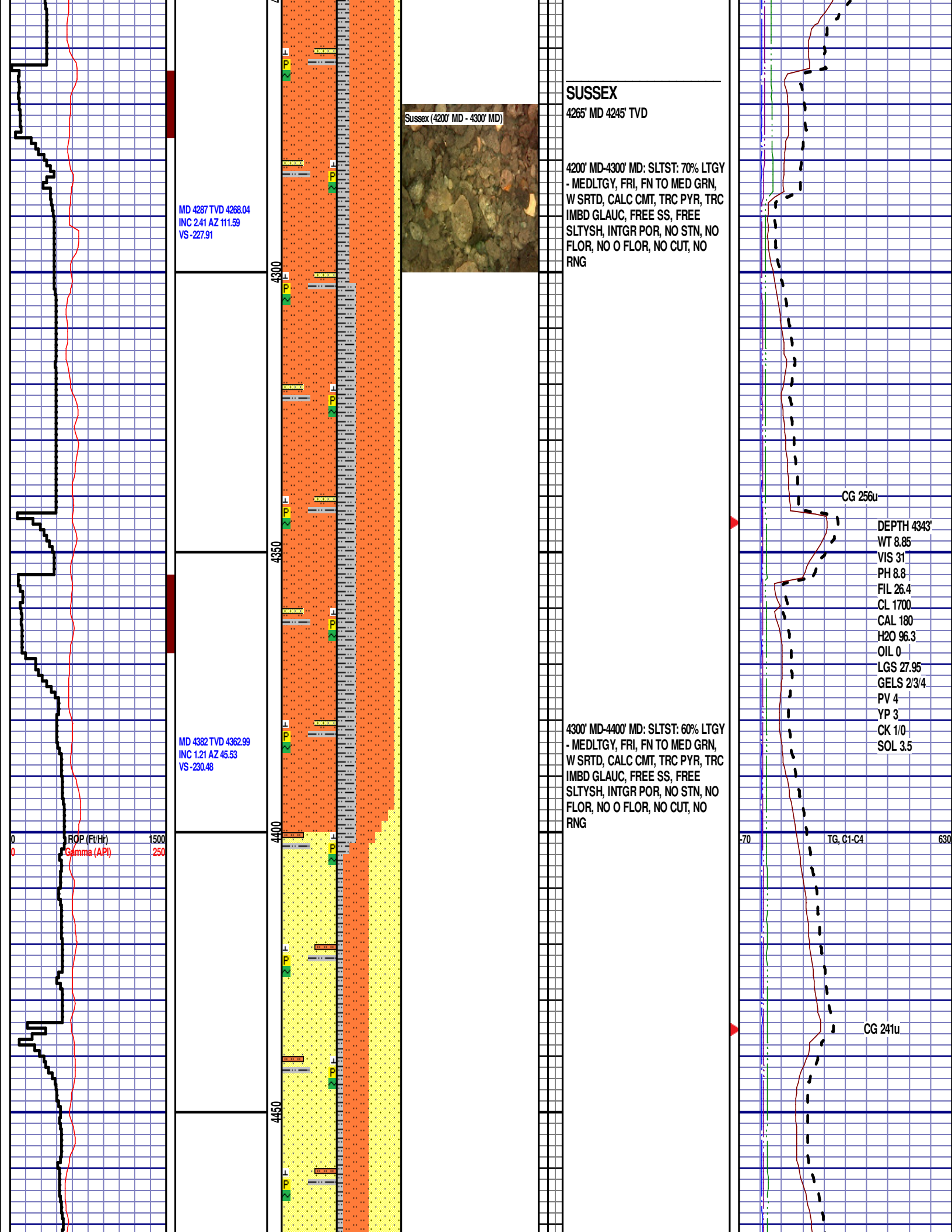
3900' MD-4000' MD: SS: 90% PRED
WHT - LTGY - OPQ, FRI, FN GRN, W
SRTD, CALC CMT, FREE SLTYSH,
IMBD PYR, IMBD GLAUC, INTGR
POR, NO STN, NO MIN FLOR, NO O
FLOR, NO CUT, NO RNG

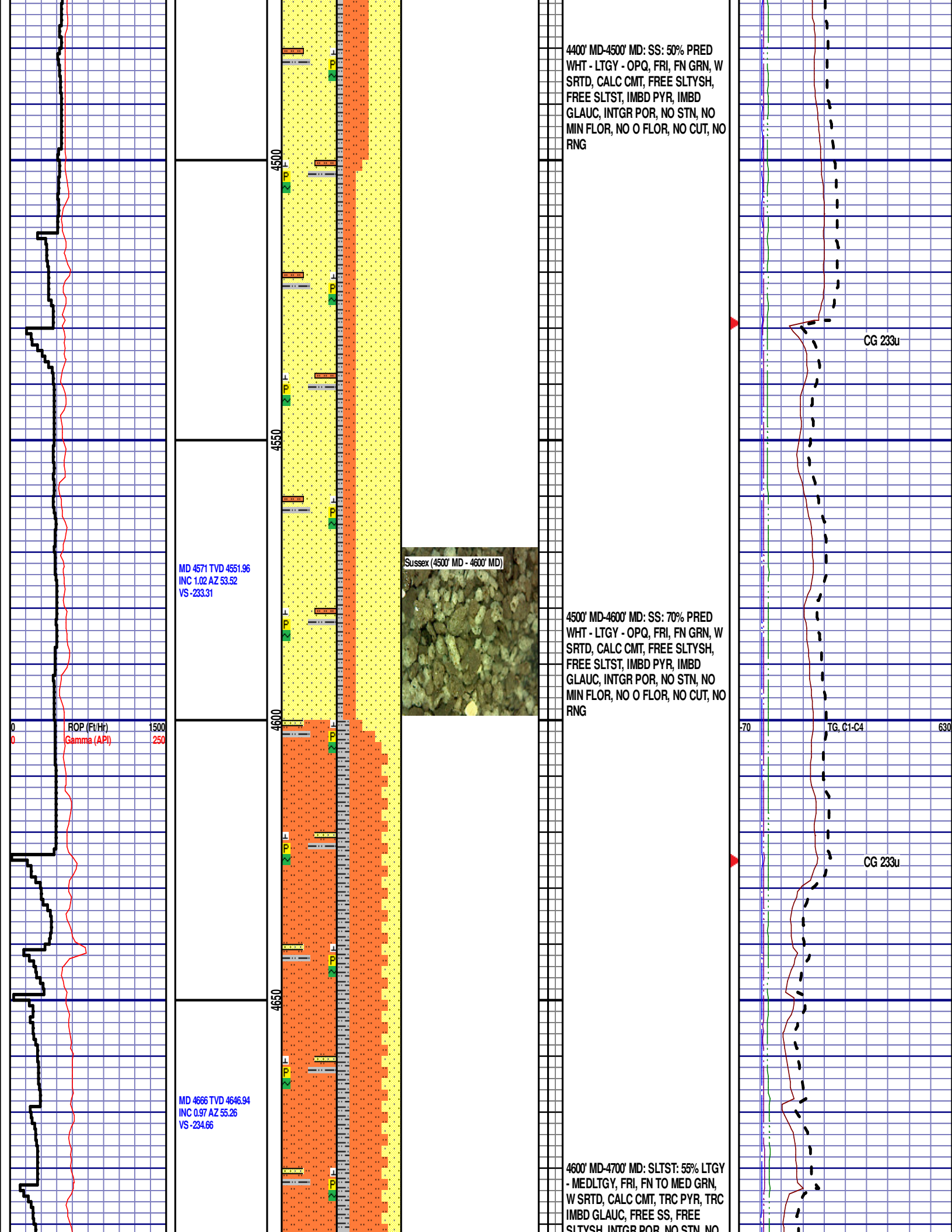
CG 378u

CG 363u

TG, C1-C4



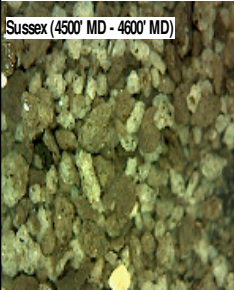




4400' MD-4500' MD: SS: 50% PRED
WHT - LTGY - OPQ, FRI, FN GRN, W
SRTD, CALC CMT, FREE SLTYSH,
FREE SLTST, IMBD PYR, IMBD
GLAUC, INTGR POR, NO STN, NO
MIN FLOR, NO O FLOR, NO CUT, NO
RNG

CG 233u

MD 4571 TVD 4551.96
INC 1.02 AZ 53.52
VS -233.31



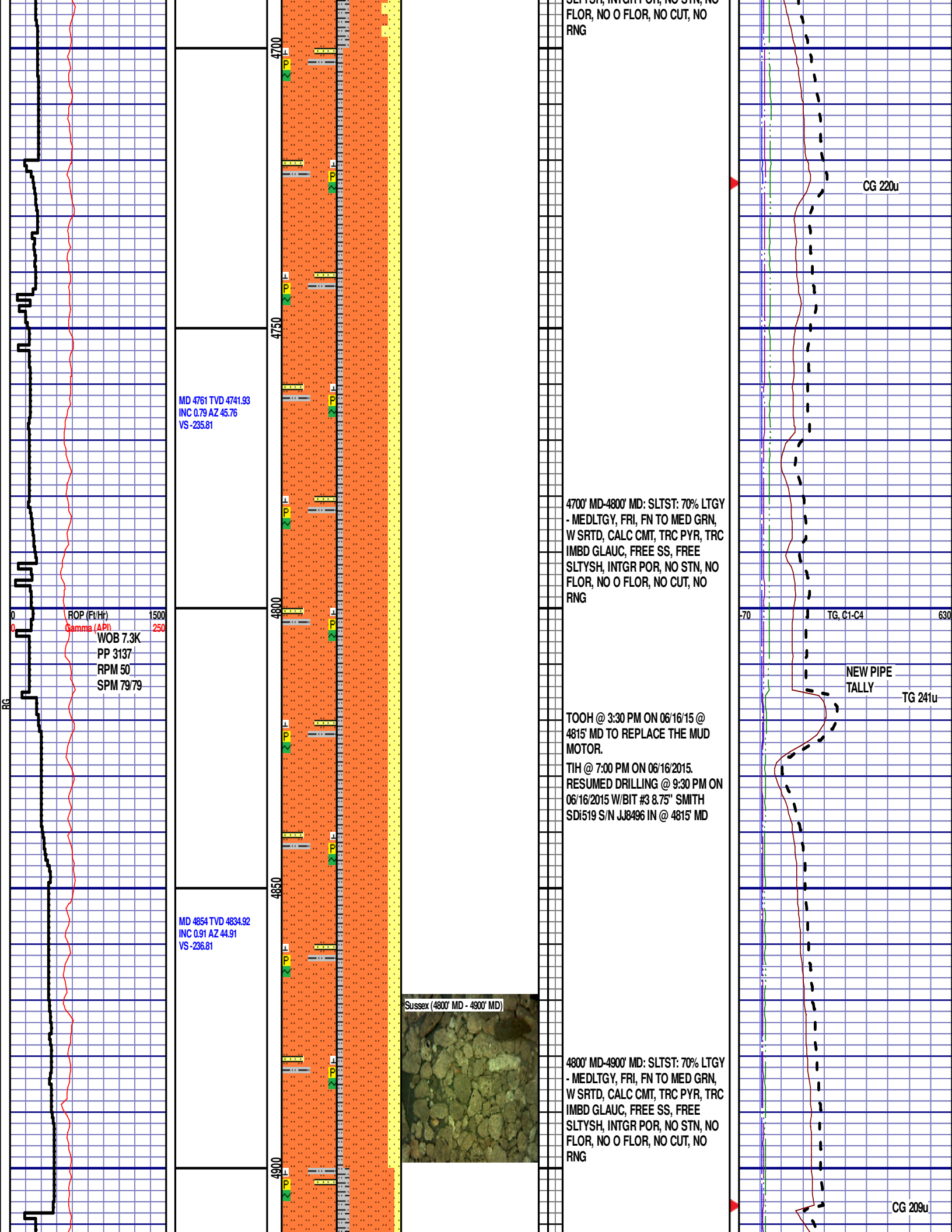
4500' MD-4600' MD: SS: 70% PRED
WHT - LTGY - OPQ, FRI, FN GRN, W
SRTD, CALC CMT, FREE SLTYSH,
FREE SLTST, IMBD PYR, IMBD
GLAUC, INTGR POR, NO STN, NO
MIN FLOR, NO O FLOR, NO CUT, NO
RNG

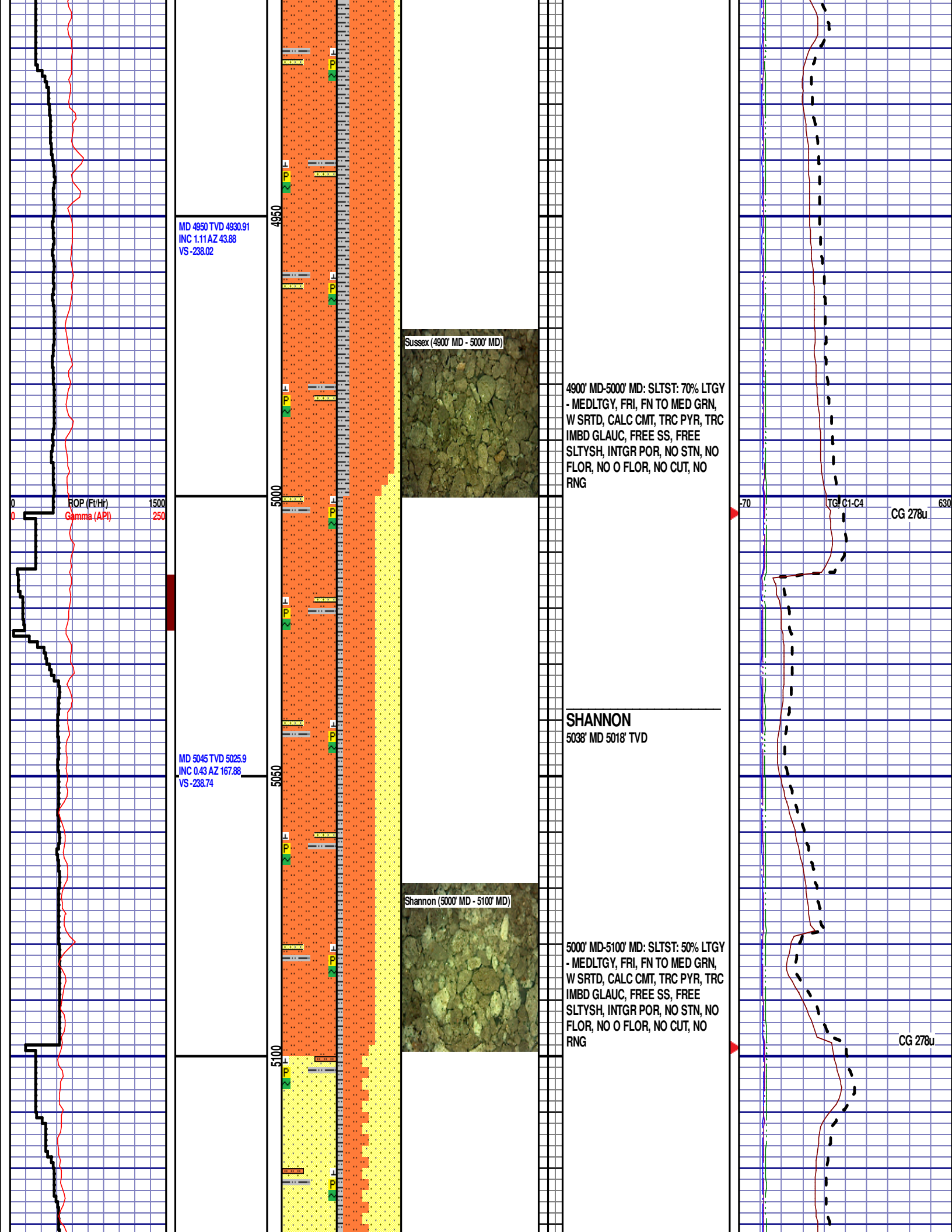
CG 233u

TG, C1-C4

MD 4666 TVD 4646.94
INC 0.97 AZ 55.26
VS -234.66

4600' MD-4700' MD: SLTST: 55% LTGY
- MEDLTGY, FRI, FN TO MED GRN,
W SRTD, CALC CMT, TRC PYR, TRC
IMBD GLAUC, FREE SS, FREE
SLTYSH INTGR POR, NO STN, NO





MD 5140 TVD 5120.9
INC 0.53 AZ 162.93
VS -238.93

5150

5200

5250

5300

5350

ROP (Ft/Hr)
Gamma (API)

1500
250

5100' MD- 5200' MD: SS: 55%: PRED
GY -LTKGY - OPQ, MOD CONS, FN
TO MED GRN, SUBANG, W TO
MODY SRTD, CALC CMT, SILTY, TRC
IMBD PYR, TRC IMBD GLAU, INTGR
POR, NO STN, NO FLOR, NO O
FLOR, NO CUT, DIM YLW RNG

CG 287u

70

TG, C4

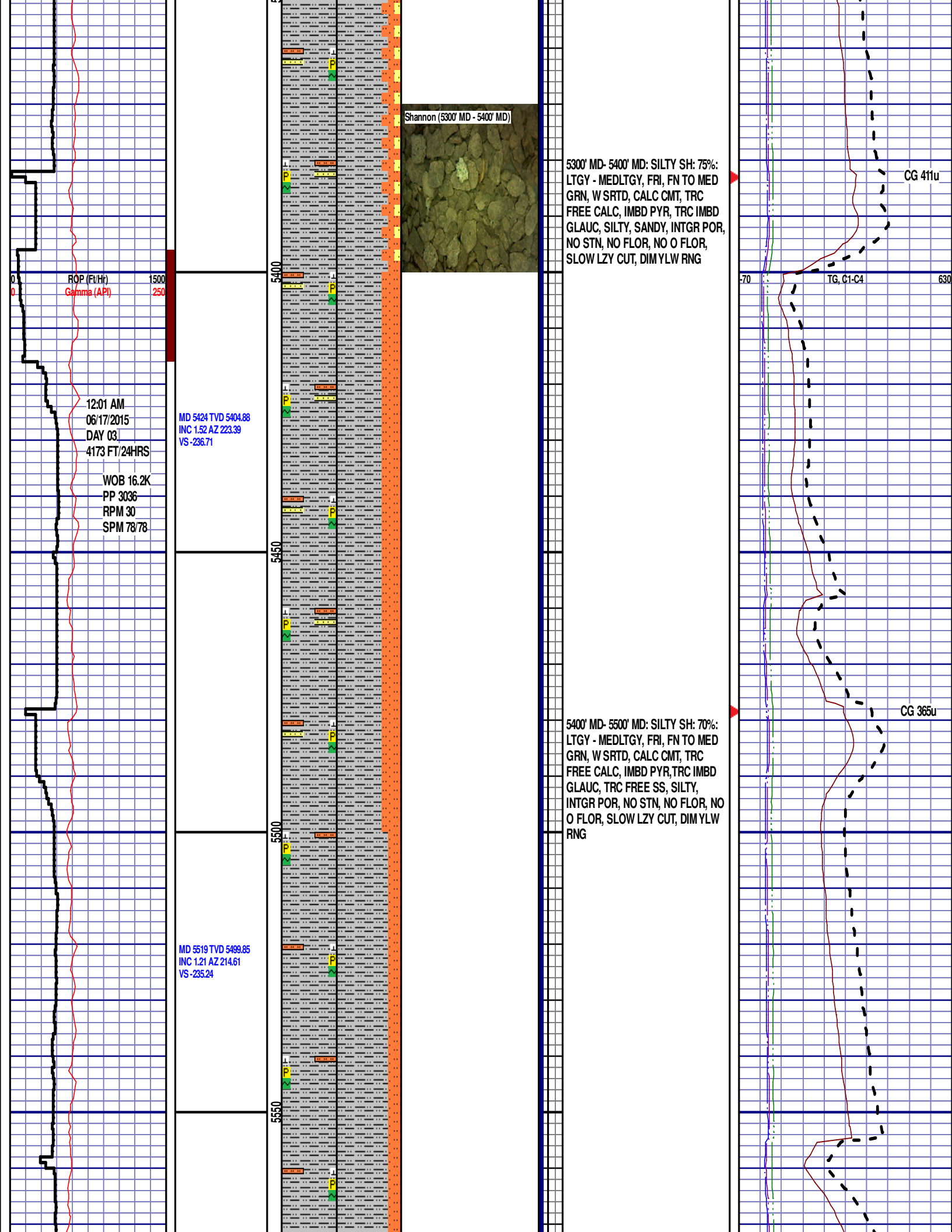
630

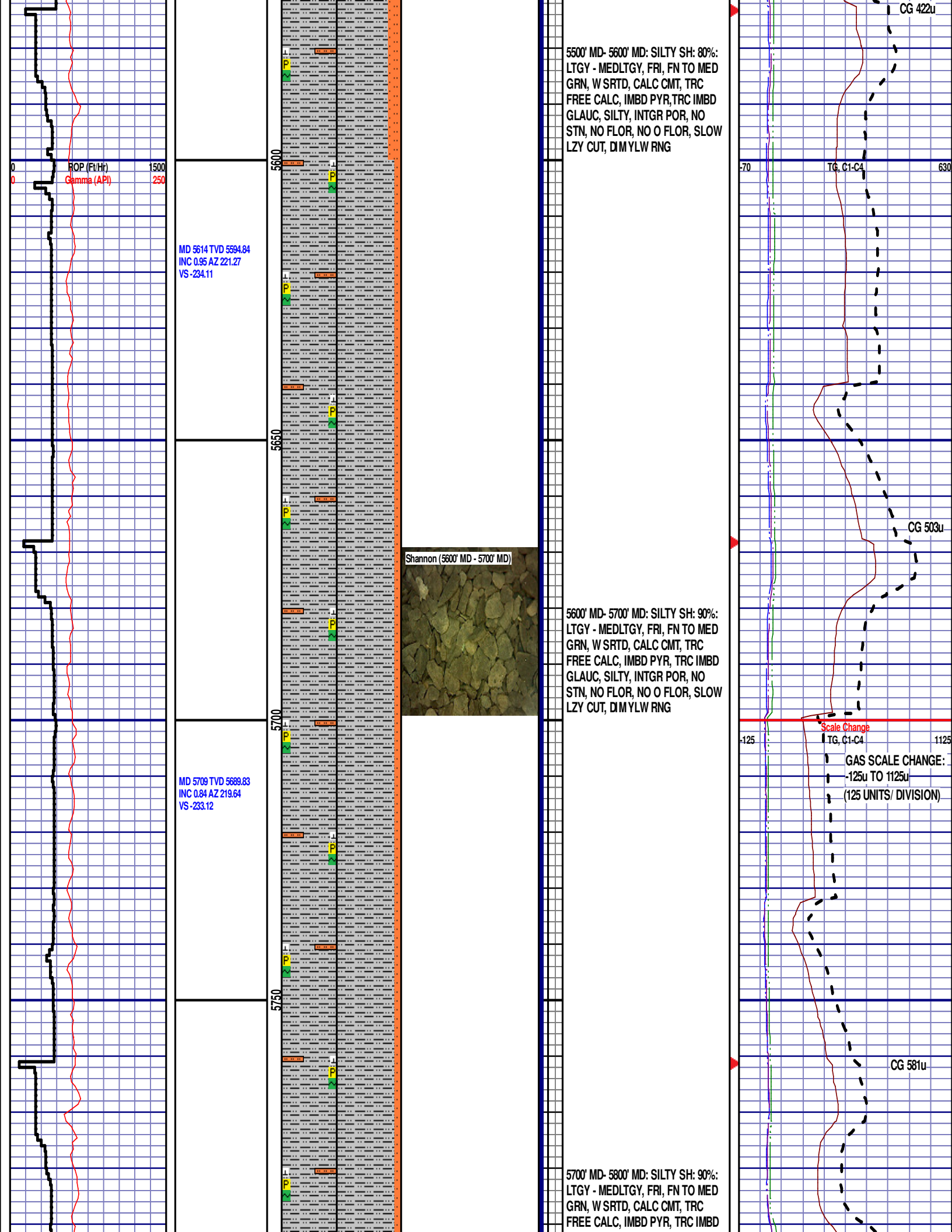
MD 5235 TVD 5215.9
INC 0.71 AZ 262.8
VS -238.46

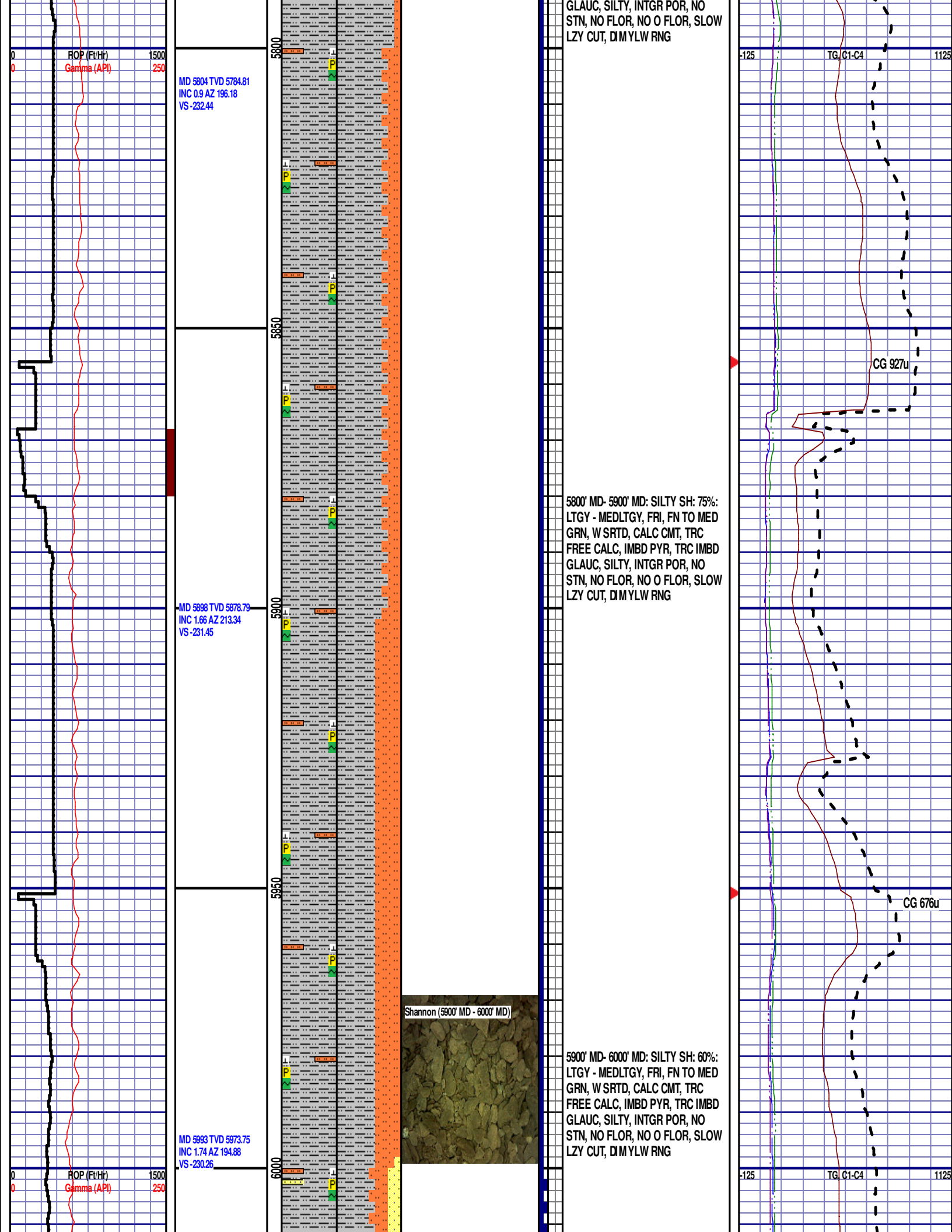
5200' MD- 5300' MD: SILTY SH: 80%:
LTGY - MEDLTGY, FRI, FN TO MED
GRN, W SRTD, CALC CMT, TRC
FREE CALC, IMBD PYR, TRC IMBD
GLAUC, SILTY, SANDY, INTGR POR,
NO STN, NO FLOR, NO O FLOR,
SLOW LZY CUT, DIM YLW RNG

CG 347u

MD 5329 TVD 5309.89
INC 0.18 AZ 255.85
VS -237.74







TEEPEE BUTTES

6014' MD 5995' TVD

MD 6088 TVD 6068.68
INC 2.53 AZ 214.11
VS -228.64

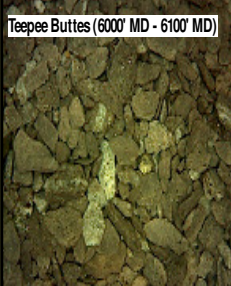
MD 6182 TVD 6162.57
INC 3.23 AZ 237.08
VS -225.18

ROP SCALE
CHANGE: 0 TO 600

Scale Change
ROP (Ft/Hr) 600
Gamma (API) 250

MD 6229 TVD 6209.32

Teepee Buttes (6000' MD - 6100' MD)



6000' MD- 6100' MD: SILTY SH: 55%:
LTGY - MEDLTGY, FRI, FN TO MED
GRN, W SRTD, CALC CMT, TRC
FREE CALC, IMBD PYR, TRC IMBD
GLAUC, SILTY, SANDY, INTGR POR,
NO STN, NO FLOR, NO O FLOR,
MOD LZY CUT, LT BRIYL RNG

SWITCHING TO 30FT SAMPLE
INTERVAL

6100' MD- 6200' MD: SILTY SH: 50%:
LTGY - MEDLTGY, FRI, FN TO MED
GRN, W SRTD, CALC CMT, TRC
FREE CALC, IMBD PYR, TRC IMBD
GLAUC, SILTY, SANDY, INTGR POR,
NO FLOR, NO O FLOR, MOD LZY
CUT, LT BRIYL RNG

6200' MD- 6230' MD: SILTY SH: 50%:
LTGY - MEDLTGY, FRI, FN TO MED
GRN, W SRTD, CALC CMT, TRC
FREE CALC, IMBD PYR, TRC IMBD
GLAUC, SILTY, SANDY, INTGR POR,
NO STN, NO FLOR, NO O FLOR,
MOD LZY CUT, LT BRIYL RNG

CG 833u

CG 1068u

-125 TG, C1-C4 1125

INC 8.24 AZ 260.71
VS -220.71

MD 6277 TVD 6256.65
INC 10.87 AZ 265.07
VS -212.78

WOB 19.5K
PP 3620
RPM 0
SPM 78/78

MD 6324 TVD 6302.66
INC 12.76 AZ 266.77
VS -203.17

MD 6372 TVD 6349.16
INC 15.89 AZ 267.53
VS -191.3

ROP (Ft/Hr)
Gamma (API)

600
250

6250

6300

6350

6400

6450

Teepee Buttes (6380' MD - 6410' MD)



6230' MD- 6260' MD: SILTY SH: 70%:
LTGY - MEDLTGY, FRI, FN TO MED
GRN, W SRTD, CALC CMT, TRC
FREE CALC, IMBD PYR, TRC IMBD
GLAUC, SILTY, SANDY, INTGR POR,
NO STN, NO FLOR, NO O FLOR,
MOD LZY CUT, LT BRIYL RNG

6260' MD-6290' MD: SLTST: 50% LTGY
- MEDLTGY, FRI, FN TO MED GRN,
W SRTD, CALC CMT, TRC PYR, TRC
IMBD GLAUC, SANDY, TRC FREE
SLTYSH, INTGR POR, NO STN, NO
FLOR, NO O FLOR, MOD LZY CUT,
LT BRIYL RNG

6290' MD-6320' MD: SLTST: 60% LTGY
- MEDLTGY, FRI, FN TO MED GRN,
W SRTD, CALC CMT, TRC PYR,
SANDY, TRC FREE SLTYSH, TRC
IMBD GLAUC, INTGR POR, NO STN,
NO FLOR, NO O FLOR, MOD LZY
CUT, LT BRIYL RNG

6320' MD-6350' MD: SLTST: 60% LTGY
- MEDLTGY, FRI, FN TO MED GRN,
W SRTD, CALC CMT, TRC PYR,
SANDY, TRC FREE SLTYSH, INTGR
POR, NO STN, NO FLOR, NO O
FLOR, MOD LZY CUT, LT BRIYL RNG

6350' MD-6380' MD: SLTST: 70% LTGY
- MEDLTGY, FRI, FN TO MED GRN,
W SRTD, CALC CMT, TRC PYR,
SANDY, TRC FREE SLTYSH, INTGR
POR, NO STN, NO FLOR, NO O
FLOR, MOD LZY CUT, LT BRIYL RNG

6380' MD-6410' MD: SLTST: 75% LTGY
- MEDLTGY, FRI, FN TO MED GRN,
W SRTD, CALC CMT, TRC PYR,
SANDY, TRC FREE SLTYSH, INTGR
POR, NO STN, NO FLOR, NO O
FLOR, MOD LZY CUT, LT BRIYL RNG

6410' MD-6440' MD: SLTST: 65% LTGY
- MEDLTGY, FRI, FN TO MED GRN,
W SRTD, CALC CMT, TRC PYR,
SANDY, TRC FREE SLTYSH, INTGR
POR, NO STN, NO FLOR, NO O
FLOR, MOD LZY CUT, LT BRIYL RNG

6440' MD-6470' MD: SLTST: 65% LTGY

CG 362u

CG 263u

-125

TG, C1-C4

1125

CG 427u

MD 6466 TVD 6438.28
INC 21.07 AZ 270.16
VS -161.52

MD 6513 TVD 6481.71
INC 23.89 AZ 273.09
VS -143.58

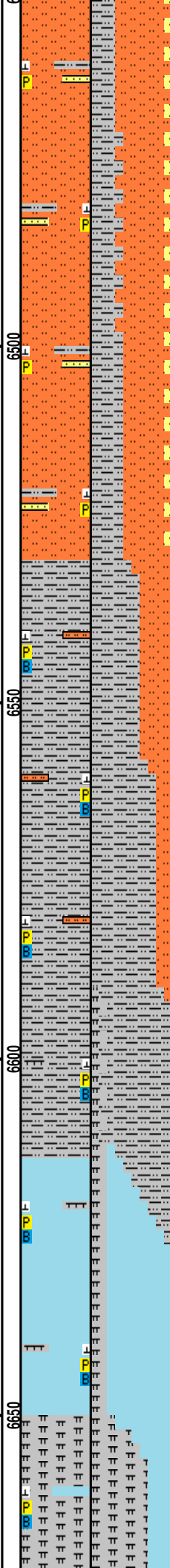
MD 6561 TVD 6525.19
INC 26.2 AZ 270.38
VS -123.3

MD 6616 TVD 6573.88
INC 29.27 AZ 264.27
VS -97.74

MD 6655 TVD 6606.97
INC 34.57 AZ 264.05
VS -77.19

BDP (Ft/Hr)
Gamma (API)
WOB 26.6K
PP 3599
RPM 0
SPM 72/72

WOB 27.8K
PP 3530
RPM 0
SPM 72/72



Sharon Springs (6580' MD - 6610' MD)

Niobrara A Chalk (6614' MD - 6650' MD)

Niobrara A Marl (6650' MD - 6680' MD)

- MEDLTGY, FRI, FN TO MED GRN,
W SRTD, CALC CMT, TRC PYR,
SANDY, TRC FREE SLTYSH, INTGR
POR, NO STN, NO FLOR, NO O
FLOR, MOD LZY CUT, LT BRIYL RNG

6470' MD-6500' MD: SLTST: 60% LTGY
- MEDLTGY, FRI, FN TO MED GRN,
W SRTD, CALC CMT, TRC PYR,
SANDY, TRC FREE SLTYSH, INTGR
POR, NO STN, NO FLOR, NO O
FLOR, MOD LZY CUT, LT BRIYL RNG

6500' MD-6530' MD: SLTST: 55% LTGY
- MEDLTGY, FRI, FN TO MED GRN,
W SRTD, CALC CMT, TRC PYR,
SANDY, TRC FREE SLTYSH, INTGR
POR, NO STN, NO FLOR, NO O
FLOR, MOD LZY CUT, LT BRIYL RNG

6530' MD-6560' MD: SLTYSH: 60%
SUBBLKY TO SUBSPLT, SLTY TO F
TXT, FREE CALC, IMBD PYR, FREE
SLTST, NO STN, TRC MIN FLOR,
FNT BLSHWT O FLOR, MOD LZY
CUT, LT BRIYL RNG

6560' MD-6590' MD: SLTYSH: 80% SUBBLKY
TO SUBSPLT, SLTY TO F TXT, FREE CALC,
IMBD PYR, ABDT FREE BENT, FREE SLTST,
NO STN, TRC MIN FLOR, FNT BLSHWT O
FLOR, IMMED STRMG CUT, HVY BLSHWT
RNG

SHARON SPRINGS

6576' MD 6538' TVD

6590' MD-6614' MD: SLTYSH: 85% SUBBLKY
TO SUBSPLT, SLTY TO F TXT, FREE CALC,
IMBD PYR, FREE BENT, 15% FREE MRLST, NO
STN, TRC MIN FLOR, FNT BLSHWT O FLOR,
IMMED STRMG CUT, HVY BLSHWT RNG

TOOH @ 8:00 AM ON 06/17/15 @ 6614' MD DUE
TO LACK OF BUILD RATES.

TIH @ 12:15 PM ON 06/17/2015. RESUMED
DRILLING @ 3:15 PM ON 06/17/2015 W/BIT #4
8.75" SMITH SDI519 S/N JK1910 IN @ 6614' MD

NIOBRARA A CHALK

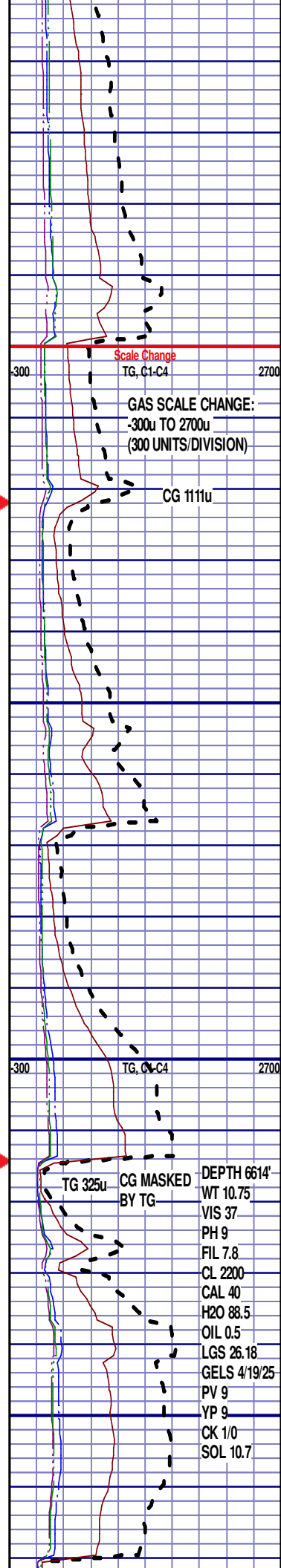
6620' MD 6577' TVD

6614' MD-6650' MD: CHK: 80% MOTT LTGY-
MEDDRKGY, BLKY TO SUBBLKY, GRTY TO
SLTY TXT, FRM TO BRIT, TRC FREE BENT,
TRC IMBD CALC, TRC IMBD PYR, 20% FREE
MRL, NO STN, TRC MIN FLOR, FNT BLSHWT
O FLOR, IMMED STRMG CUT, HVY BLSHWT
RNG

NIOBRARA A MARL

6654' MD 6606' TVD

6650' MD-6680' MD: MRST: 70% MEDDRKGY-
MEDLTGY, BLKY TO SUBBLKY, GRTY TO
SLTY TXT, FRM TO BRIT, FREE CALC, TRC
FREE BENT, IMBD PYR, 30% FREE CHK, NO



Scale Change
TG, C1-C4

GAS SCALE CHANGE:
-300u TO 2700u
(300 UNITS/DIVISION)

CG 1111u

TG, C1-C4

TG 325u CG MASKED
BY TG

DEPTH 6614'
WT 10.75
VIS 37
PH 9
FIL 7.8
CL 2200
CAL 40
H2O 88.5
OIL 0.5
LGS 26.18
GELS 4/19/25
PV 9
YP 9
CK 1/0
SOL 10.7

-300			TG, C1-C4			2700
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