

# **HORIZONTAL LITHOLOGY STRIP LOG**

## **WellSight Systems**

Scale 1:240 (5"=100') Imperial  
Measured Depth Log

Well Name: Thunder 5-64 15-16-1CHZ  
Well Id: SEC 15 T5S R64W  
Location: ARAPAHOE COUNTY, COLORADO, USA  
License Number: 05-005-07342  
Spud Date: JUNE 23, 2018  
Surface Coordinates: 1650' FNL 3272' FEL  
239.94 987.06  
Bottom Hole EASTING NORTHING  
Coordinates: -595.28-9978.22  
Ground Elevation (ft): 5934'  
Logged Interval (ft): 4500' To: TD  
Formation: NIOBRARA C  
Type of Drilling Fluid: OBM

Region: DJ BASIN  
Drilling Completed: JUNE 30, 2018  
K.B. Elevation (ft): 5961'  
Total Depth (ft): 17991'

Printed by HorizontalLog from WellSight Systems 1-800-447-1534 [www.WellSight.com](http://www.WellSight.com)

### **OPERATOR**

Company: TRUE OIL, LLC.  
Address: TRUE OIL, LLC.  
P.O. DRAWER 2360  
CASPER, WY. 82602

### **GEOLOGIST**

Name: Colter Anderson, Kelley Reynolds, Tyler Murphree  
Company: Intermountain Wellsight Geologists  
Address: P.O. BOX 4007  
CASPER, WY. 82609

### **Cores**

### **DSTs**



## Comments

## ROCK TYPES

	Chlk		Clyst		Igne		Shale		Till
	Anhy		Coal		Lmst		Shcol		
	Bent		Congl		Meta		Shgy		
	Brec		Dol		Mrlst		Sltst		
	Cht		Gyp		Salt		Ss		

## ACCESSORIES

<b>MINERAL</b>		<b>Gyp</b>	<b>FOSSIL</b>		<b>Ostra</b>		<b>Sltstrg</b>
	Anhy		<b>Algae</b>		<b>Pelec</b>		<b>Ssstrg</b>
	Arggrn				<b>Pellet</b>		
	Arg				<b>Pisolite</b>		<b>TEXTURE</b>
	Bent				<b>Plant</b>		<b>Boundst</b>
	Bit				<b>Strom</b>		<b>Chalky</b>
	Brecfrag						<b>Cryxln</b>
	Calc			<b>STRINGER</b>		<b>Anhy</b>	<b>Earthy</b>
	Carb				<b>Arg</b>		<b>Finexln</b>
	Chtdk				<b>Bent</b>		<b>Grainst</b>
	Chtlt				<b>Coal</b>		<b>Lithogr</b>
	Dol				<b>Dol</b>		<b>Microxln</b>
	Feldspar				<b>Gyp</b>		<b>Mudst</b>
	Ferrpel				<b>Ls</b>		<b>Packst</b>
	Ferr				<b>Mrst</b>		<b>Wackest</b>
	Glau						

## OTHER SYMBOLS

POROSITY		Vuggy		Rounded		Spotted		Earthly
	Earthly			Subrnd		Ques		Rft
	Fenest			Subang		Dead		Sidewall
	Fracture							
	Inter							
	Moldic							
	Organic							
	Pinpoint							

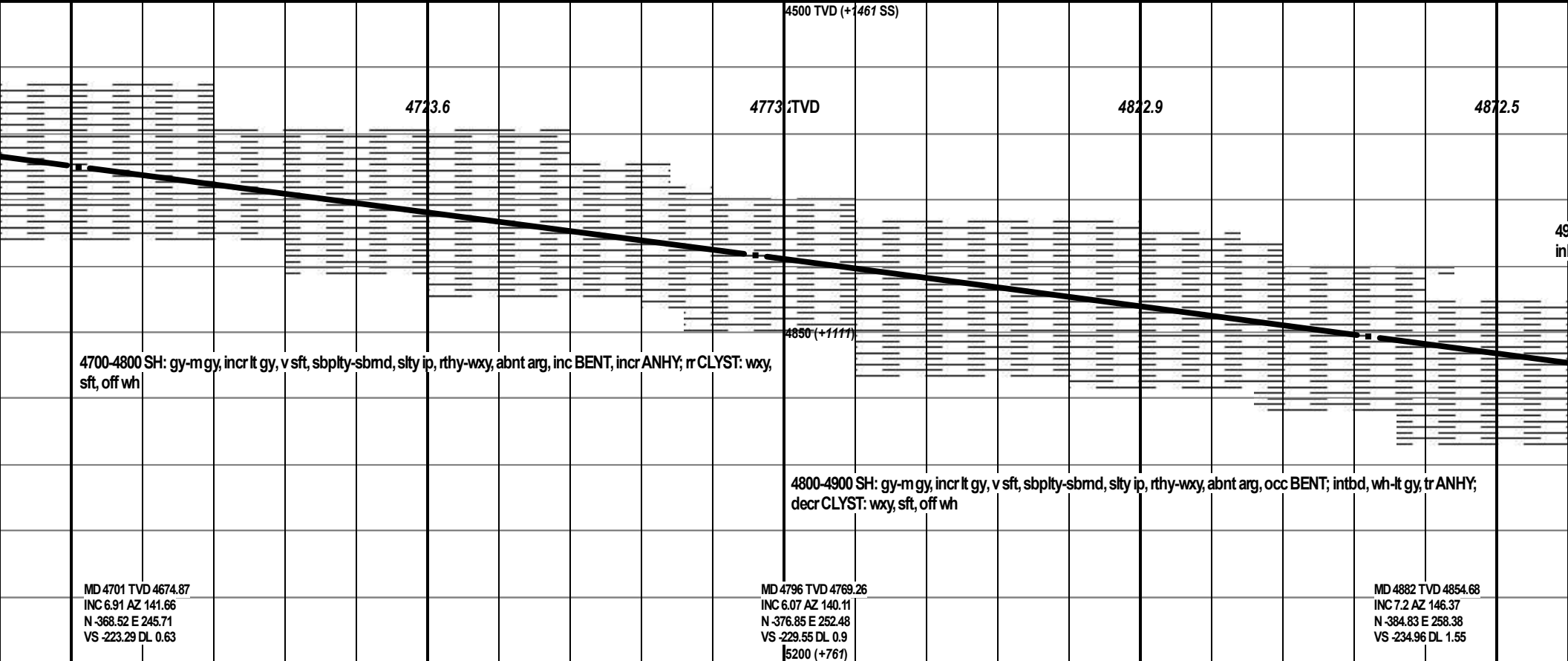
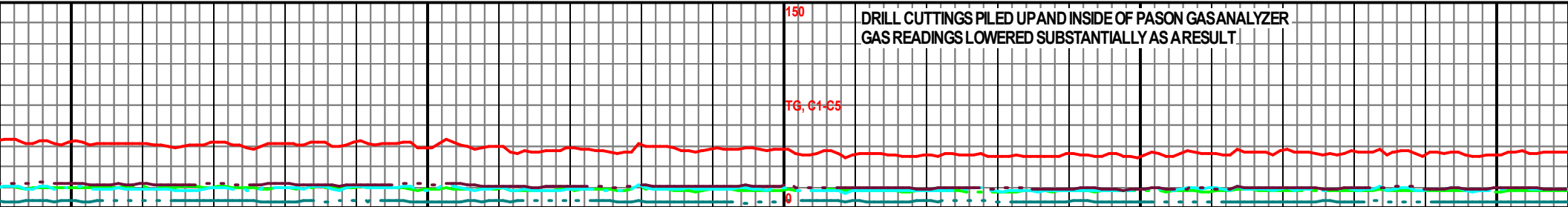
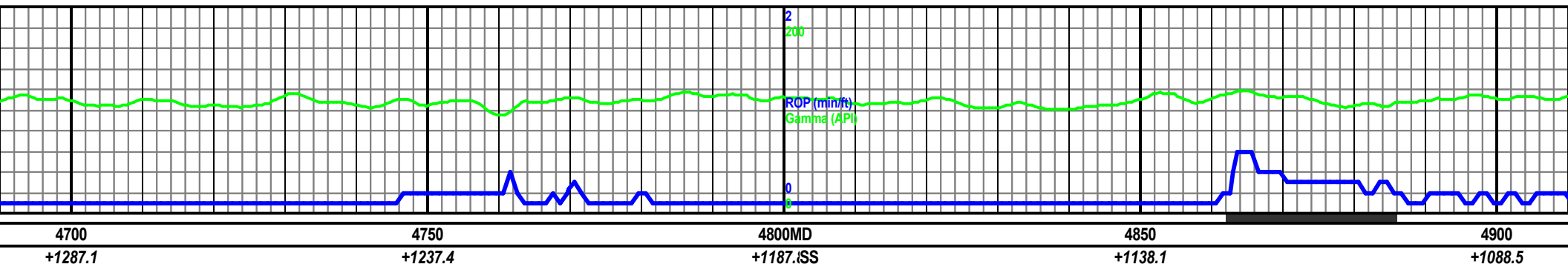
OIL SHOW  
Even

INTERVAL  
Core  
Dst

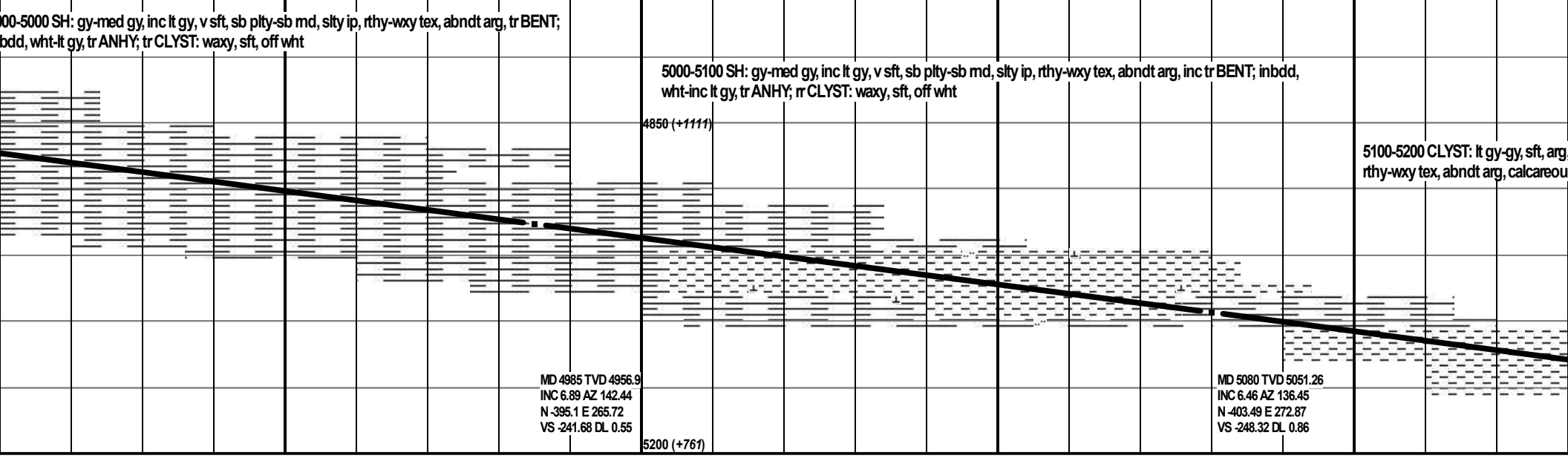
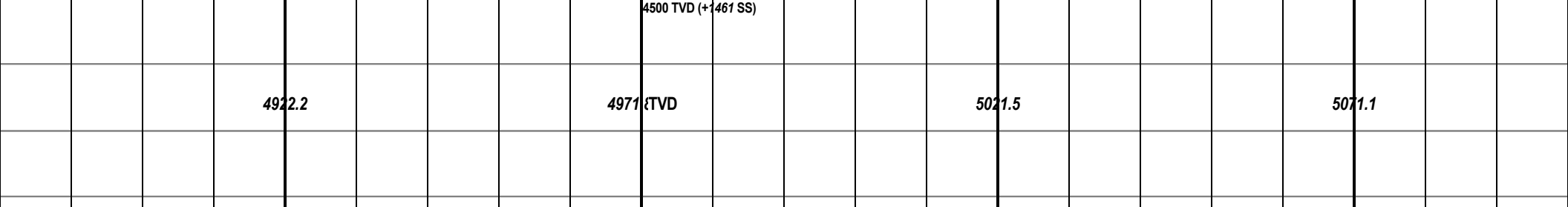
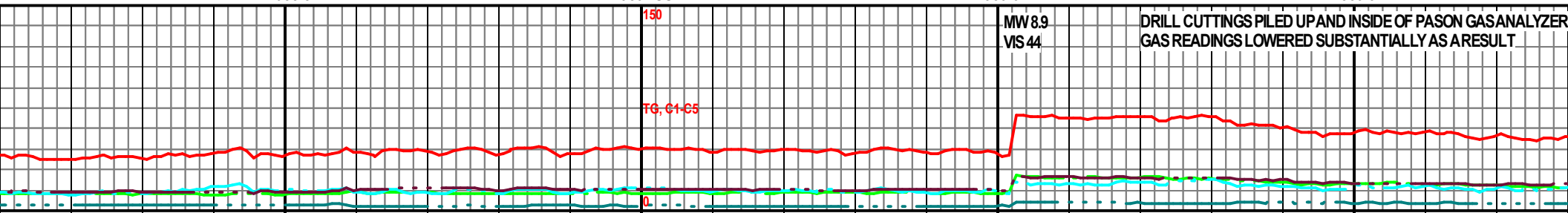
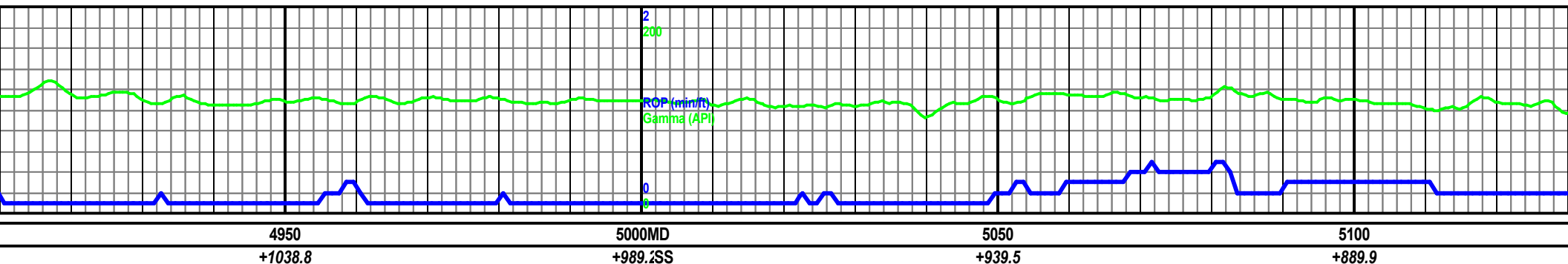




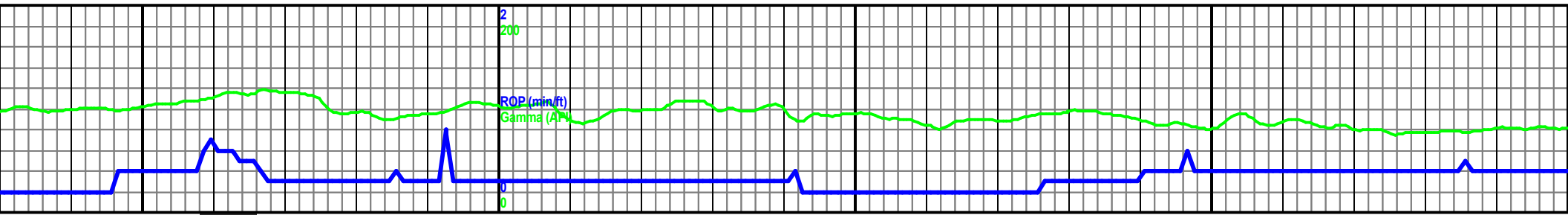












5150  
+840.3

5200MD  
+790.8SS

5250  
+741.3

5300  
+691.8

5350  
+641.3

CG

DTG

MW 8.8+  
VS 44

TG, C1-C5

Gas Data unavailable from  
PASON reset

5200 TVD (+761 SS)

5120.7

5170.7 TVD

5219.7

5269.2

5319.7

5200-5300 SH: gy-med gy, lt gy, v sft, sb plty-sb md, slty ip, rthy-wxy tex, abndt arg, calcareous; dec to r BENT;  
ANHY ip CLYST: lt gy-gy, sft, arg, dul, rthy, bicky, sft-v sft

5300-5400 SH: gy-med gy, lt gy, sft-mod frm, sb plty-blk, rthy, bicky, sft-v sft; dec to r BENT;  
AND CLYST: lt gy-gy, sft, arg, dul, rthy, bicky, sft-v sft

Scale Change  
5650 (+311)

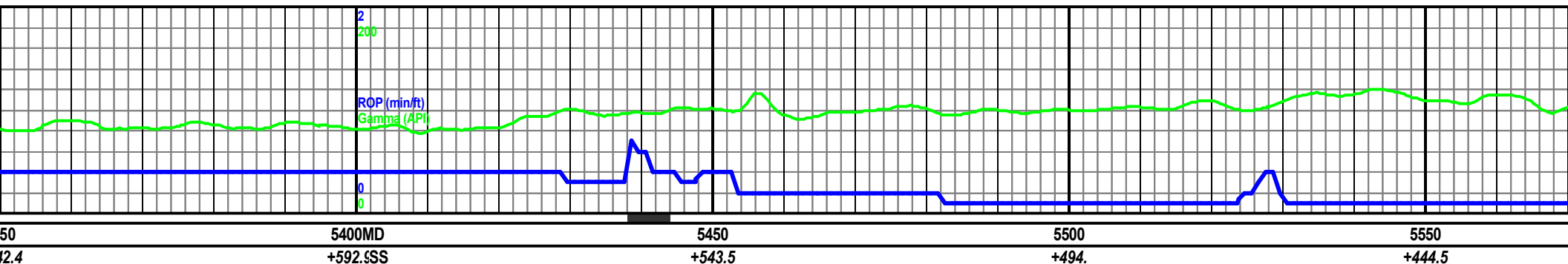
dul, rthy, bicky, sft-v sft; tr SH: gy-med gy, inc lt gy, v sft, sb plty-sb md, slty ip, rthy, bicky, sft-v sft; dec to r BENT; ANHY ip

MD 5175 TVD 5145.5  
INC 8.06 AZ 141.44  
N -412.57 E 280.71  
VS -255.59 DL 1.81

6100 (-139)

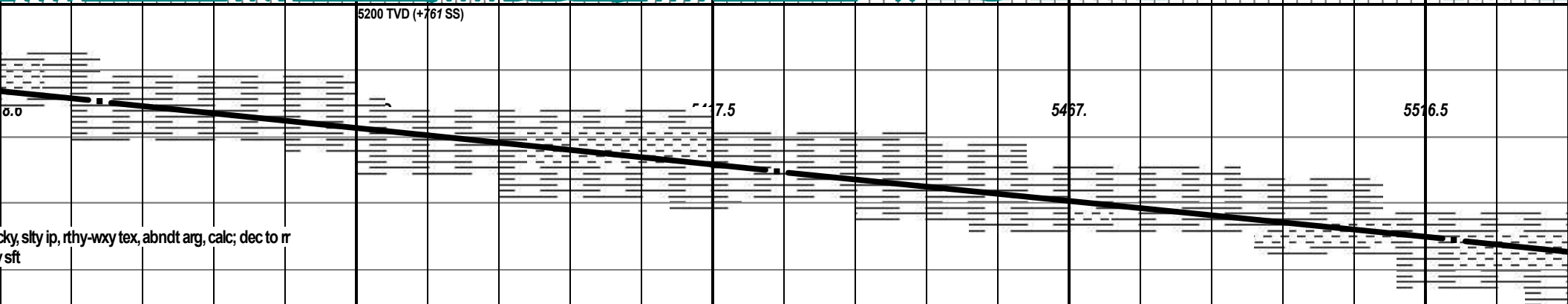
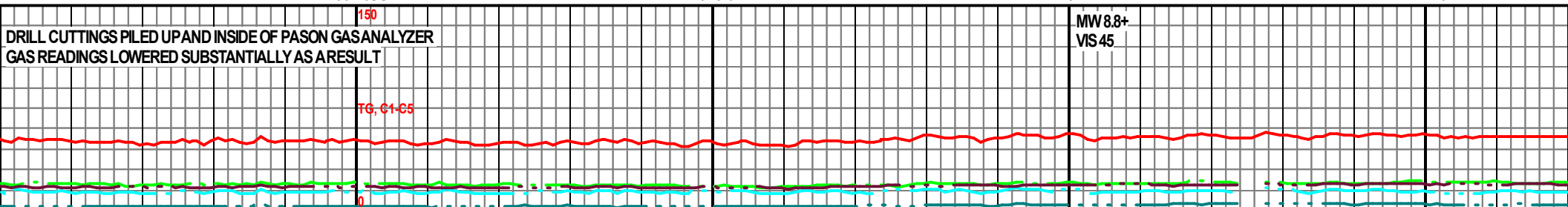
MD 5269 TVD 5238.5  
INC 8.63 AZ 143.68  
N -423.4 E 288.99  
VS -263.22 DL 0.7





DRILL CUTTINGS PILED UP AND INSIDE OF PASON GAS ANALYZER  
GAS READINGS LOWERED SUBSTANTIALLY AS A RESULT

MW 8.8+  
VIS 45



cky, slty ip, rthy-wxy tex, abndt arg, calc; dec to rr  
sft

5650 (+311)

5400-5500 SH: gy-med gy, lt gy, sft- mod frm, sb plty- bckly, slty ip, rthy-wxy tex, calc; inc rr BENT; AND CLYST: lt  
gy-gy, sft, arg, dul, rthy, bckly, sft-v sft; tr and ANHY ip: isolated f gmd sb mded yel qtz grain.

5500-5600 SH: gy-med gy, lt gy, sft- v sft, sb plty-plty, slty ip, rthy-wxy tex, calc; inc  
arg, dul, rthy, bckly, sft-v sft; tr and ANHY ip:

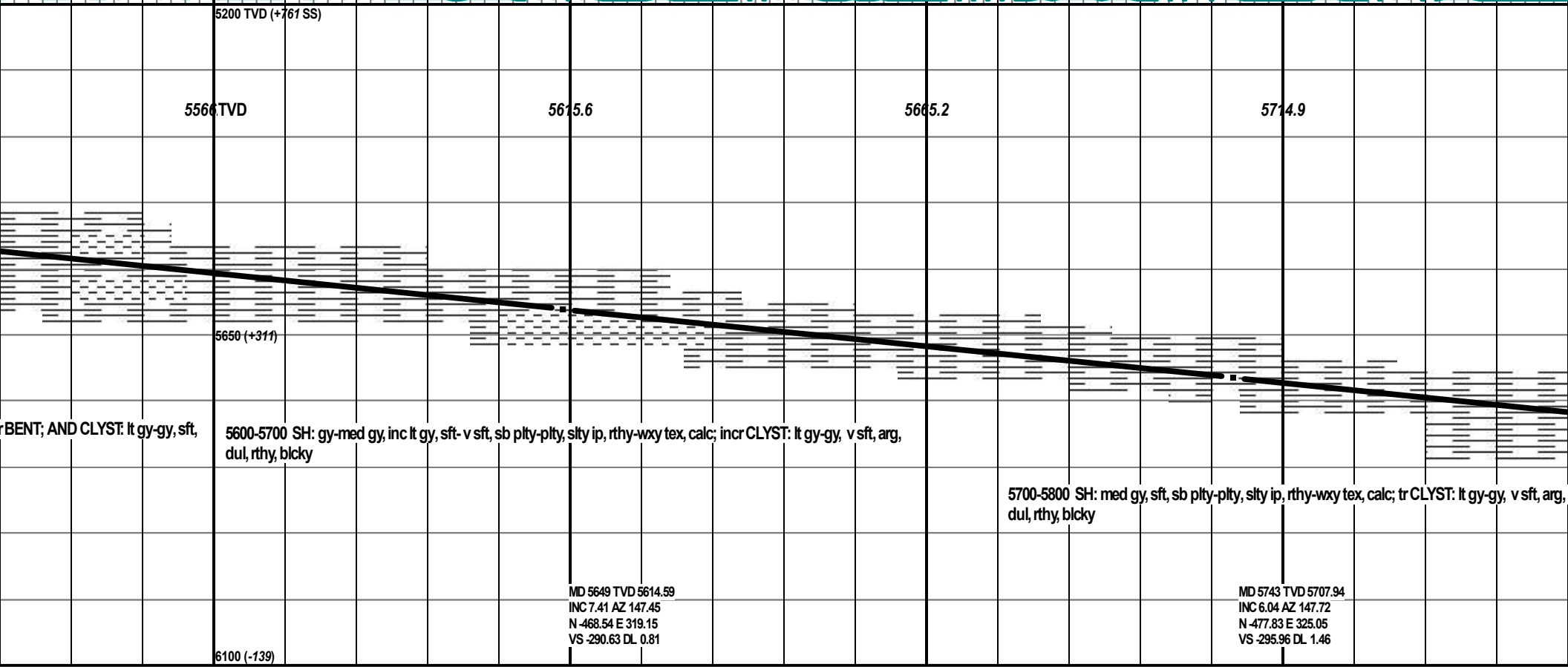
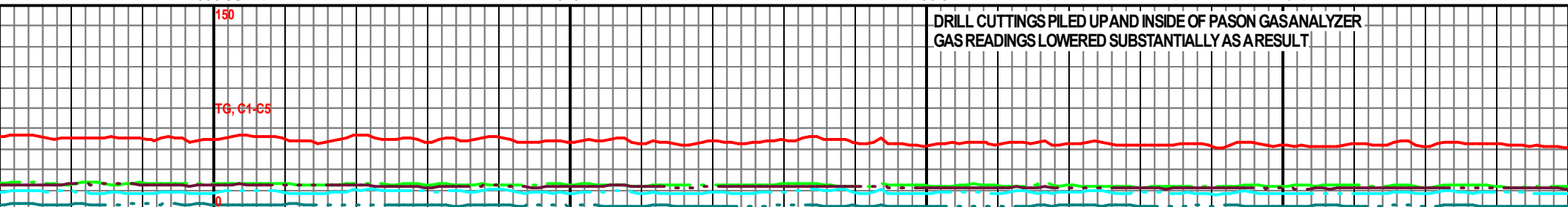
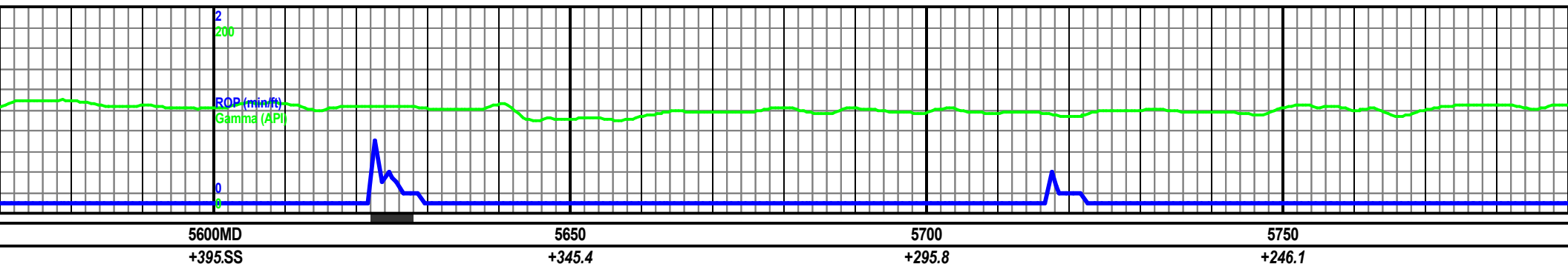
MD 5364 TVD 5332.45  
INC 8.44 AZ 141.82  
N -434.63 E 297.52  
VS -271.06 DL 0.35

MD 5459 TVD 5426.44  
INC 8.29 AZ 148.75  
N -445.96 E 305.38  
VS -278.23 DL 1.07

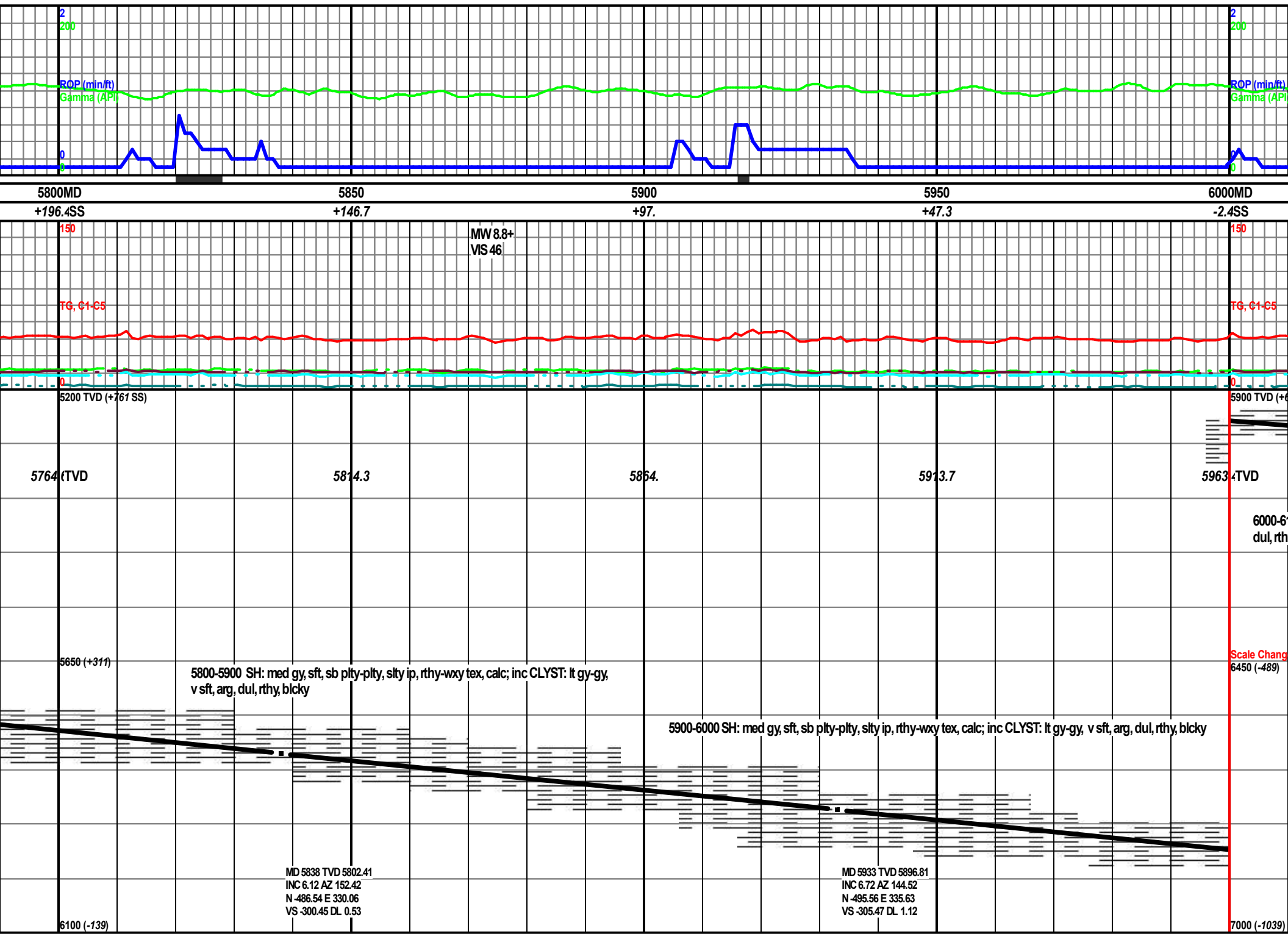
MD 5554 TVD 5520.47  
INC 8.15 AZ 149.11  
N -457.6 E 312.39  
VS -284.54 DL 0.16

6100 (-139)

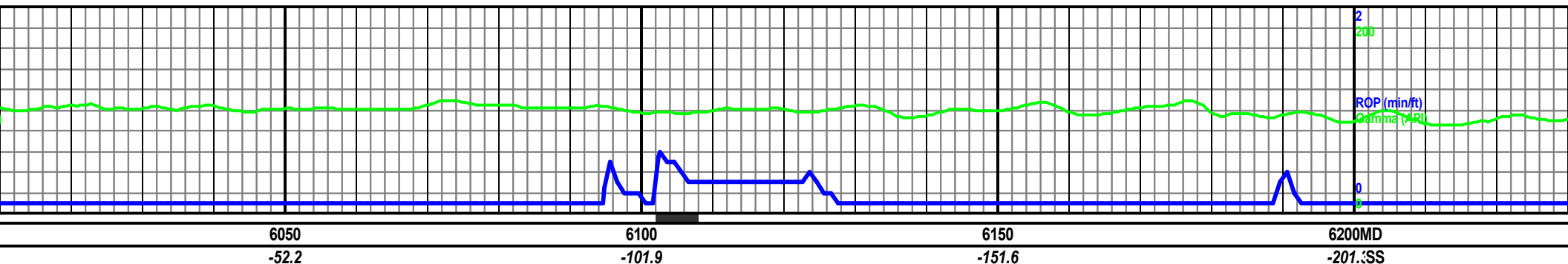




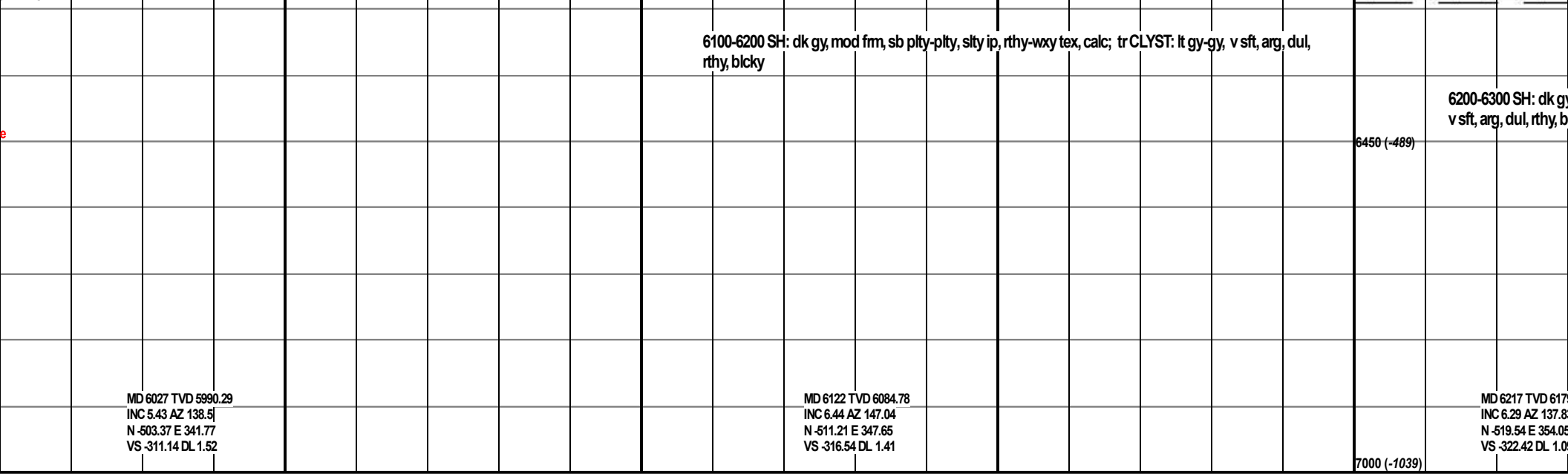
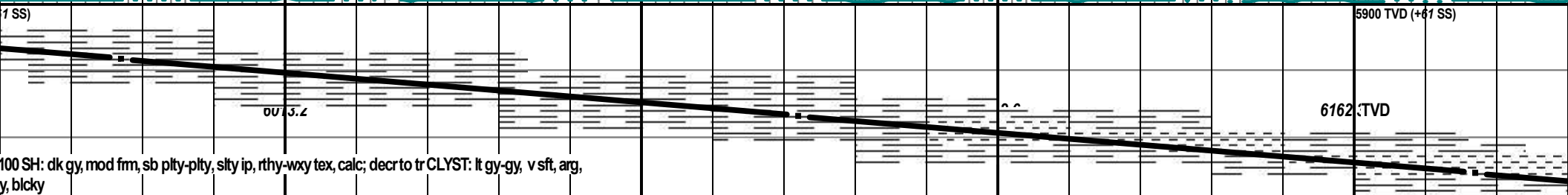
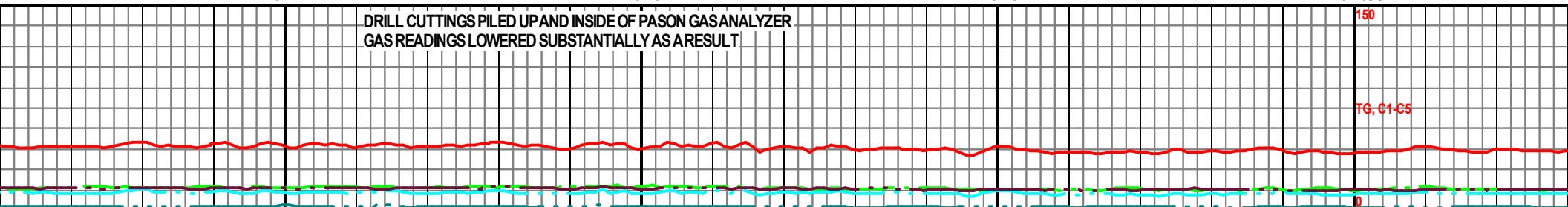








DRILL CUTTINGS PILED UP AND INSIDE OF PASON GAS ANALYZER  
GAS READINGS LOWERED SUBSTANTIALLY AS A RESULT

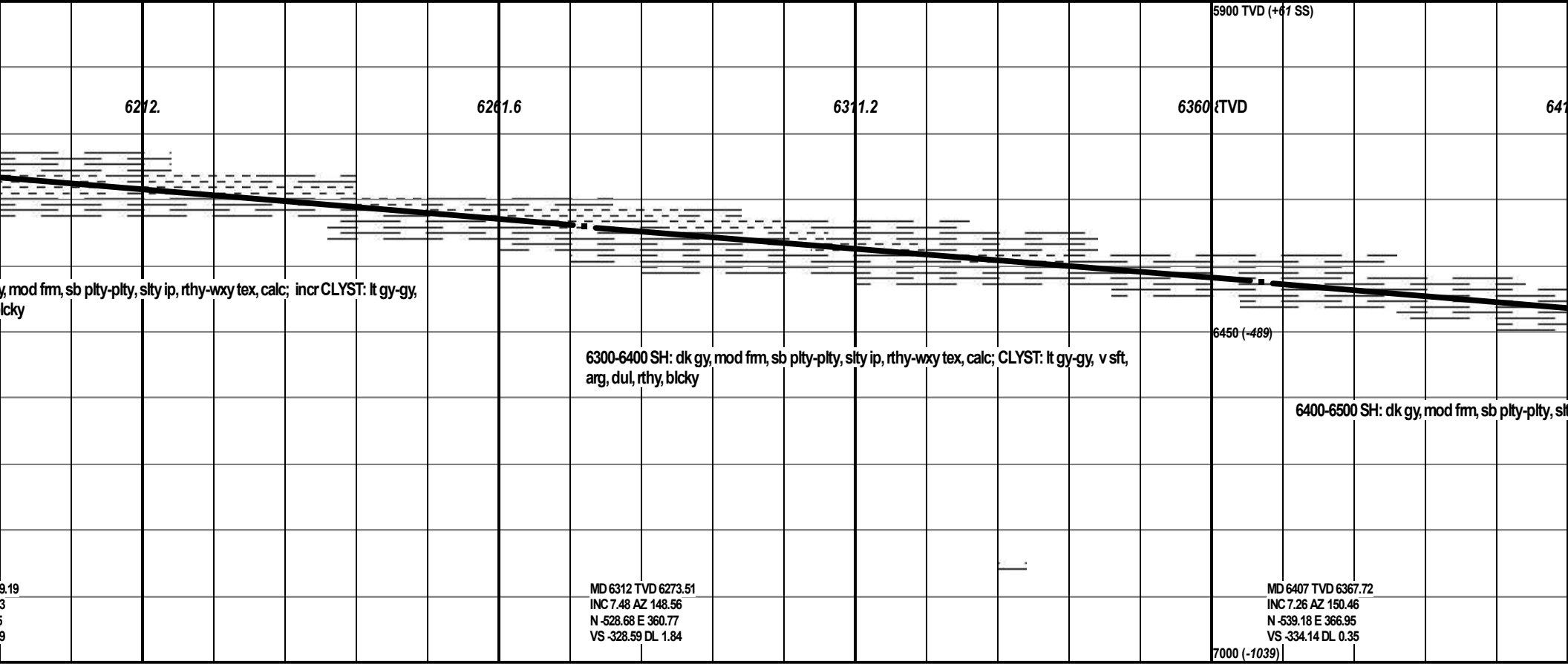
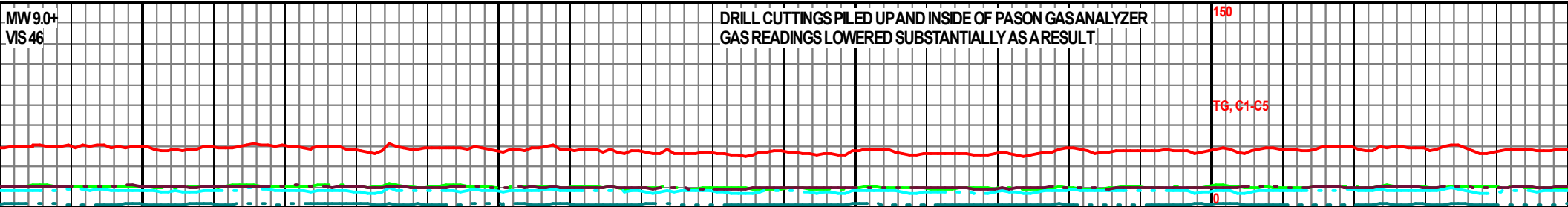
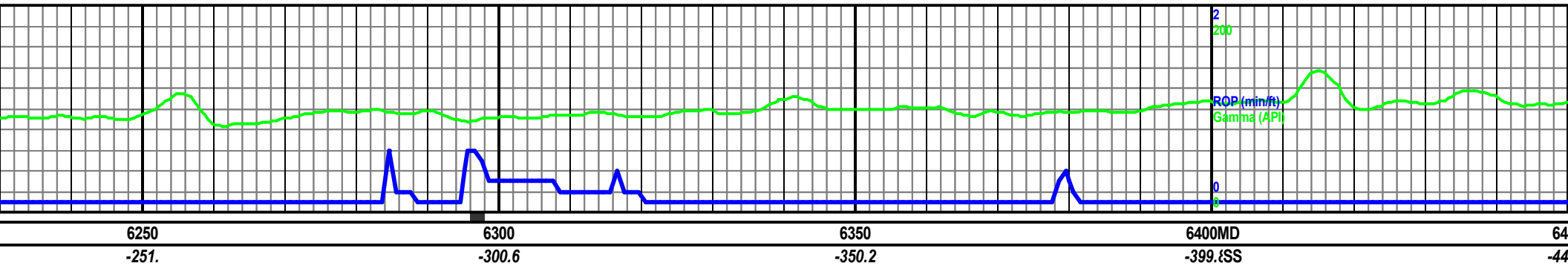


MD 6027 TVD 5990.29  
INC 5.43 AZ 138.5  
N -503.37 E 341.77  
VS -311.14 DL 1.52

MD 6122 TVD 6084.78  
INC 6.44 AZ 147.04  
N -511.21 E 347.65  
VS -316.54 DL 1.41

MD 6217 TVD 6171.0  
INC 6.29 AZ 137.8  
N -519.54 E 354.05  
VS -322.42 DL 1.0







6/25/18

2  
200

ROP (min/R)  
Gamma (API)

0  
8

50  
9.4

6500  
-499.1

6550  
-548.8

6600MD  
-598.5SS

6650  
-648.3

MW 9.0+  
VIS 46

DRILL CUTTINGS PILED UP AND INSIDE OF P  
GAS READINGS LOWERED SUBSTANTIALLY

TG, C1-C5

5900 TVD (+61 SS)

0.4

6460.1

6509.8

6559.1TVD

6609.3

6450 (-489)

gy ip, rthy-wxy tex, calc

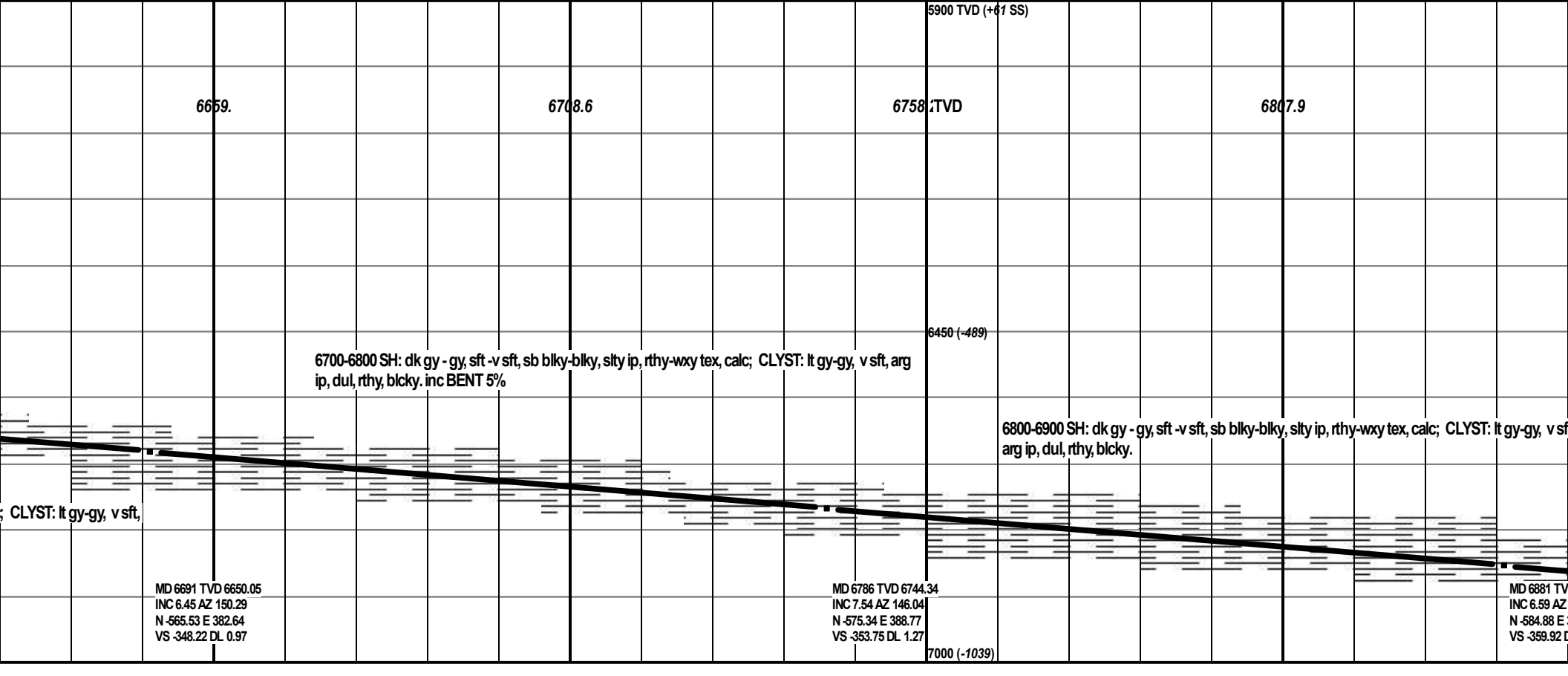
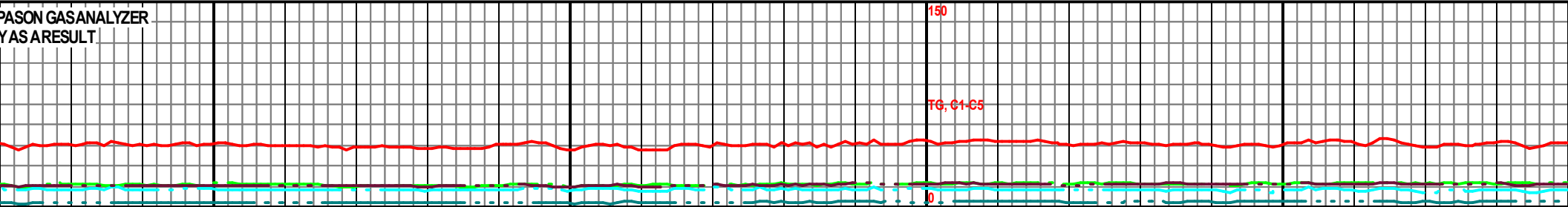
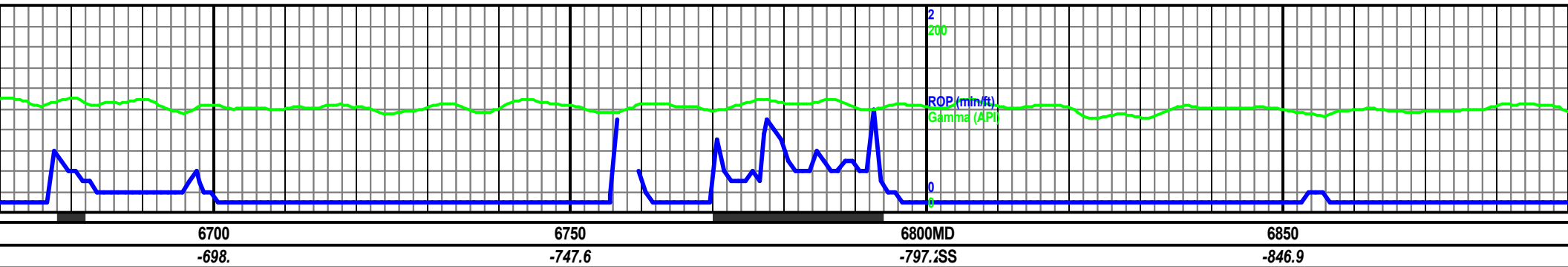
6500-6600 SH: dk gy - gy, sft -v sft, sb plty-plty, slty ip, rthy-wxy tex, v calc; incr CLYST: lt gy-gy, v  
sft, arg, dul, rthy, bicky

6600-6700 SH: dk gy - gy, sft -v sft, sb blkly-blky, slty ip, rthy-wxy tex, calc  
arg ip, dul, rthy, bicky

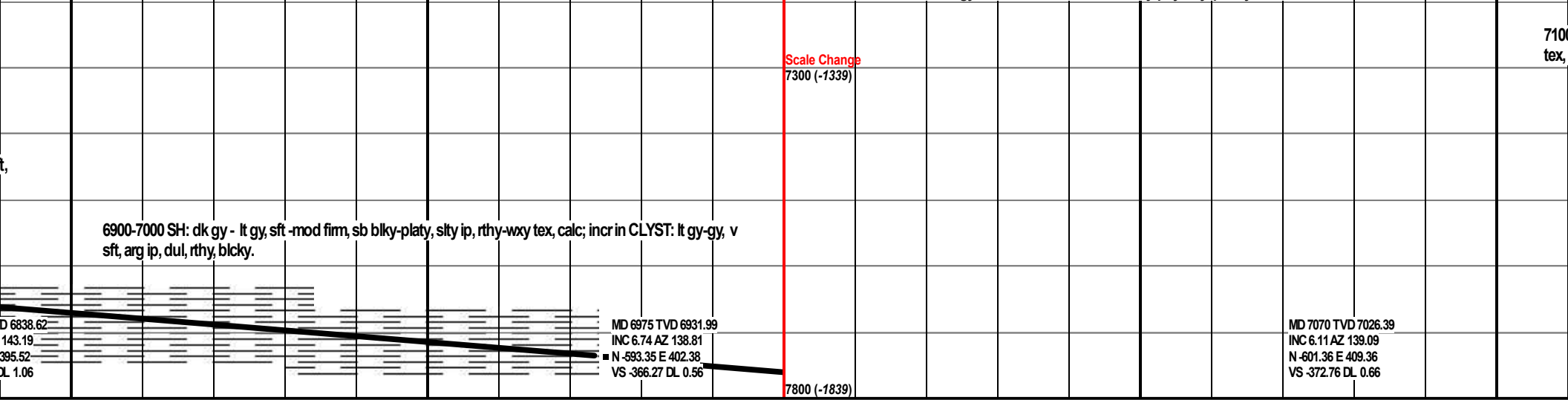
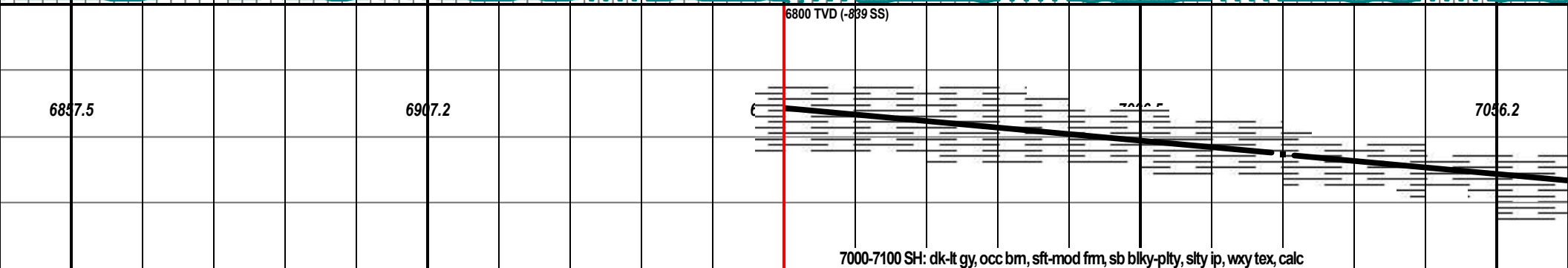
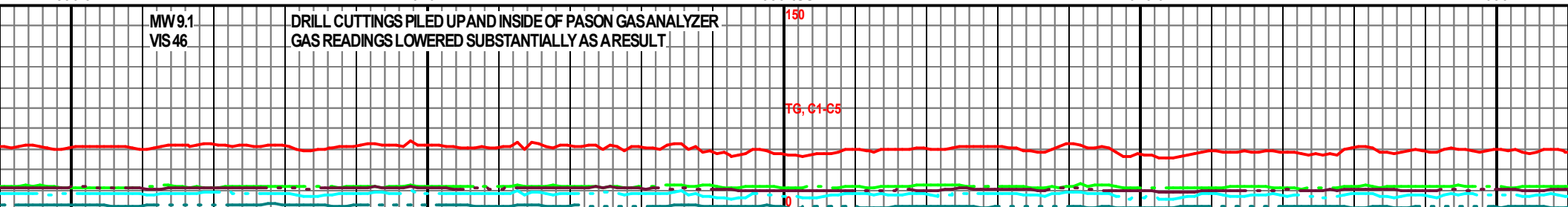
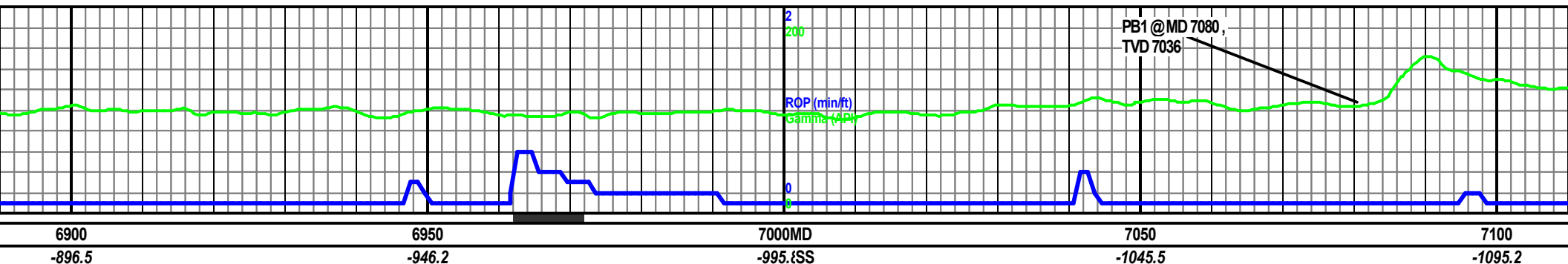
MD 6501 TVD 6461.07  
INC 6.26 AZ 145.02  
N -548.54 E 372.82  
VS -339.43 DL 1.27

MD 6596 TVD 6555.57  
INC 5.56 AZ 152.64  
N -556.87 E 377.9  
VS -344.01 DL 1.1  
7000 (-1039)

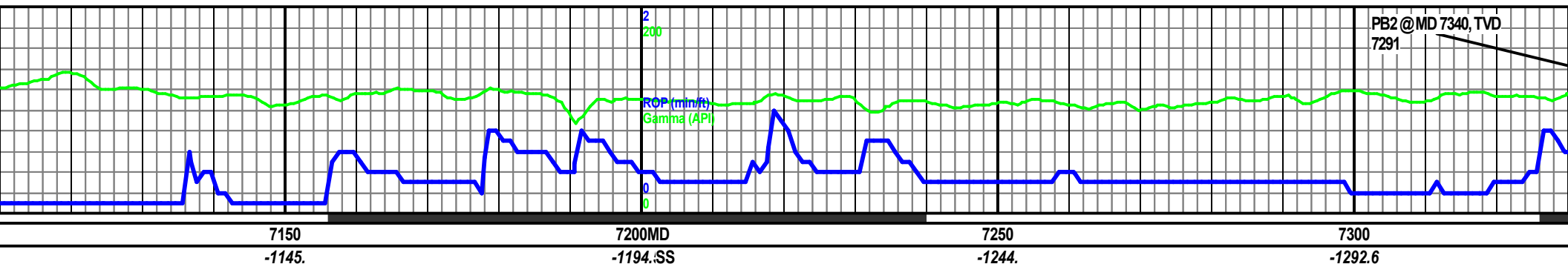












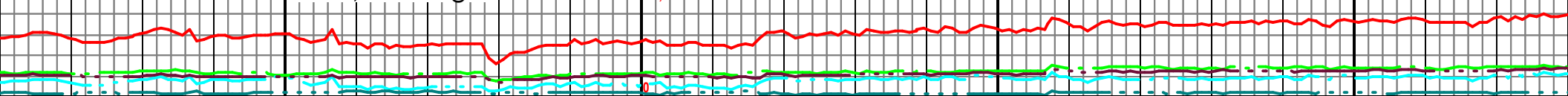
KOP 7157' MD 7113'  
TVD

MW 9.2  
VS 45

DRILL CUTTINGS PILED UP AND INSIDE OF PASON GAS ANALYZER  
GAS READINGS LOWERED SUBSTANTIALLY AS A RESULT

NOTE POSSUM BELLY AND PASON GAS WERE CHECKED,  
PURGED, AND ZEROED @ 7190'

TG, G1-C5



6800 TVD (-839 SS)

0-7200 CLYST: lt gy-gy, v sft, arg ip, dul, rthy, blk; SH: dk-lt gy-brn, sft-mod frm, sb blk-plty, slty ip, wxy  
calc

7300 (-1339)

7200-7300 CLYST: lt gy-gy, v sft, arg ip, dul, rthy, blk; SH: dk gy - lt gy-br, sft-mod frm, sb blk-plty, slty  
ip, wxy tex, calc

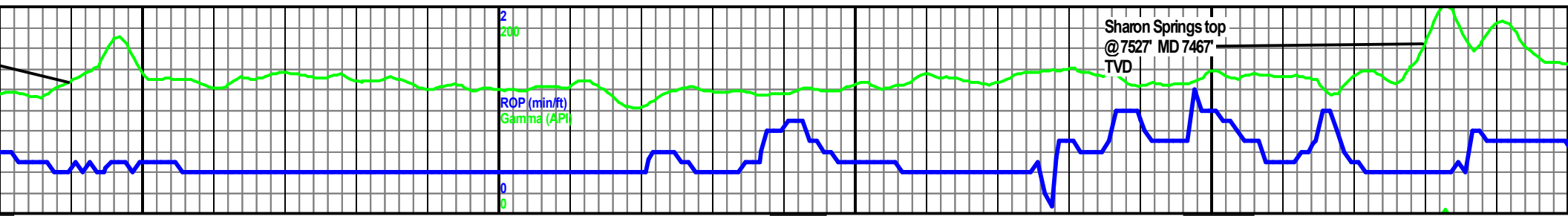
7300-7400 CLYST: lt gy-gy, v  
blk-plty, slty ip, wxy tex, calc

MD 7165 TVD 7120.9  
INC 5.55 AZ 122.19  
N-607.63 E 416.56  
VS -379.57 DL 1.89

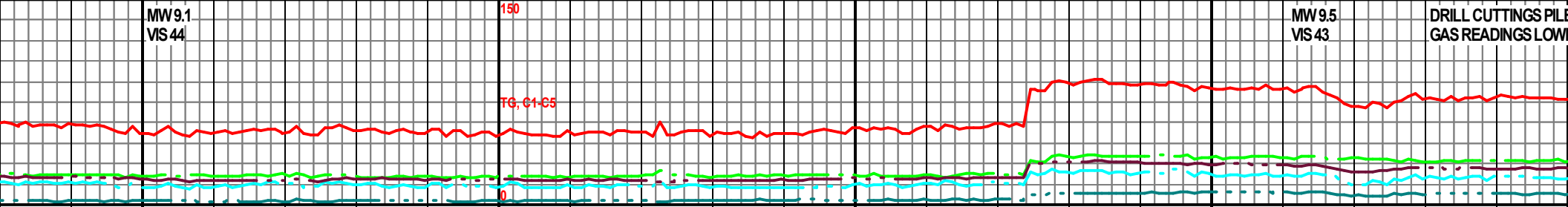
7800 (-1839)

MD 7260 TVD 7214.88  
INC 11.84 AZ 173.13  
N-619.78 E 421.63  
VS -383.9 DL 9.87

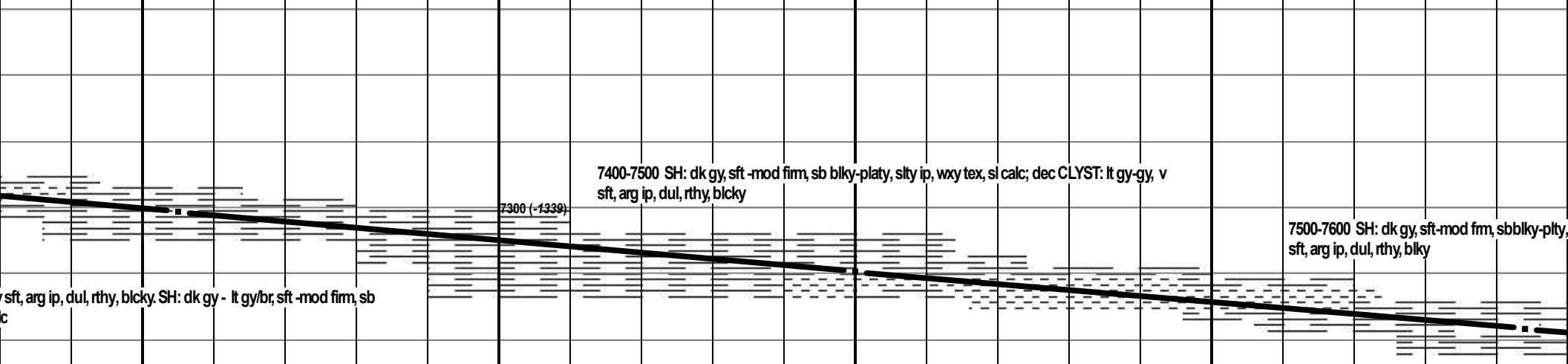




7350 7400MD 7450 7500 7550  
-1341.1 -1388.4SS -1435.6 -1481.3 -1527.1



6800 TVD (-839 SS)  
7302.1 7349.4TVD 7396.6 7442.3 7488.1



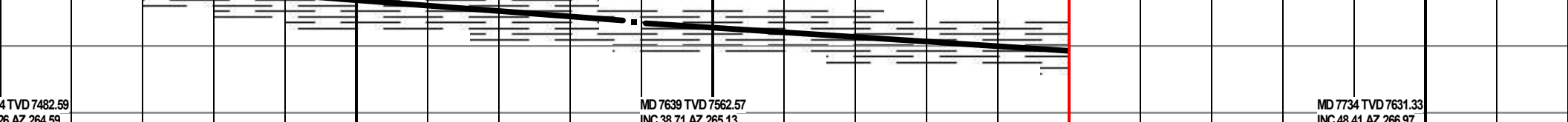
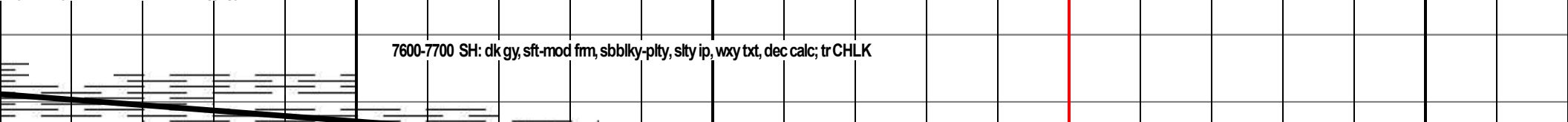
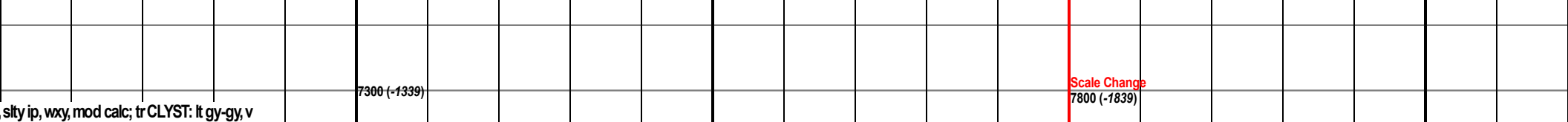
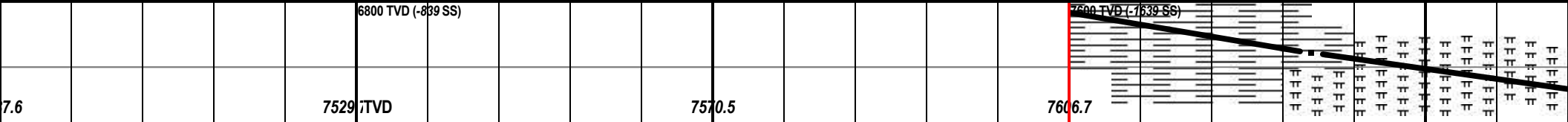
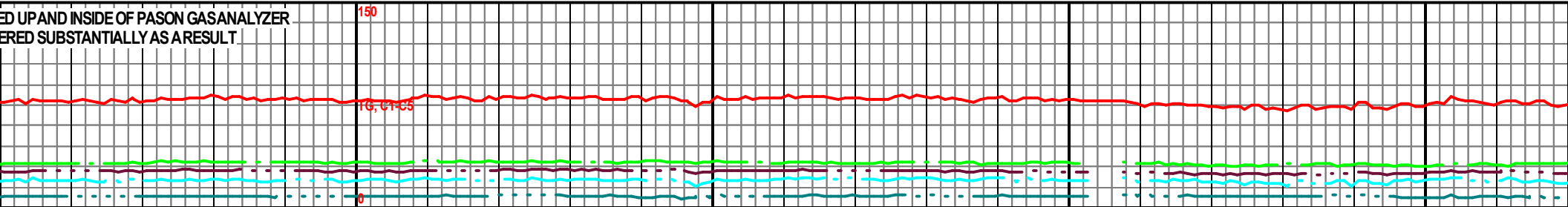
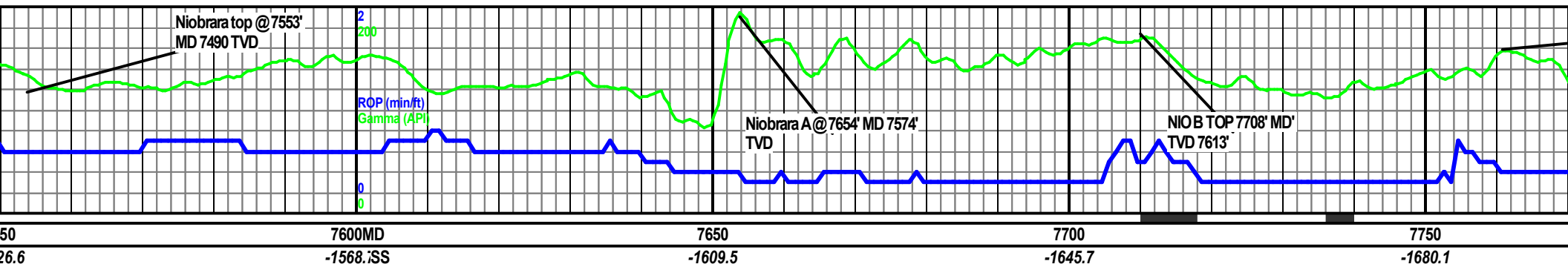
MD 7355 TVD 7306.94  
INC 17.64 AZ 212.81  
N-641.63 E 414.97  
VS -375.96 DL 11.91

MD 7450 TVD 7396.62  
INC 21.77 AZ 245.55  
N-661.08 E 391.05  
VS -350.92 DL 12.22

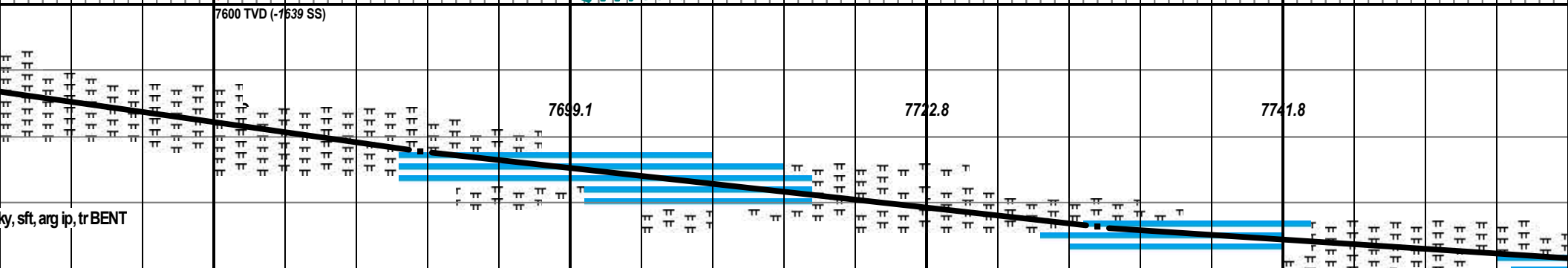
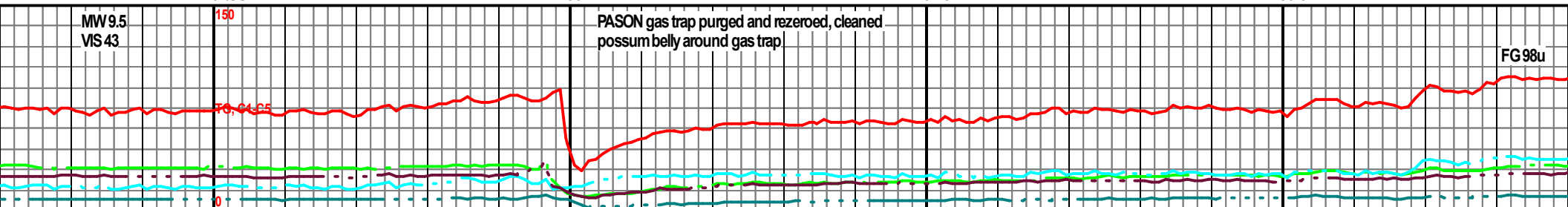
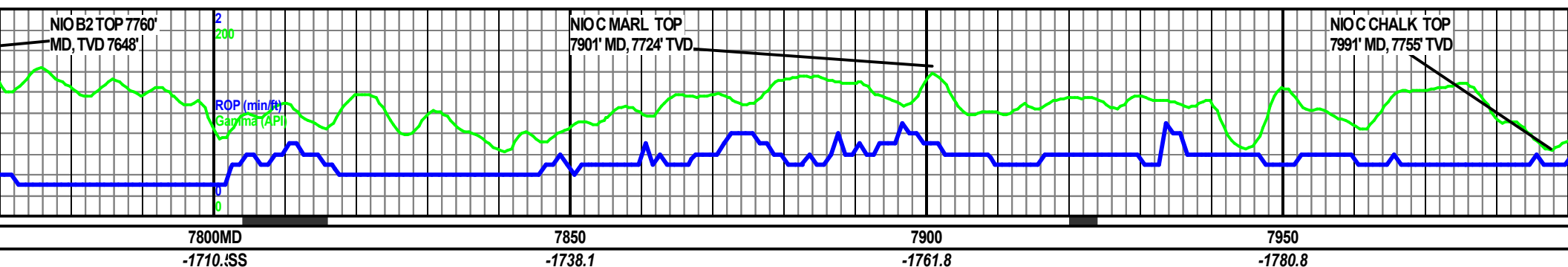
MD 7540 TVD 7488.1  
INC 26.2 AZ 255.55  
N-670.2 E 391.05  
VS -313.92 DL 12.22

7800 (-1839)

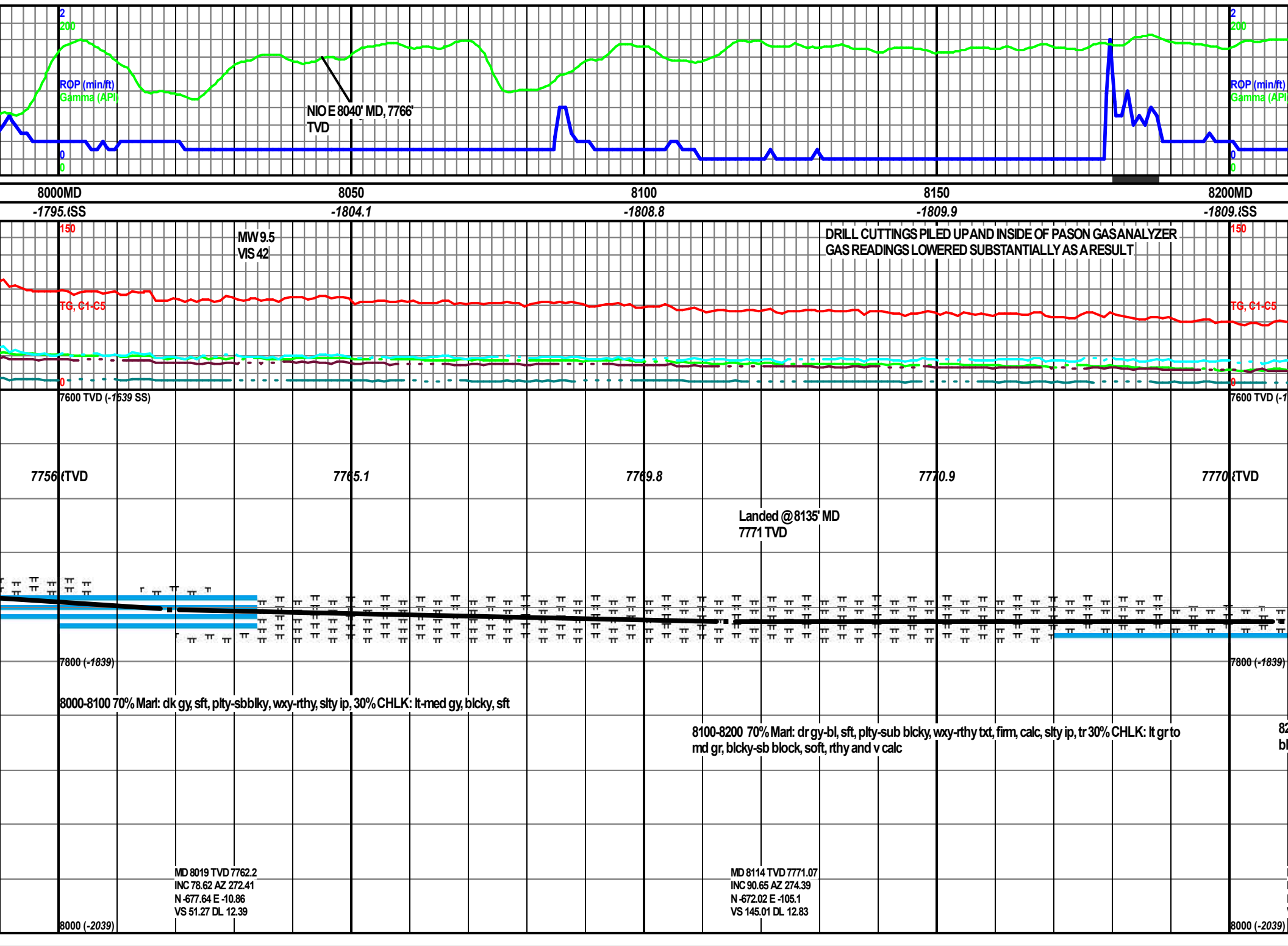




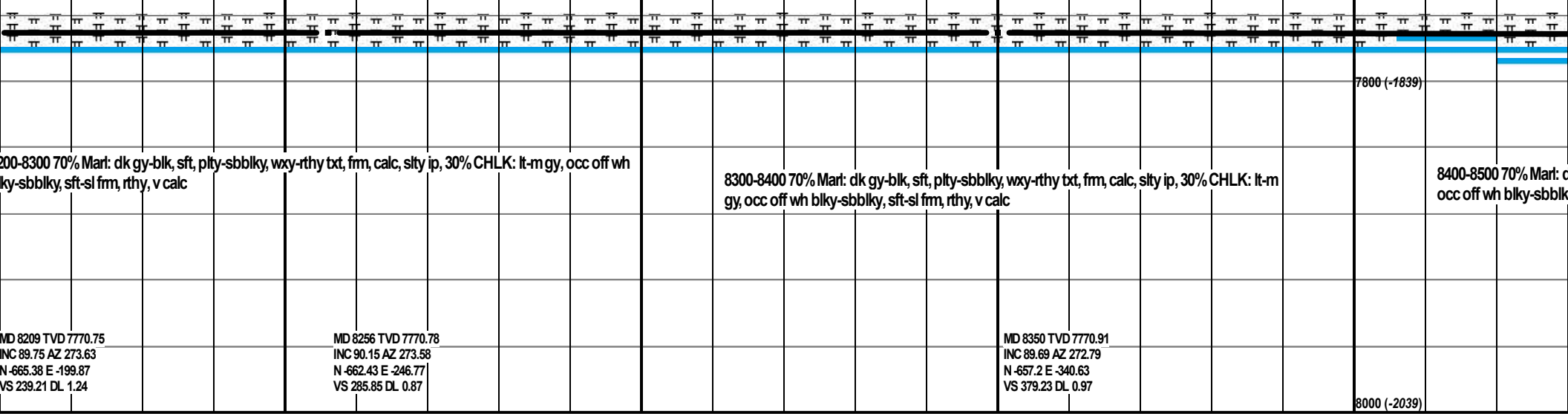
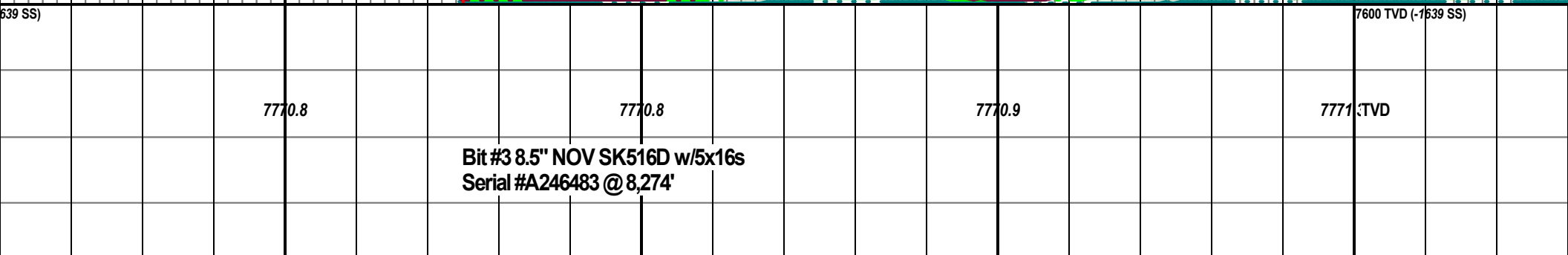
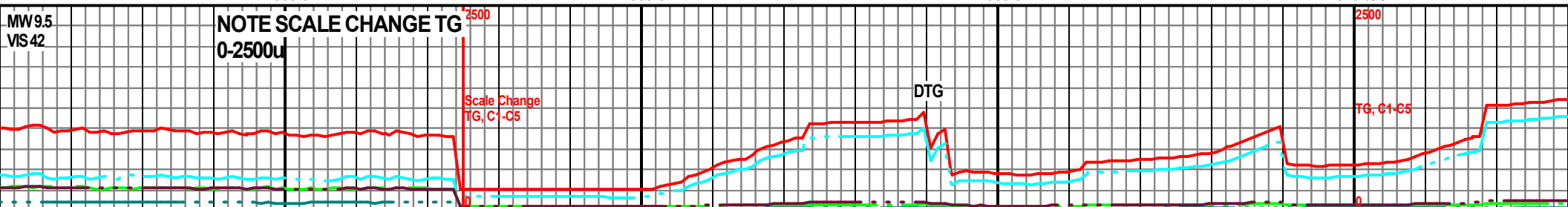
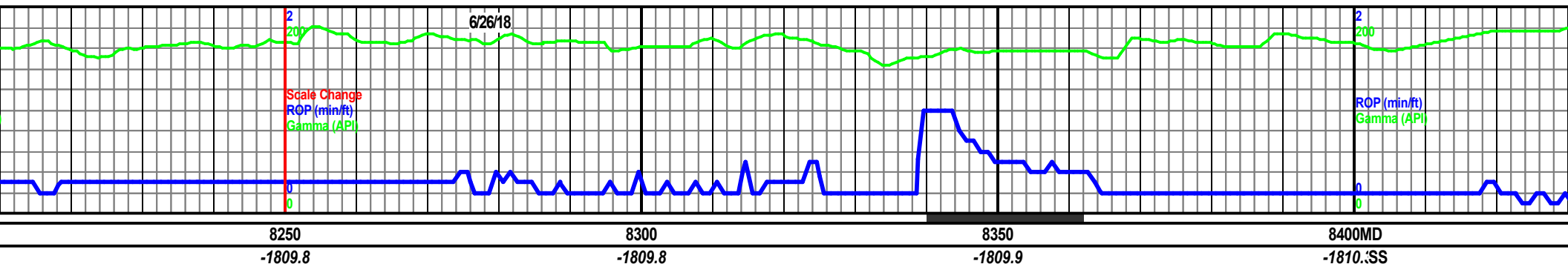












8200-8300 70% Mar: dk gy-blk, sft, pty-sbblky, wxy-rthy txt, frm, calc, sity ip, 30% CHLK: lt-m gy, occ off wh ky-sbblky, sft-sl frm, rthy, v calc

8300-8400 70% Mar: dk gy-blk, sft, pty-sbblky, wxy-rthy txt, frm, calc, sity ip, 30% CHLK: lt-m gy, occ off wh blky-sbblky, sft-sl frm, rthy, v calc

8400-8500 70% Mar: dk gy-blk, sft, pty-sbblky, wxy-rthy txt, frm, calc, sity ip, 30% CHLK: lt-m gy, occ off wh blky-sbblky, sft-sl frm, rthy, v calc

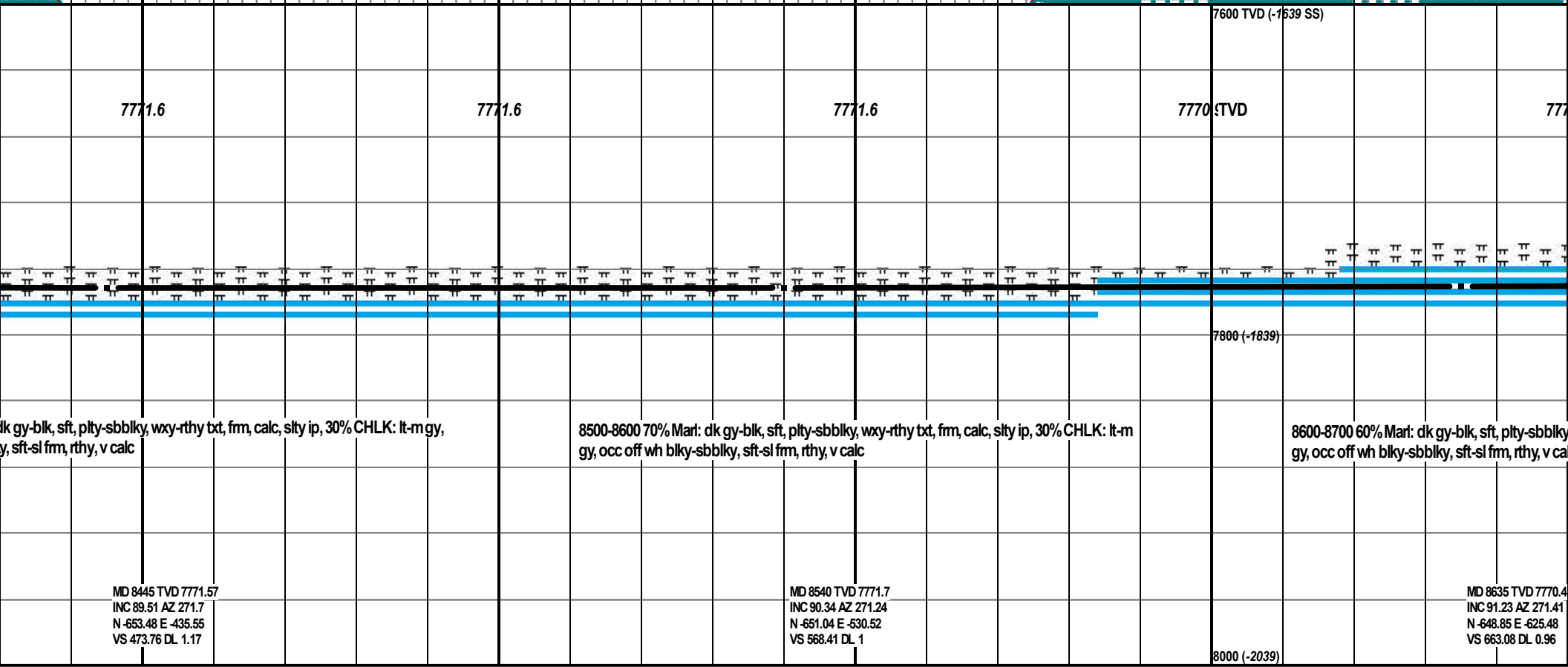
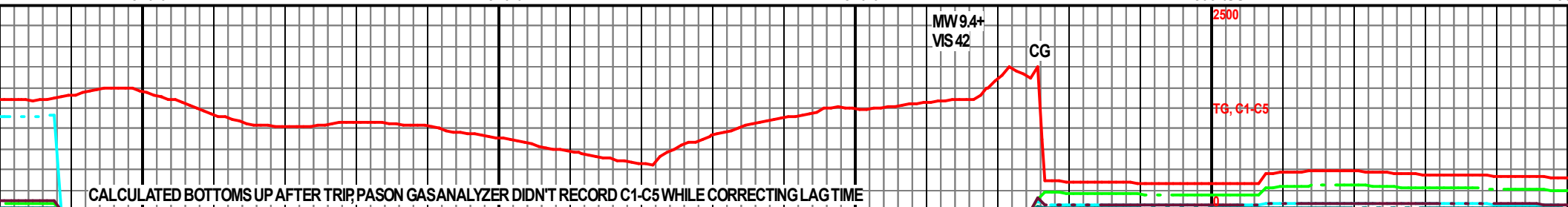
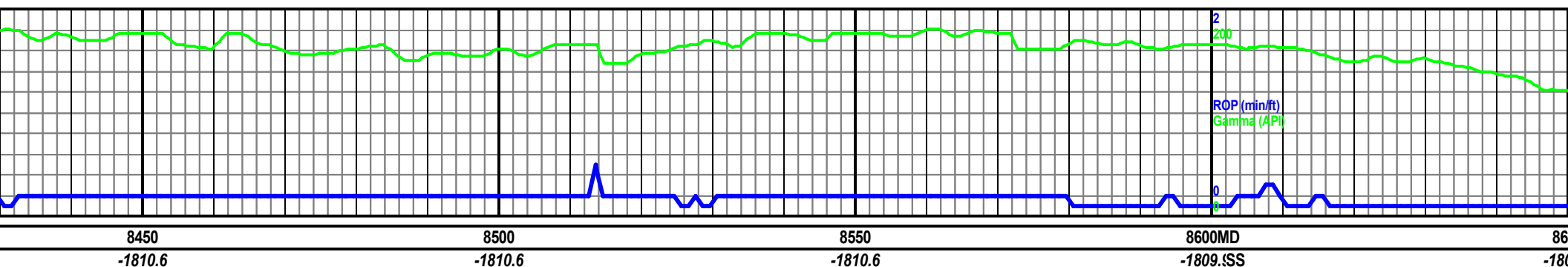
MD 8209 TVD 7770.75  
INC 89.75 AZ 273.63  
N -665.38 E -199.87  
VS 239.21 DL 1.24

MD 8256 TVD 7770.78  
INC 90.15 AZ 273.58  
N -662.43 E -246.77  
VS 285.85 DL 0.87

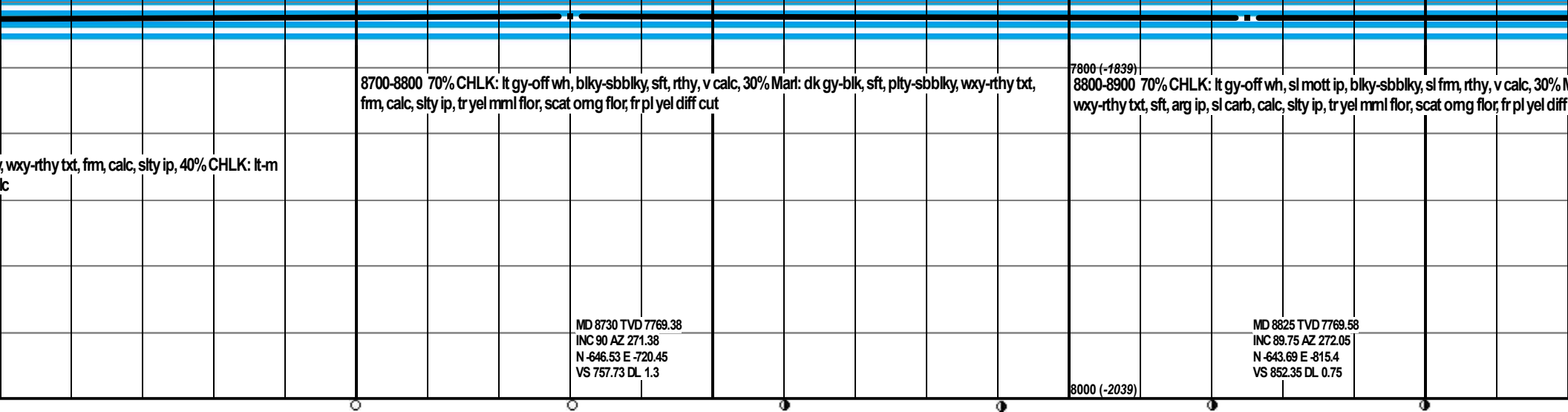
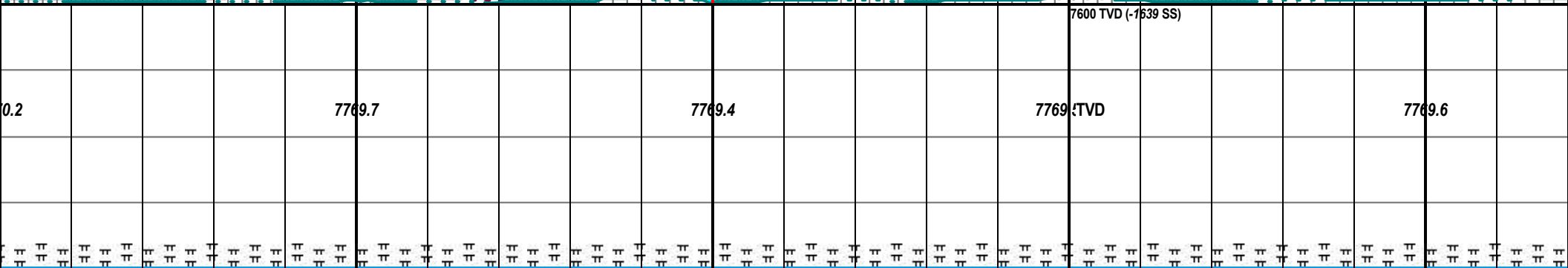
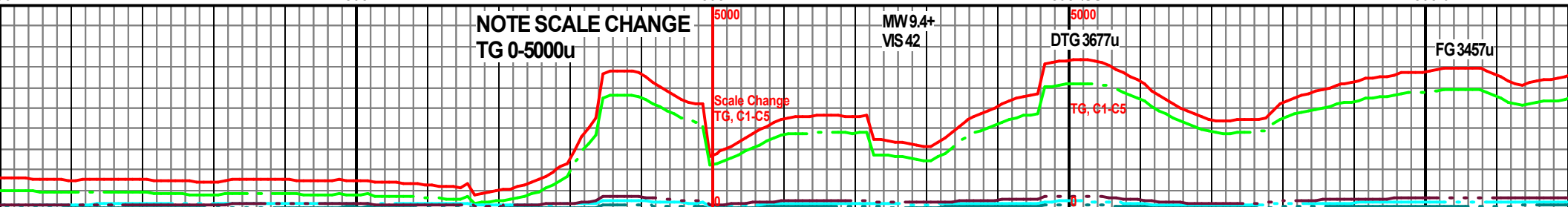
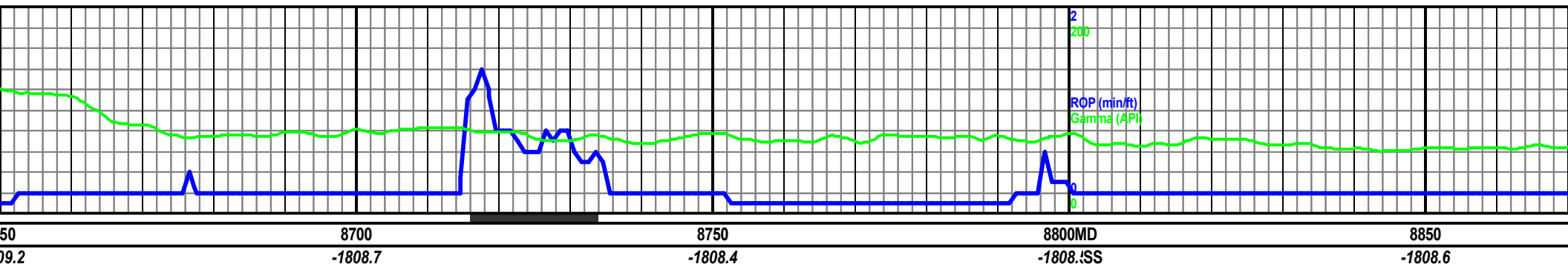
MD 8350 TVD 7770.91  
INC 89.69 AZ 272.79  
N -657.2 E -340.63  
VS 379.23 DL 0.97

8000 (-2039)

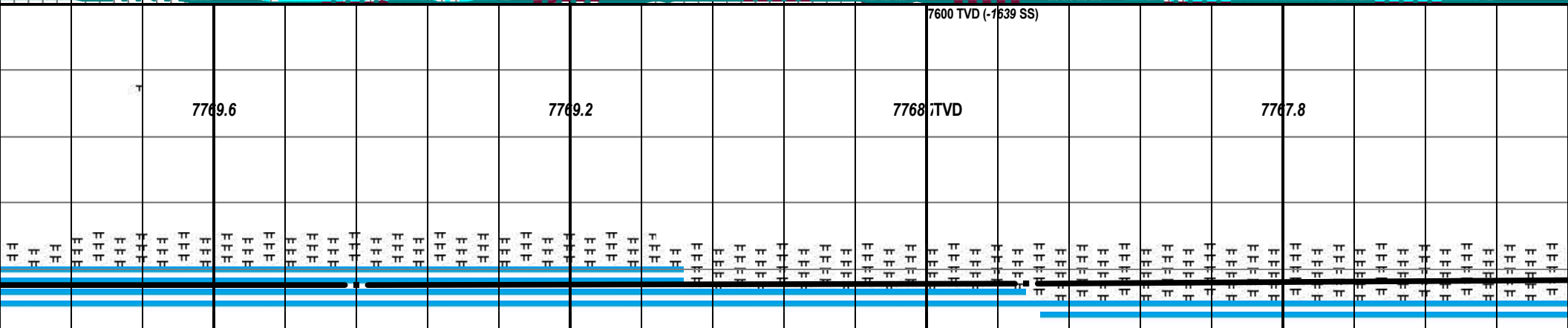
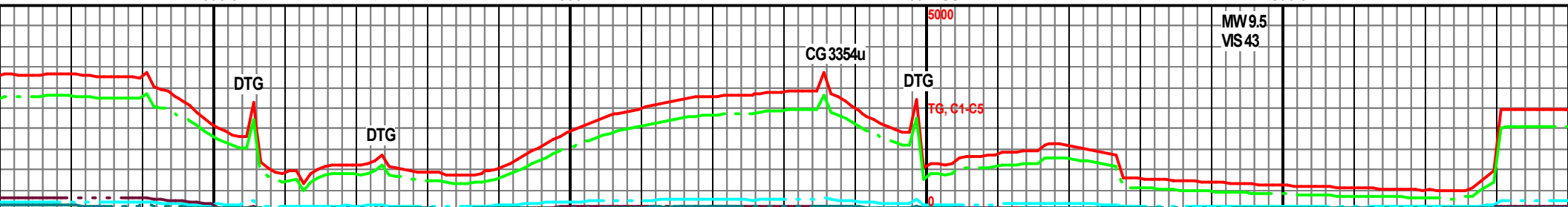
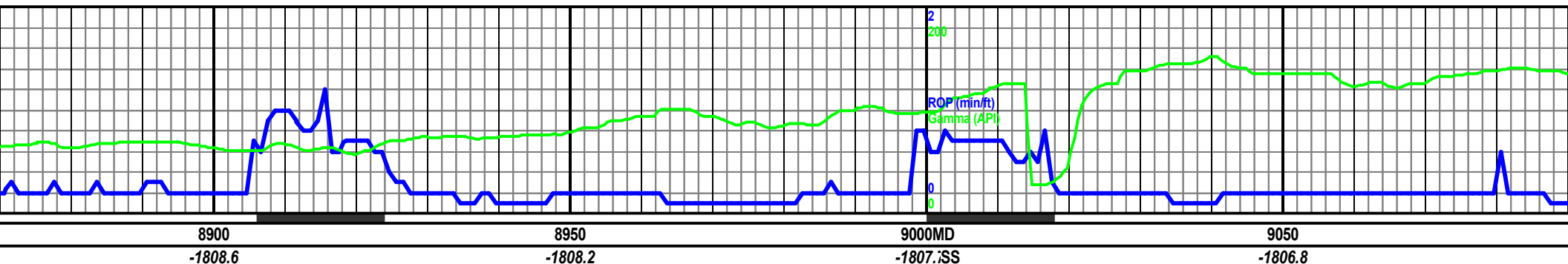












Mar: dk gy-blk, sft, plty-sbbly, cut

8900-9000 70% CHLK: lt gy-off wh, sl mott ip, blk-y-sbbly, sl fm, rthy, v calc, 30% Mar: dk gy-blk, sft, plty-sbbly, wxy-rthy txt, sft, arg ip, sl carb, calc, slty ip, spotty gm flor, str pl yel diff cut

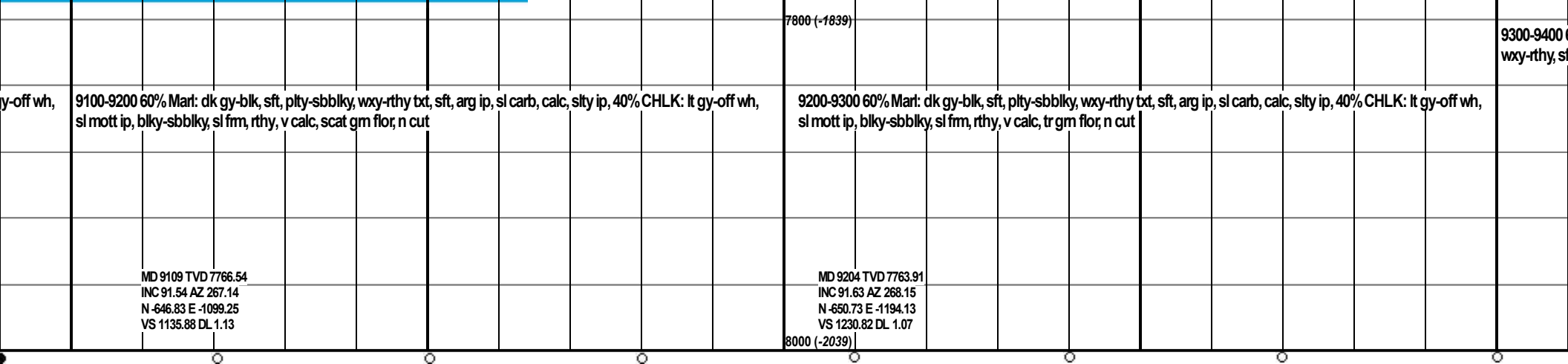
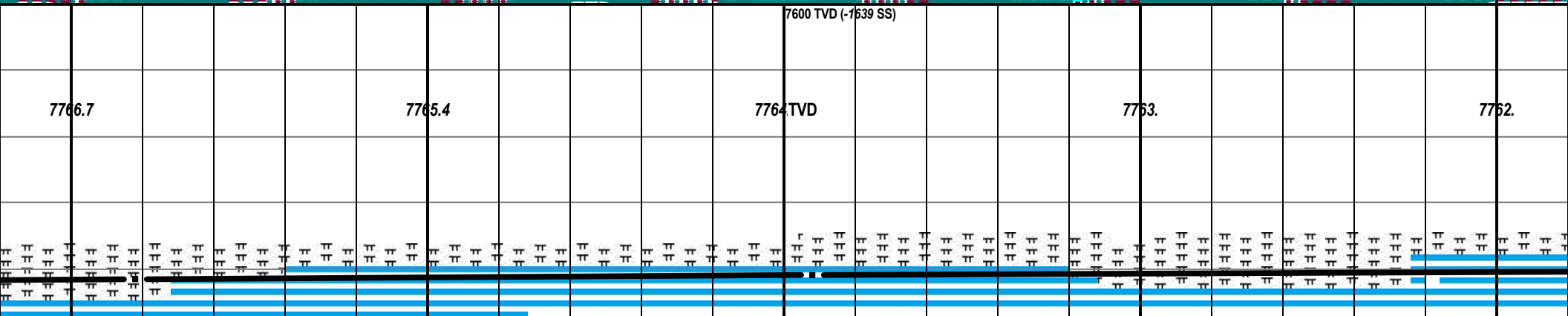
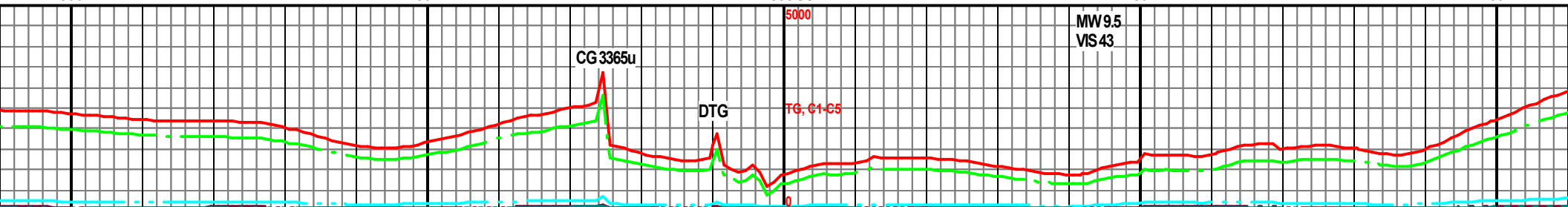
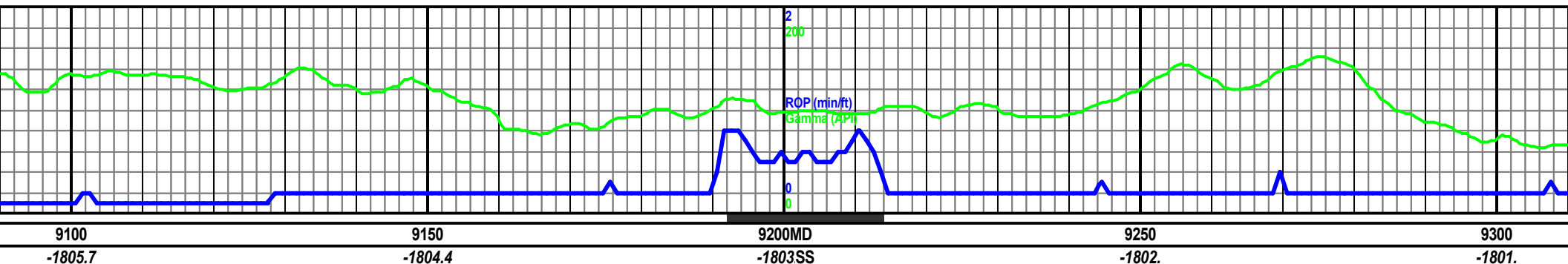
9000-9100 80% Mar: dk gy-blk, sft, plty-sbbly, wxy-rthy txt, sft, arg ip, sl carb, calc, slty ip, 20% CHLK: lt gy-off wh, sl mott ip, blk-y-sbbly, sl fm, rthy, v calc, scat omg flor, fr pl yel diff cut

MD 8920 TVD 7769.56  
INC 90.28 AZ 270.48  
N -641.59 E -910.38  
VS 947.03 DL 1.74

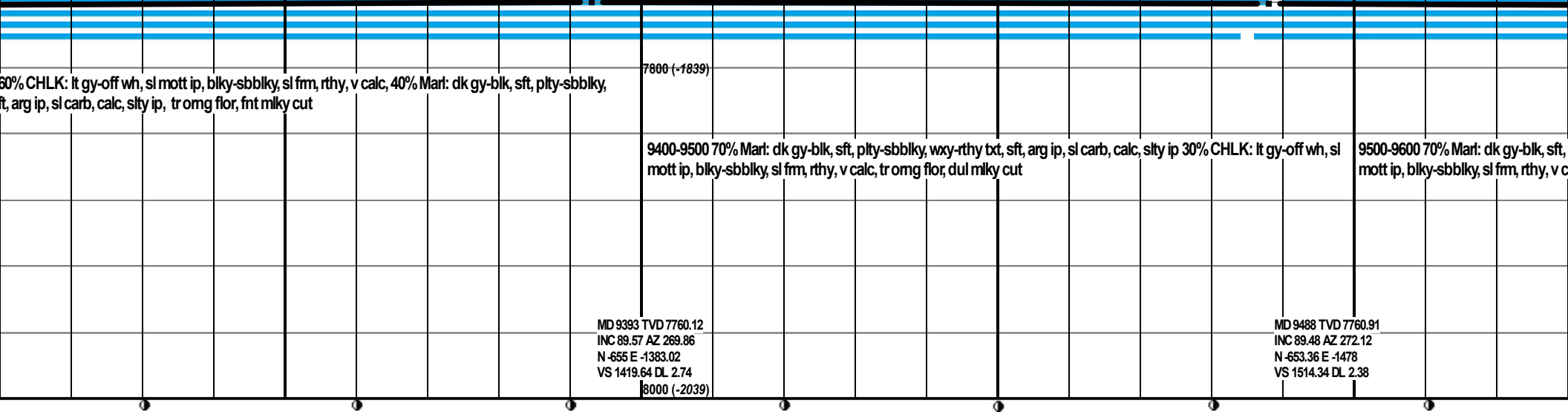
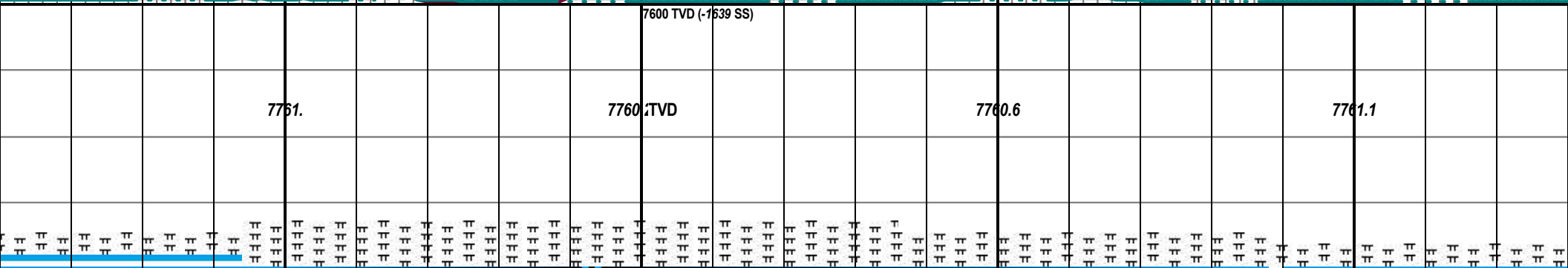
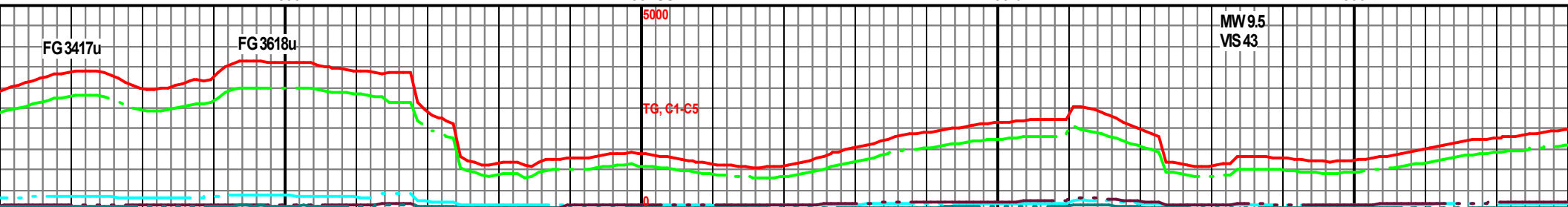
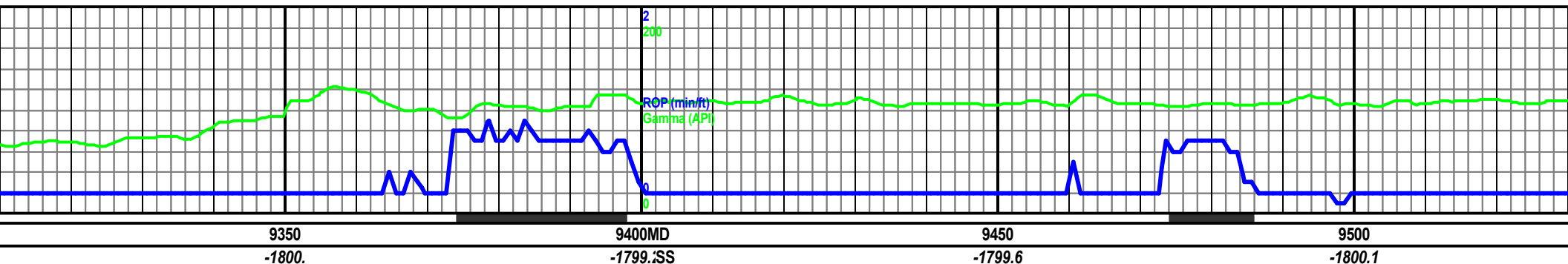
MD 9014 TVD 7768.58  
INC 90.92 AZ 268.02  
N -642.81 E -1004.36  
VS 1040.92 DL 2.71

8000 (-2039)

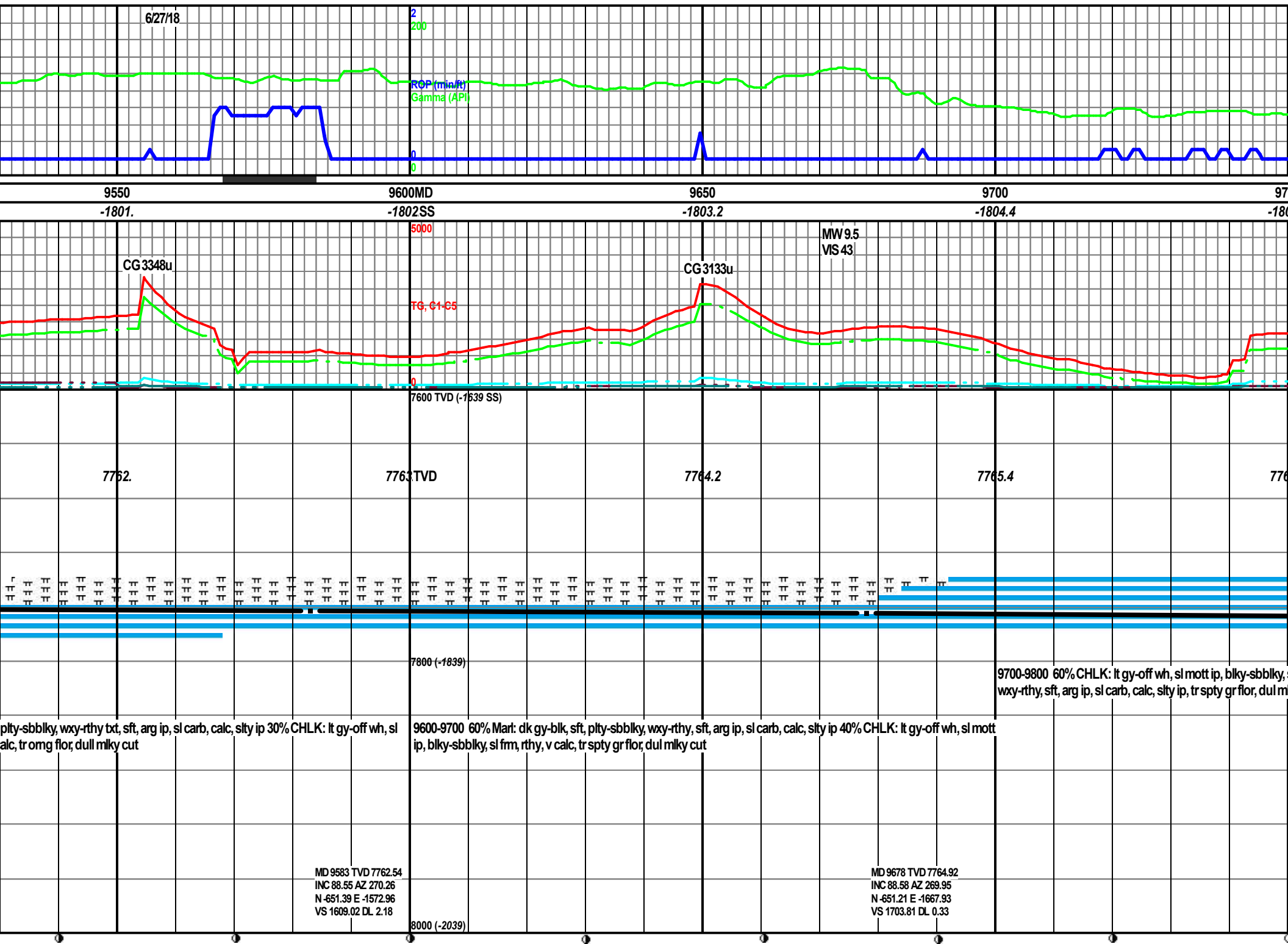




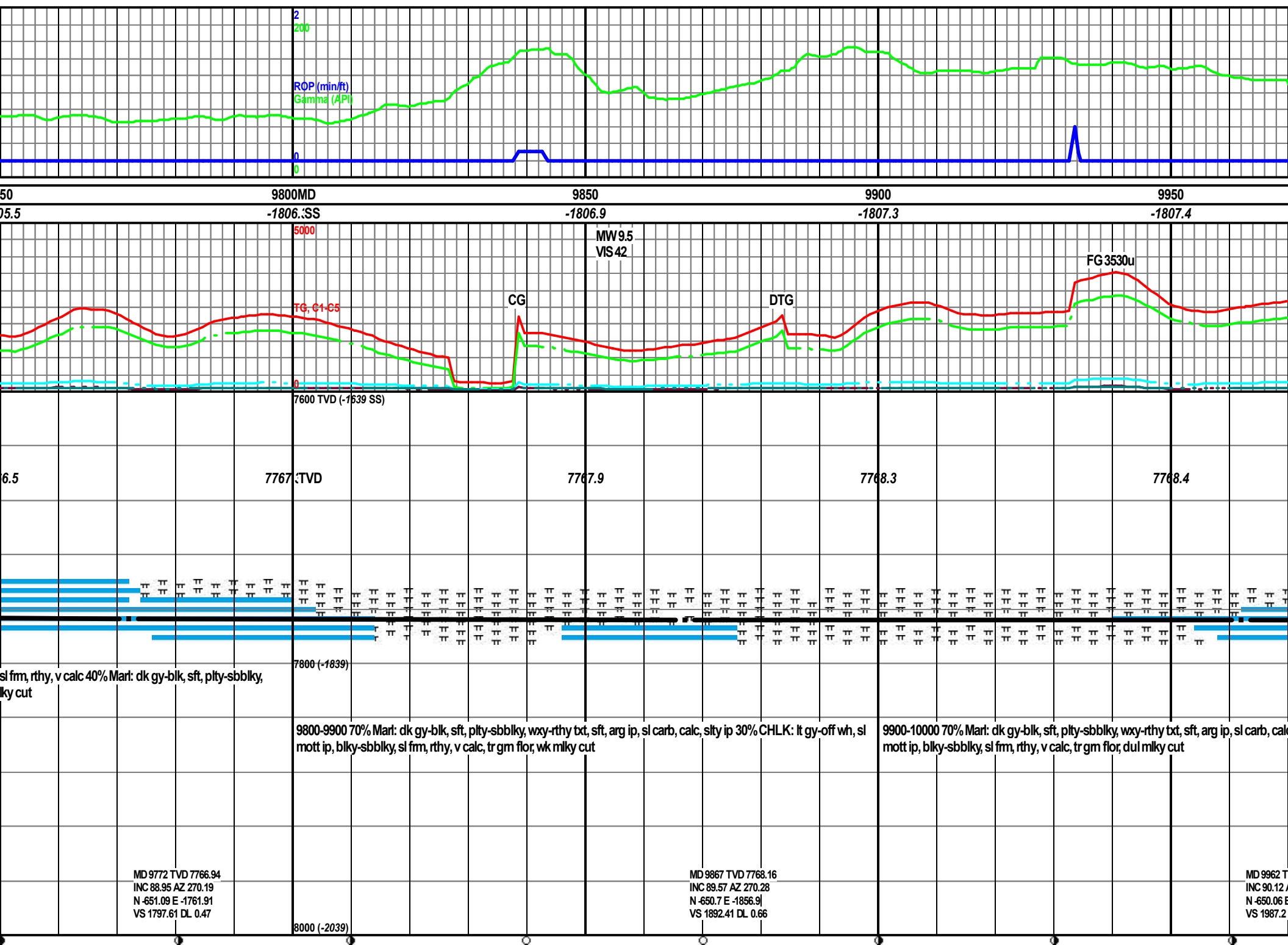




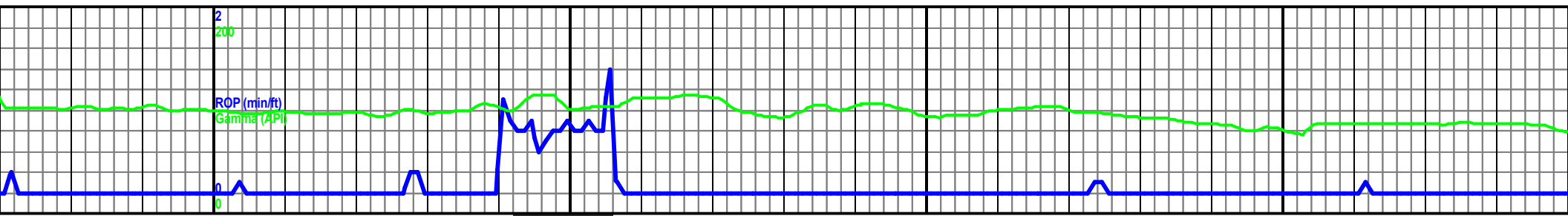










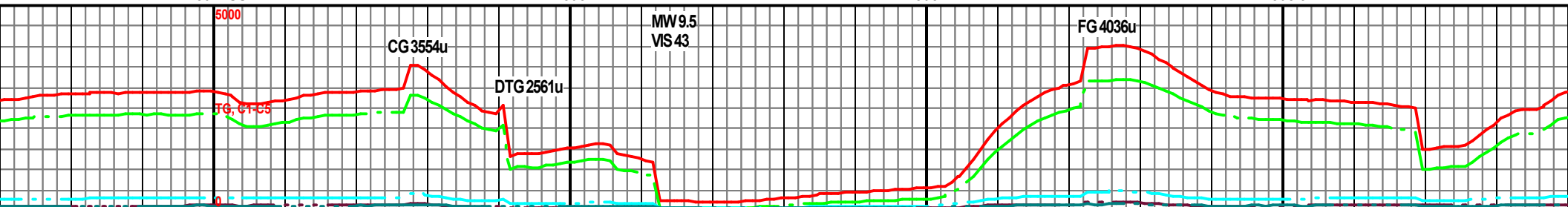


10000MD  
-1807.5SS

10050  
-1808.

10100  
-1808.4

10150  
-1808.9



7600 TVD (-1639 SS)

7768.7TVD

7769.

7769.4

7769.9



7800 (-1839)

10100-10200 60% CHLK: lt gy-off wh, sl mott ip, blkly-sbbkly, sl frm, rthy, v calc 40% Marl: dk gy-blk, sft, pty  
sft, arg ip, sl carb, calc, slty ip, fnt omg flor, dul mlky cut

c, slty ip 30% CHLK: lt gy-off wh, sl  
10000-10100 60% Marl: dk gy-blk, sft, pty-sbbkly, wxy-rthy, sft, arg ip, sl carb, calc, slty ip 40% CHLK: lt gy-off wh, sl mott  
ip, blkly-sbbkly, sl frm, rthy, v calc, fnt omg flor, dul mlky cut

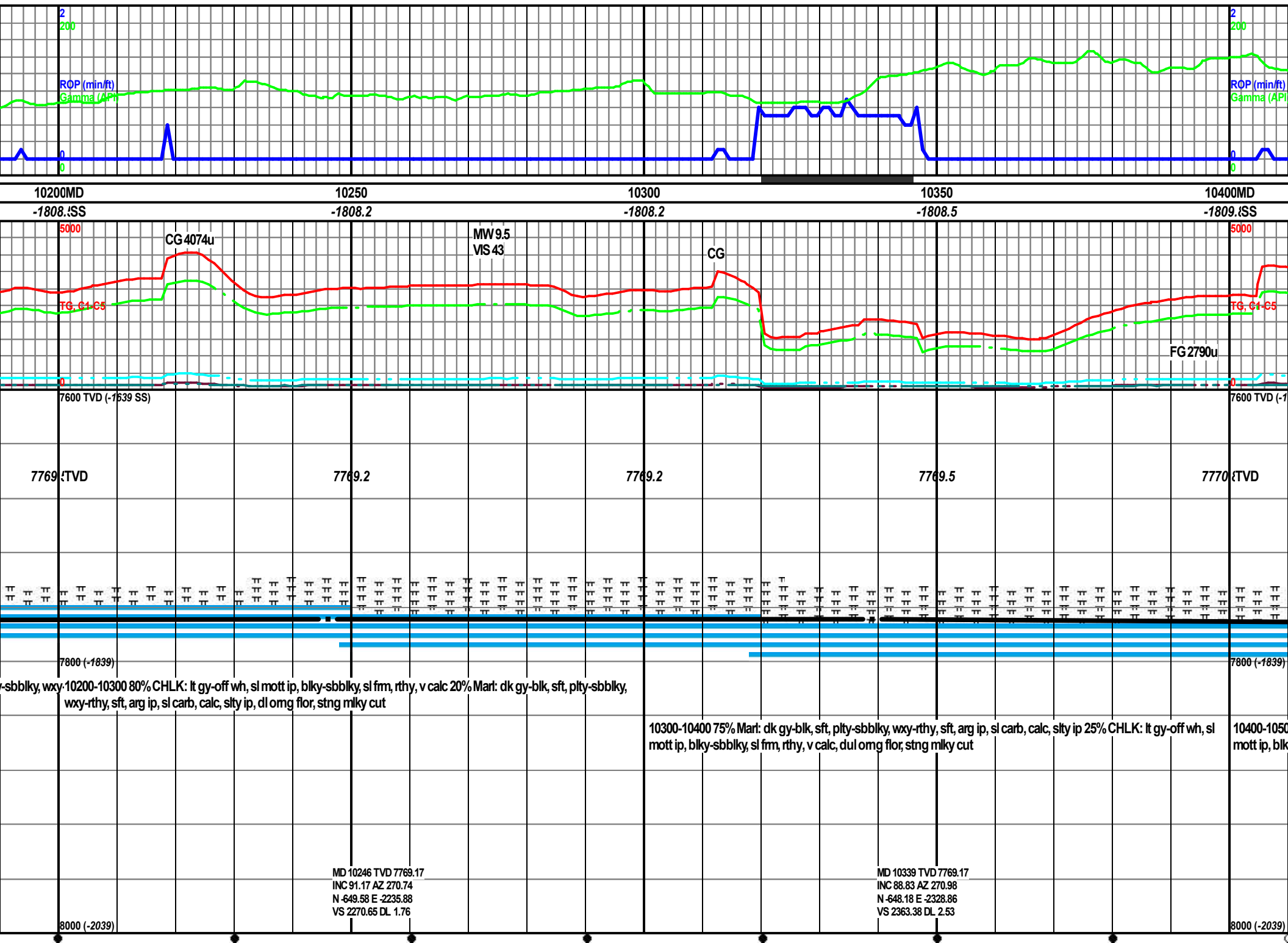
TVD 7768.42  
AZ 270.5  
E -1951.9  
DL 0.63

MD 10057 TVD 7769.03  
INC 89.14 AZ 269.82  
N -649.79 E -2046.89  
VS 2082.01 DL 1.26

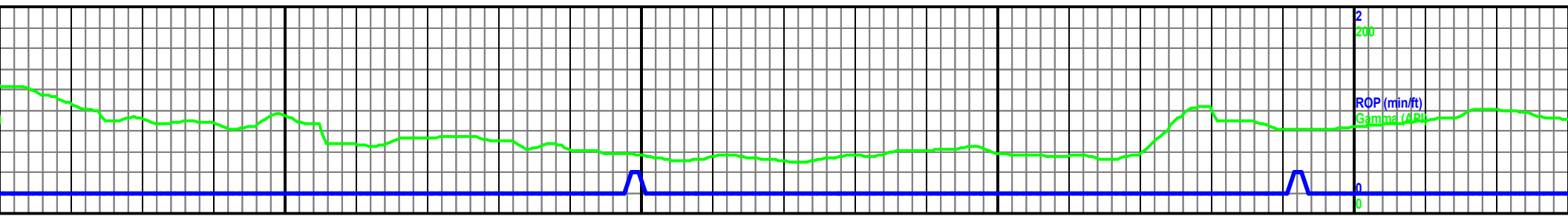
MD 10151 TVD 7769.94  
INC 89.75 AZ 269.84  
N -650.07 E -2140.89  
VS 2175.85 DL 0.66

8000 (-2039)

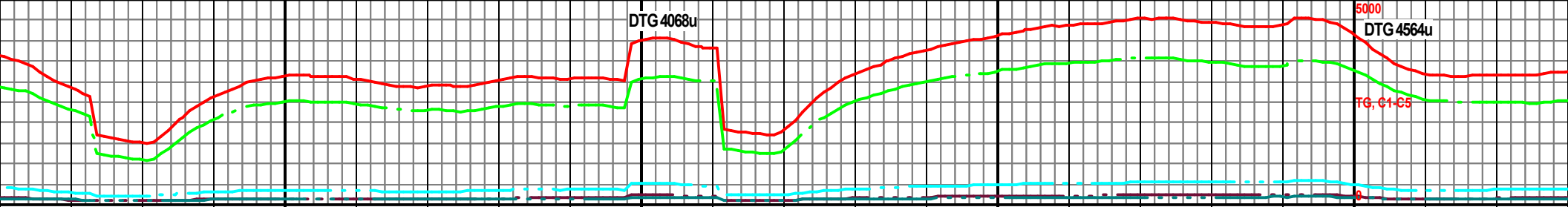




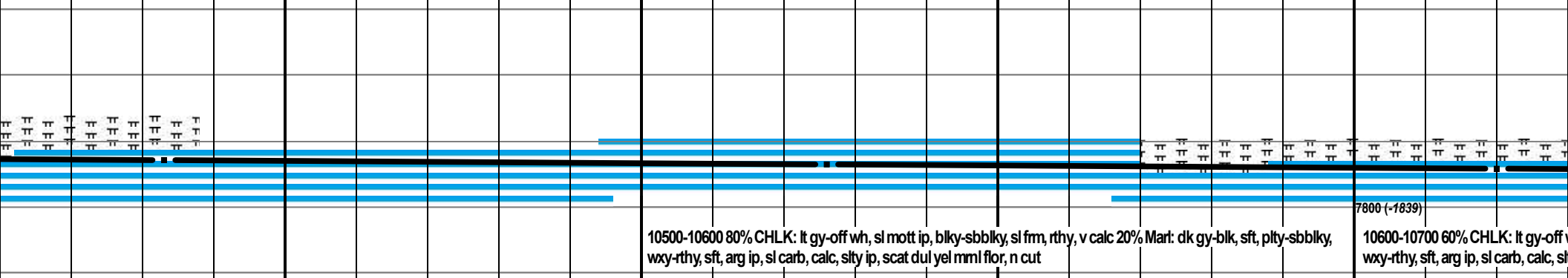




10450 -1811.1 10500 -1812.6 10550 -1814. 10600MD -1815. SS



639 SS) 7600 TVD (-1639 SS)



0 70% Marl: dk gy-blk, sft, plty-sbbkly, wxy-rthy, sft, arg ip, sl carb, calc, slty ip 30% CHLK: lt gy-off wh, sl mott ip, blk-y-sbbkly, sl frm, rthy, v calc, dul omg flr, wk mly cut

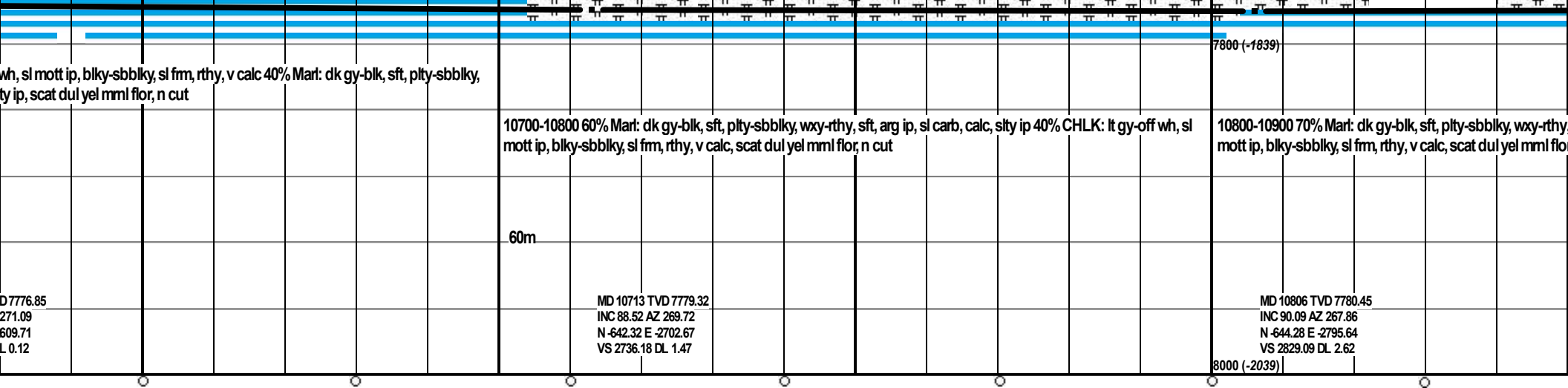
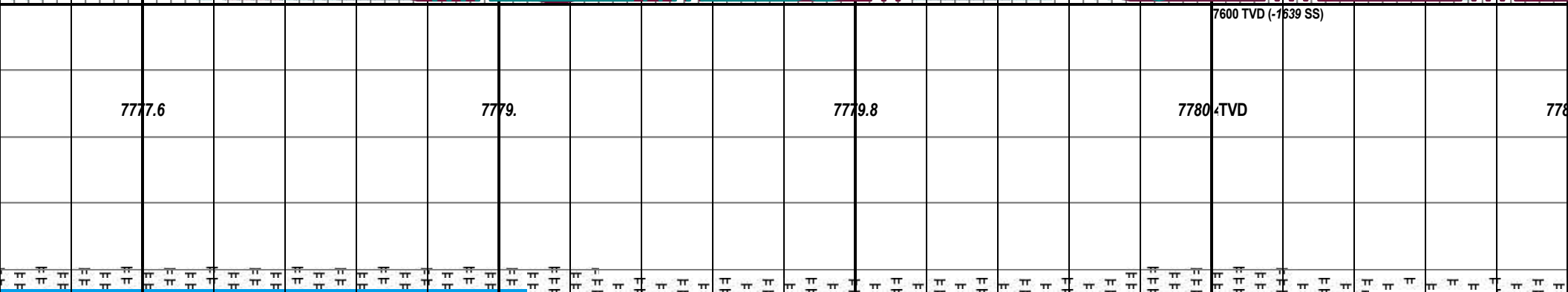
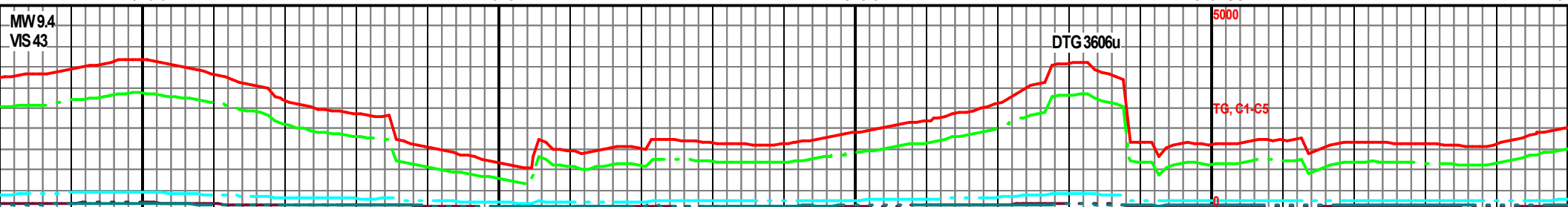
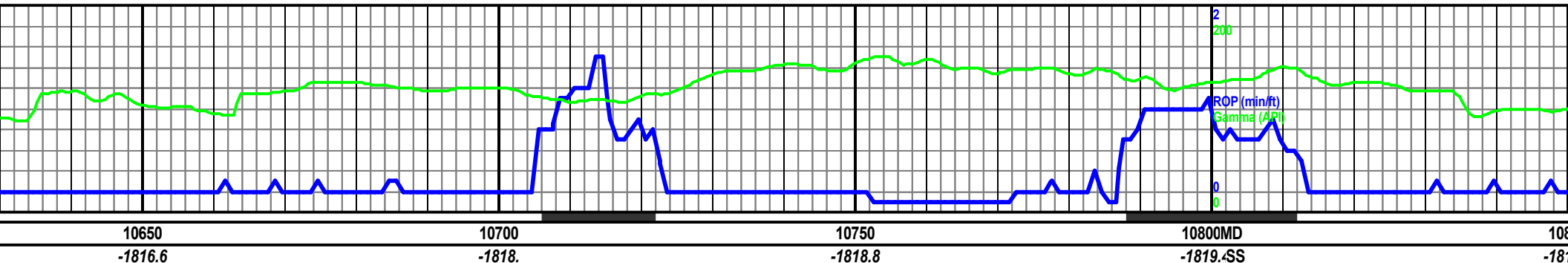
MD 10433 TVD 7771.65  
INC 88.15 AZ 271  
N -646.56 E -2422.82  
VS 2457.07 DL 0.72

MD 10526 TVD 7774.35  
INC 88.52 AZ 271.15  
N -644.81 E -2515.76  
VS 2549.75 DL 0.43

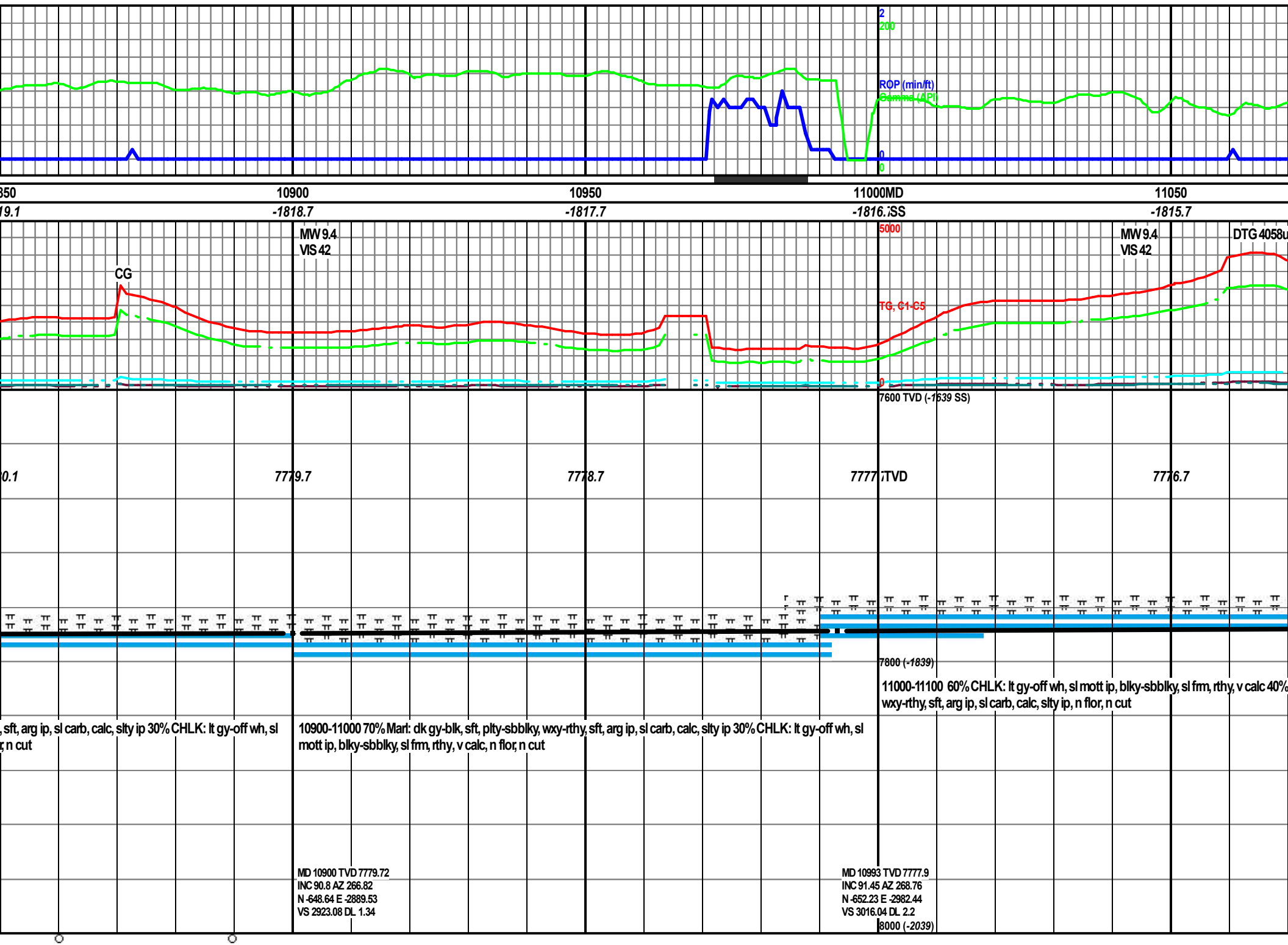
MD 10620 TVD 7776.35  
INC 88.43 AZ 271.15  
N -642.97 E -2515.76  
VS 2643.42 DL 0.43

8000 (-2039)

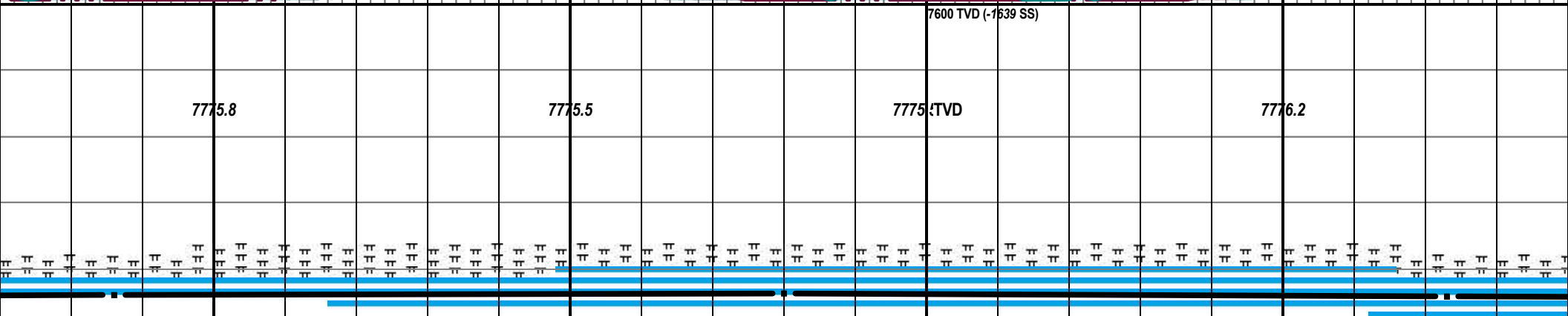
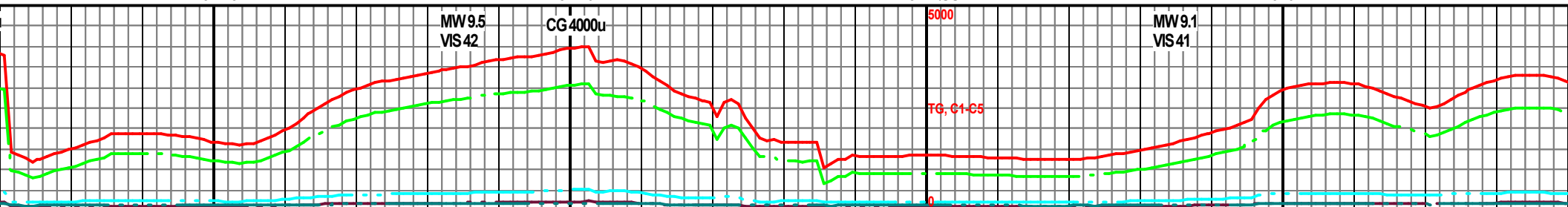
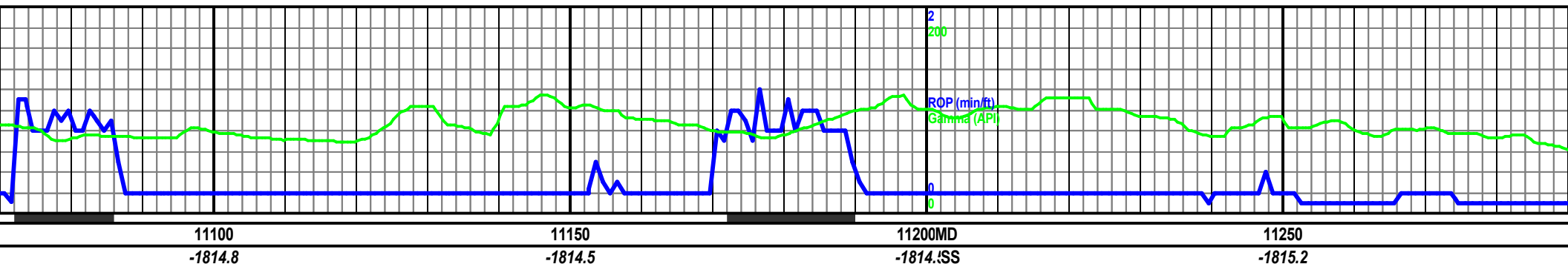












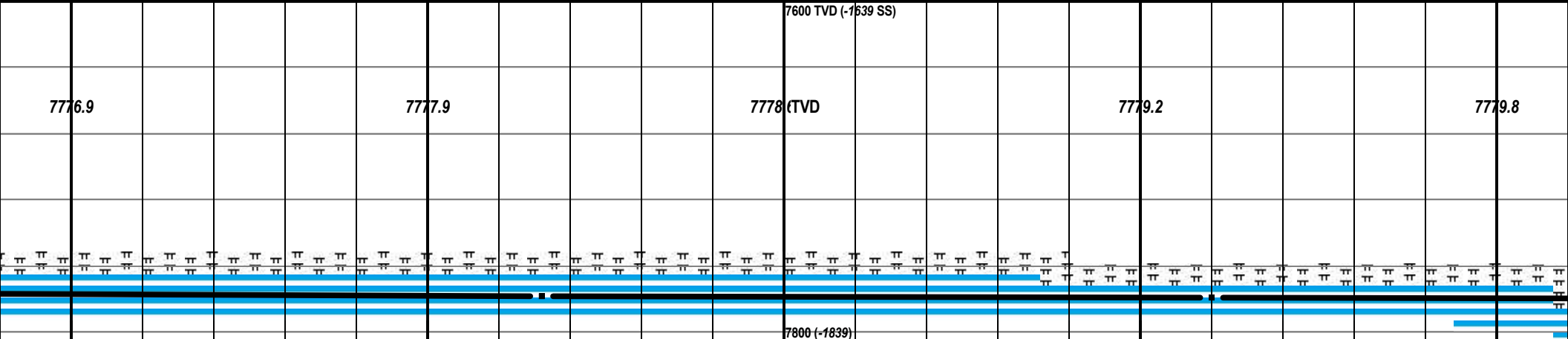
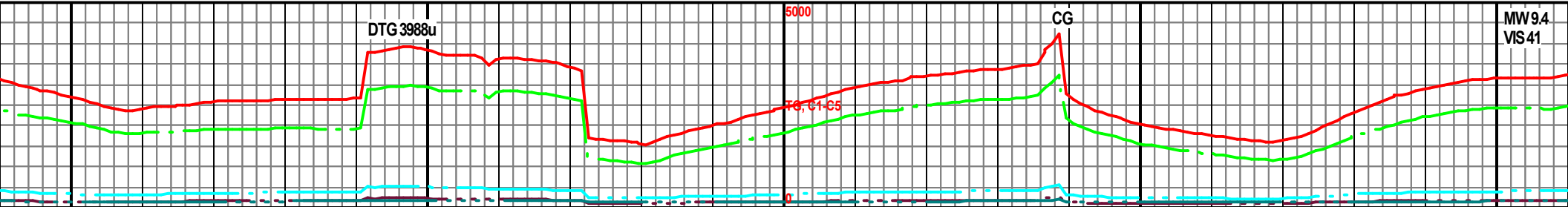
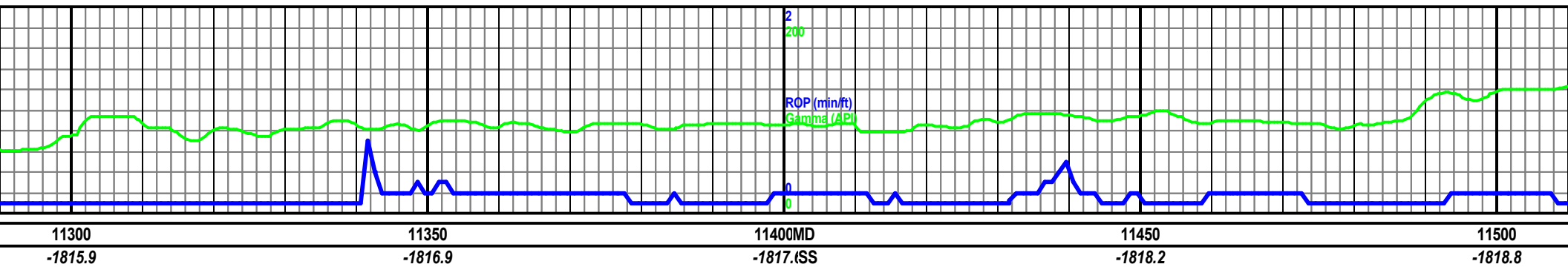
Marl: dk gy-blk, sft, pty-sbbkly, 11100-11200 75% CHLK: lt gy-off wh, sl mott ip, blkly-sbbkly, sl frm, rthy, v calc 25% Marl: dk gy-blk, sft, pty-sbbkly, wxy-rthy, sft, arg ip, sl carb, calc, slty ip, n flor, n cut

MD 11086 TVD 7775.87  
INC 91.05 AZ 270.53  
N -652.81 E -3075.41  
VS 3108.88 DL 1.95

MD 11180 TVD 7775.27  
INC 89.69 AZ 271.78  
N -650.92 E -3169.39  
VS 3202.57 DL 1.97

MD 11273 TVD 7776.45  
INC 88.86 AZ 272.16  
N -647.72 E -3262.32  
VS 3295.15 DL 0.98





11300-11400 70% CHLK: lt gy-off wh, sl mott ip, blk-y-sbbiky, sl frm, rthy, v calc 30% Marl: dk gy-blk, sft, pty-sbbiky, wxy-rthy, sft, arg ip, sl carb, calc, slty ip fnt yel mml flor, n cut

11400-11500 60% CHLK: lt gy-off wh, sl mott ip, blk-y-sbbiky, sl frm, rthy, v calc 40% Marl: dk gy-blk, sft, pty-sbbiky, wxy-rthy, sft, arg ip, sl carb, calc, slty ip fnt yel mml flor, n cut

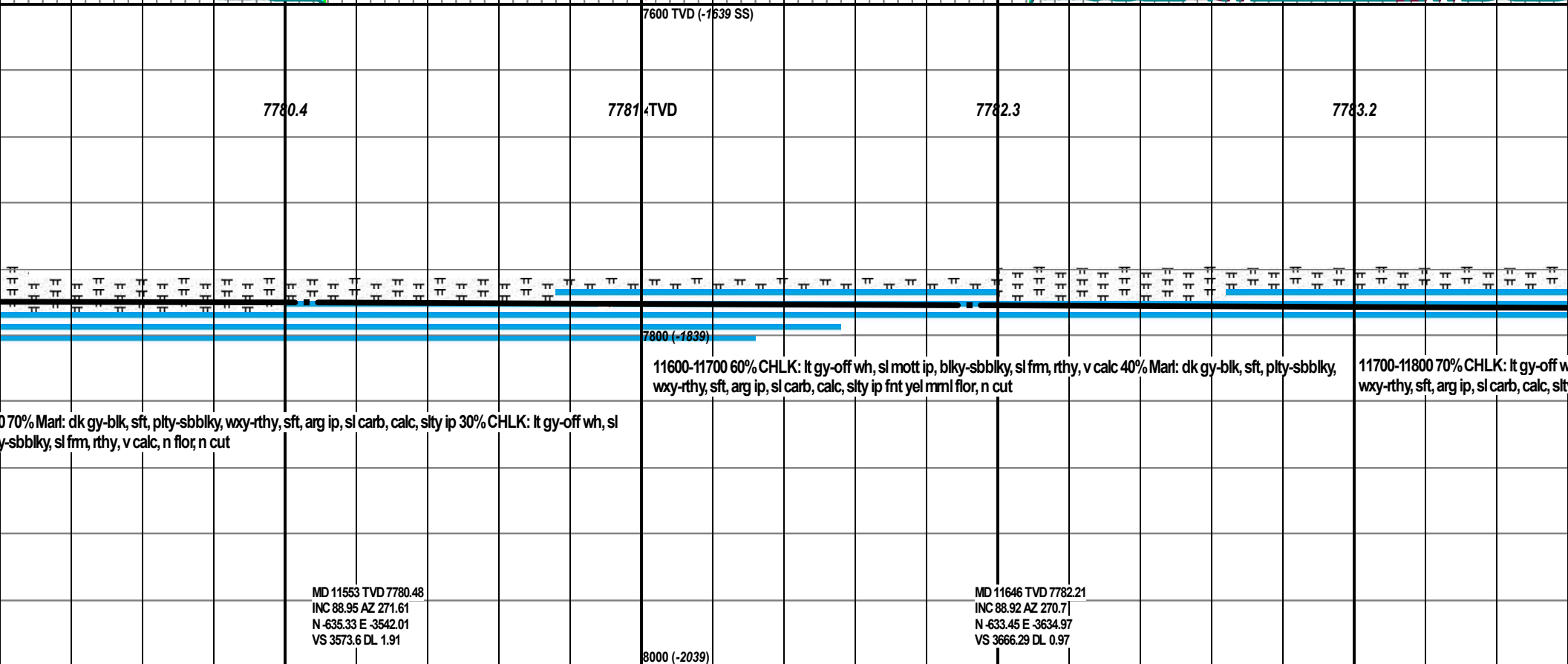
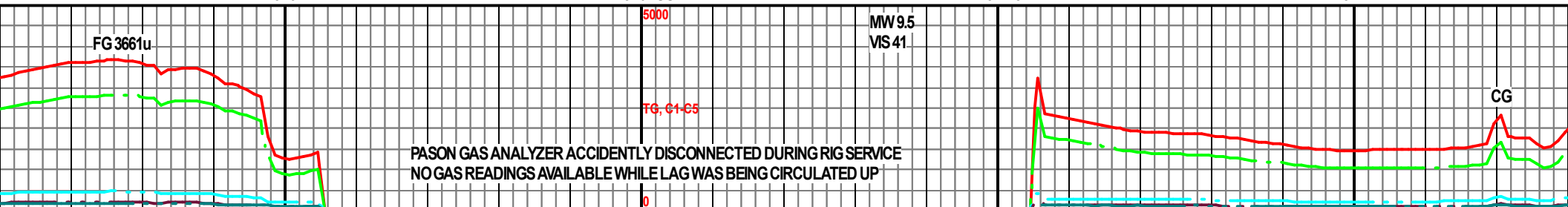
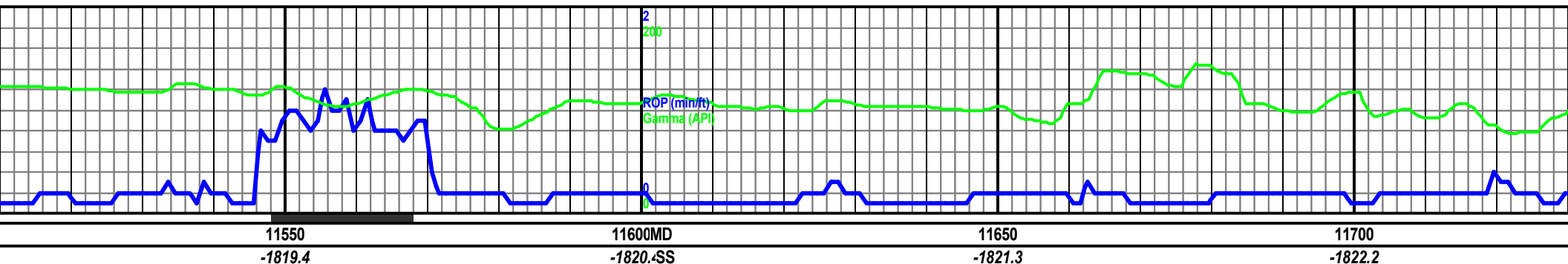
11500-11600 mott ip, blk

MD 11366 TVD 7778.15  
INC 89.05 AZ 272.45  
N -643.98 E -3355.23  
VS 3387.67 DL 0.38

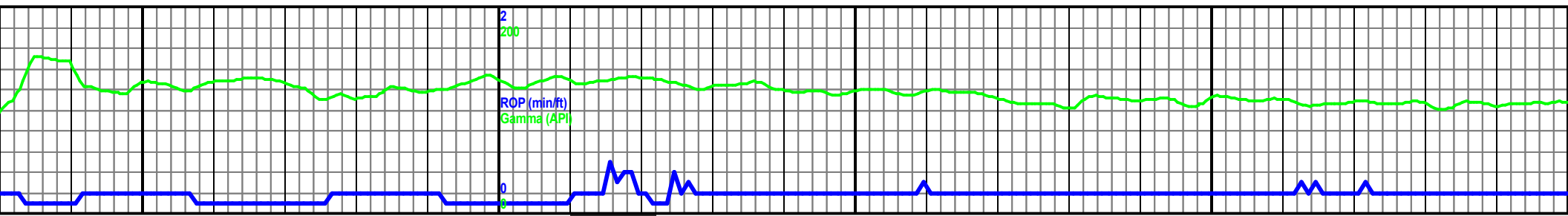
MD 11460 TVD 7779.28  
INC 89.57 AZ 273.27  
N -639.29 E -3449.11  
VS 3481.1 DL 1.04

8000 (-2039)









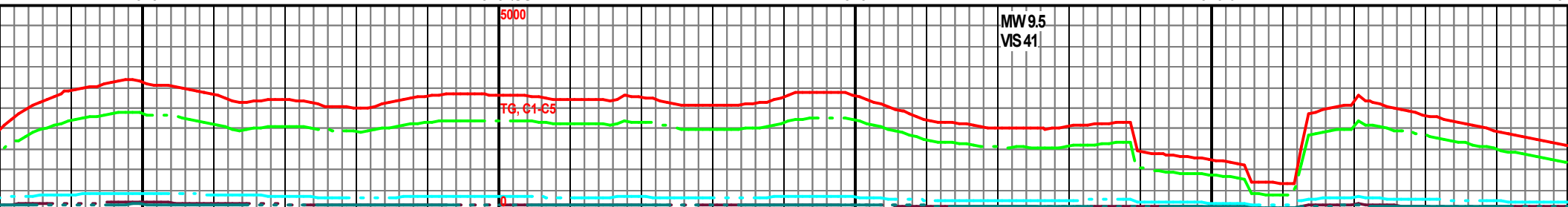
11750  
-1823.

11800MD  
-1823.5SS

11850  
-1823.7

11900  
-1823.6

11950  
-1823.5



MW9.5  
VS 41

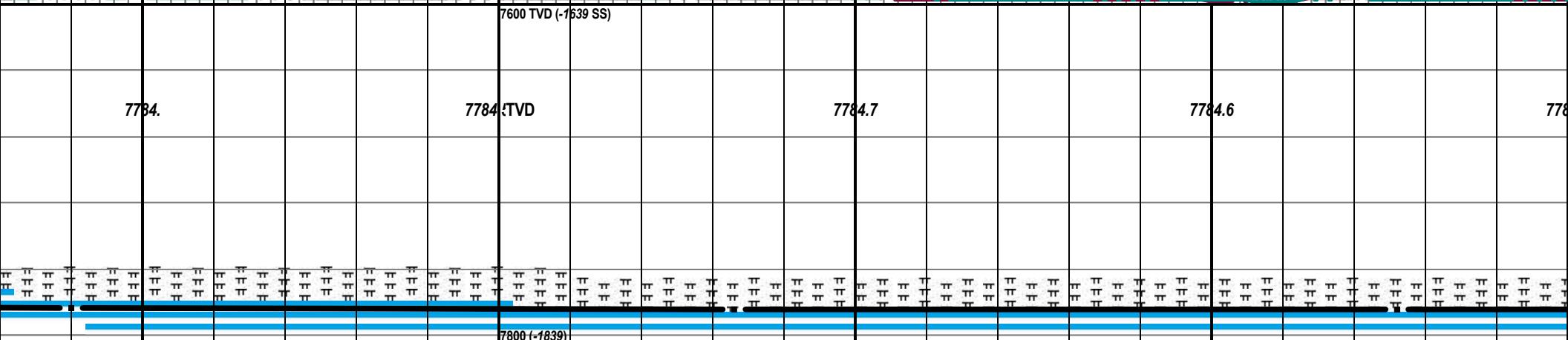
7784.

7784.5TVD

7784.7

7784.6

7784.5



wh, sl mott ip, blkly-sbbkly, sl frm, rthy, v calc 30% Marl: dk gy-blk, sft, plty-sbbkly,  
y ip frt yel mml flor, n cut

11800-11900 60% Marl: dk gy-blk, sft, plty-sbbkly, wxy-rthy, sft, arg ip, sl carb, calc, slty ip 40% CHLK: lt gy-off wh, sl  
mott ip, blkly-sbbkly, sl frm, rthy, v calc, scat dul yel mml flor, n cut

11900-12000 70% Marl: dk gy-blk, sft, plty-sbbkly, wxy-rthy,  
mott ip, blkly-sbbkly, sl frm, rthy, v calc, scat dul yel mml flor

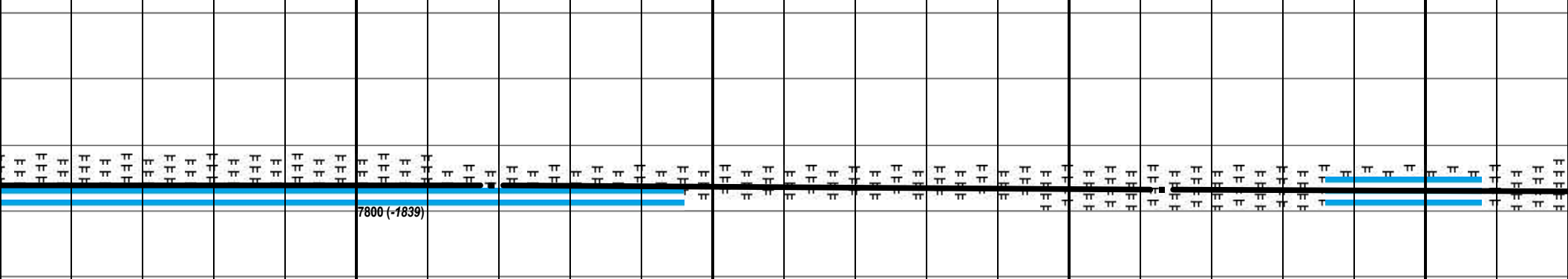
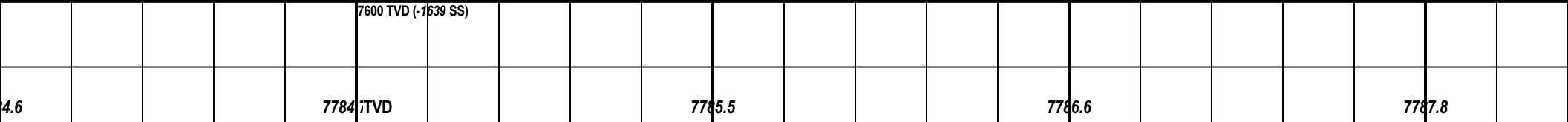
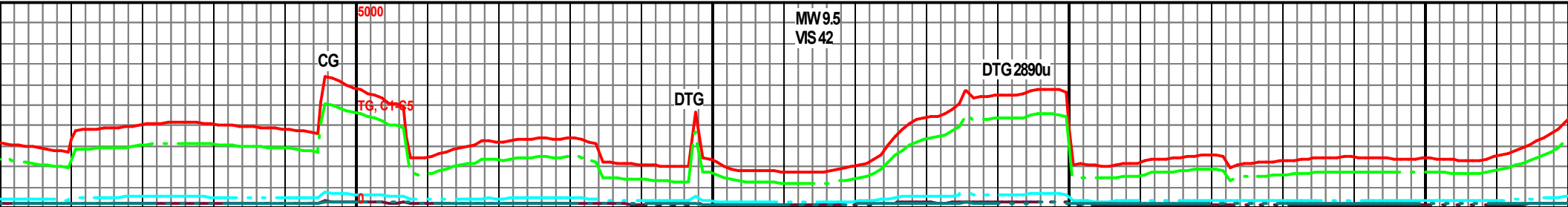
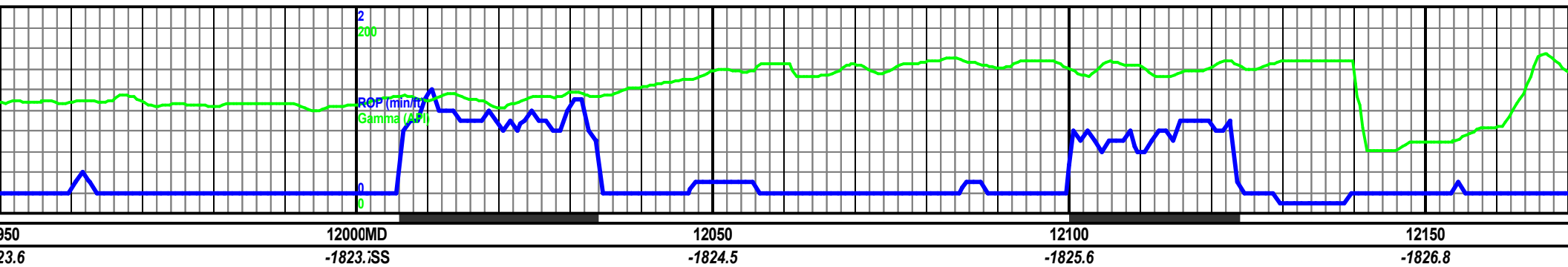
MD 11740 TVD 7783.87  
INC 89.05 AZ 270.49  
N -632.47 E -3728.95  
VS 3760.04 DL 0.26

MD 11833 TVD 7784.8  
INC 89.82 AZ 271.04  
N -631.23 E -3821.94  
VS 3852.79 DL 1.02

MD 11926 TVD 7784.5  
INC 90.55 AZ 271.68  
N -629.02 E -3914.91  
VS 3945.46 DL 1.05

8000 (-2039)





sft, arg ip, sl carb, calc, slty ip 30% CHLK: lt gy-off wh, sl  
g n cut

12000-12100 70% Mar: dk gy-blk, sft, plty-sbbkly, wxy-rthy, sft, arg ip, sl carb, calc, slty ip 30% CHLK: lt gy-off wh, sl  
mott ip, blkly-sbbkly, sl frm, rthy, v calc, spotty omg flr, mlky cut

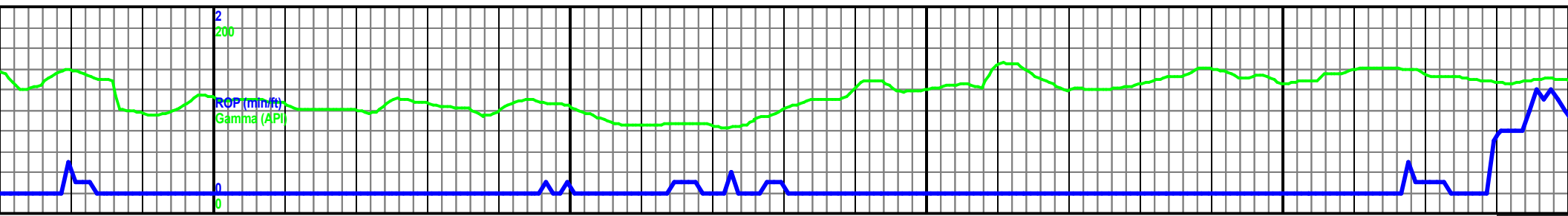
12100-12200 70% Mar: dk gy-blk, sft, plty-sbbkly, wxy-rthy, sft, arg ip, sl carb, calc, slty ip 30% CHLK: lt gy-off wh, sl  
mott ip, blkly-sbbkly, sl frm, rthy, v calc, spotty omg flr, mlky cut

MD 12019 TVD 7784.77  
INC 89.11 AZ 271.94  
N -626.08 E -4007.86  
VS 4038.07 DL 1.58

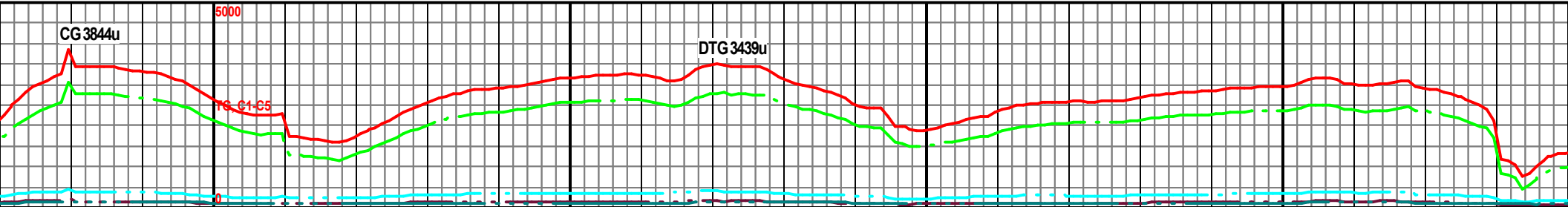
MD 12113 TVD 7786.89  
INC 88.31 AZ 269.09  
N -625.23 E -4101.82  
VS 4131.82 DL 3.16

8000 (-2039)





12200MD -1827.1SS 12250 -1828.7 12300 -1829.4 12350 -1829.8



7600 TVD (-1639 SS)

7788.1TVD

7789.7

7790.4

7790.8



sity ip 30% CHLK: lt gy-off wh, sl

12200-12300 60% Marl: dk gy-blk, sft, plty-sbbly, wxy-rthy, sft, arg ip, sl carb, calc, sity ip 40% CHLK: lt gy-off wh, sl mott ip, blk-sbbly, sl frm, rthy, v calc, n flor, n cut

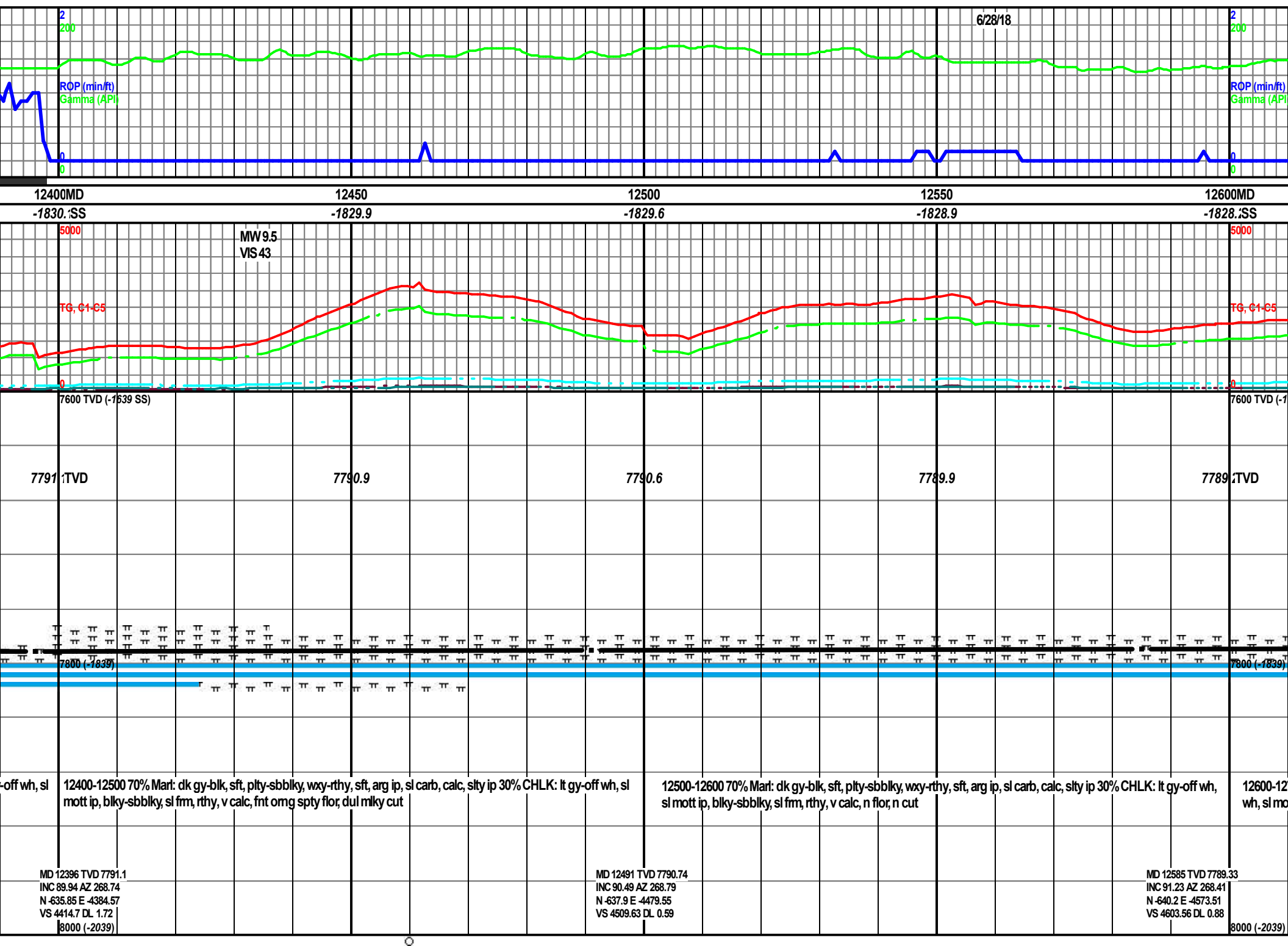
12300-12400 70% Marl: dk gy-blk, sft, plty-sbbly, wxy-rthy, sft, arg ip, sl carb, calc, sity ip 30% CHLK: lt gy mott ip, blk-sbbly, sl frm, rthy, v calc, fnt omg spty flor, dul mlky cut

MD 12206 TVD 7789.06  
INC 89.02 AZ 267.4  
N -628.08 E -4194.75  
VS 4224.75 DL 1.97

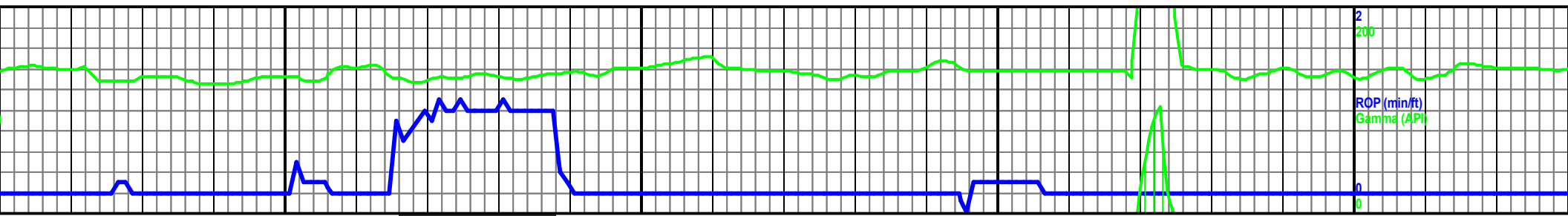
MD 12301 TVD 7790.46  
INC 89.29 AZ 267.24  
N -632.53 E -4289.64  
VS 4319.73 DL 0.33

8000 (-2039)

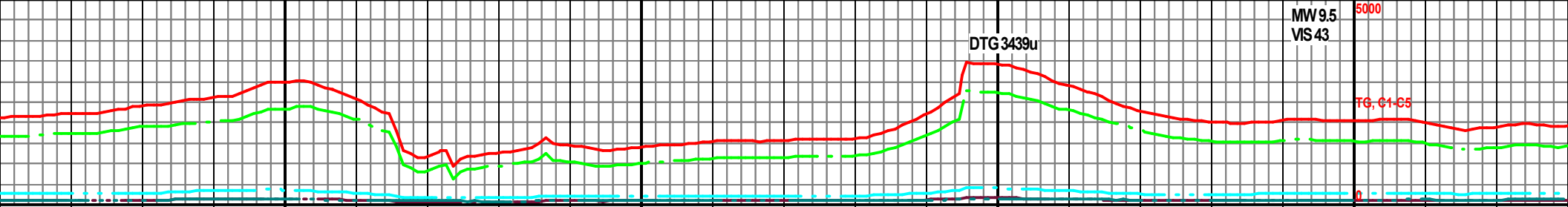






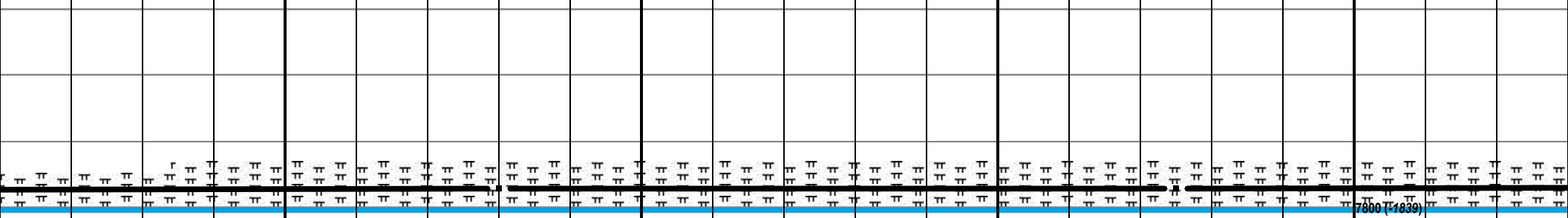


12650	12700	12750	12800MD
-1827.7	-1827.4	-1827.5	-1827.5SS



639 SS) 7600 TVD (-1639 SS)

7788.7	7788.4	7788.5	7788.5TVD
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700 70% Marl: dk gy-blk, sft, plty-sbbiky, wxy-rthy, sft, arg ip, sl carb, calc, slty ip 30% CHLK: lt gy-off  
tt ip, blkly-sbbiky, sl frm, rthy, v calc, n flor, n cut

12700-12800 70% Marl: dk gy-blk, sft, plty-sbbiky, wxy-rthy, sft, arg ip, sl carb, calc, slty ip 30% CHLK: lt gy-off wh,  
sl mott ip, blkly-sbbiky, sl frm, rthy, v calc, n flor, n cut

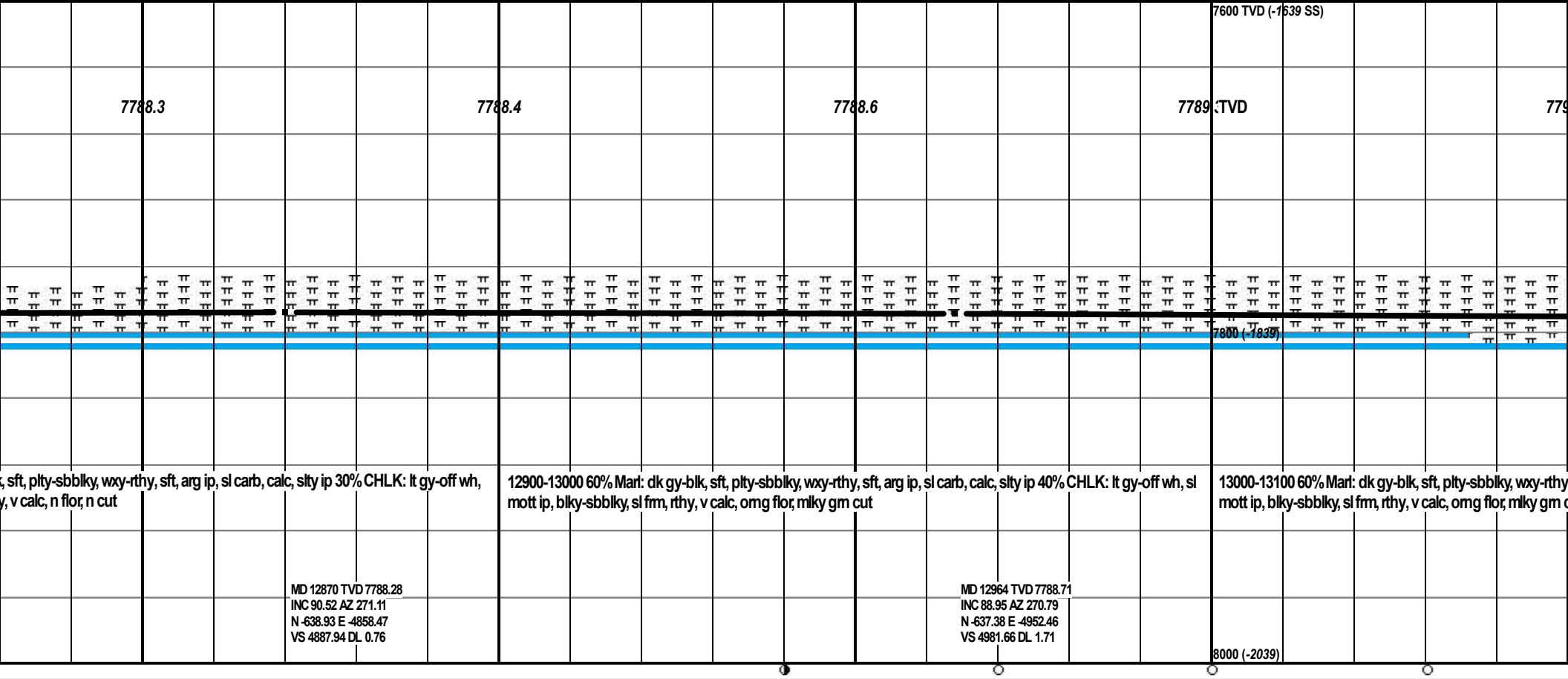
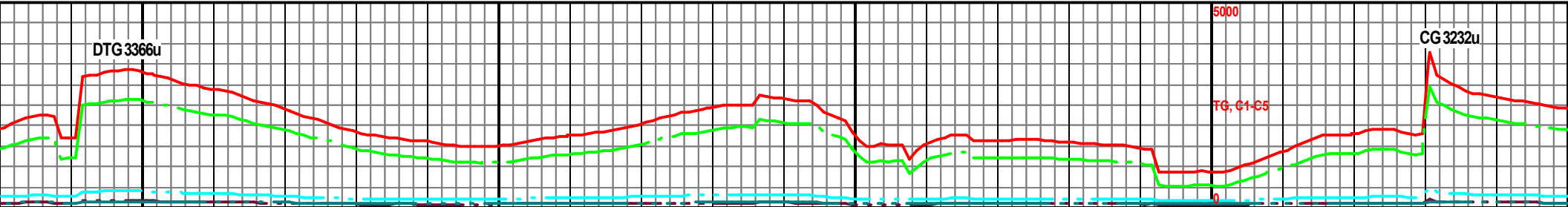
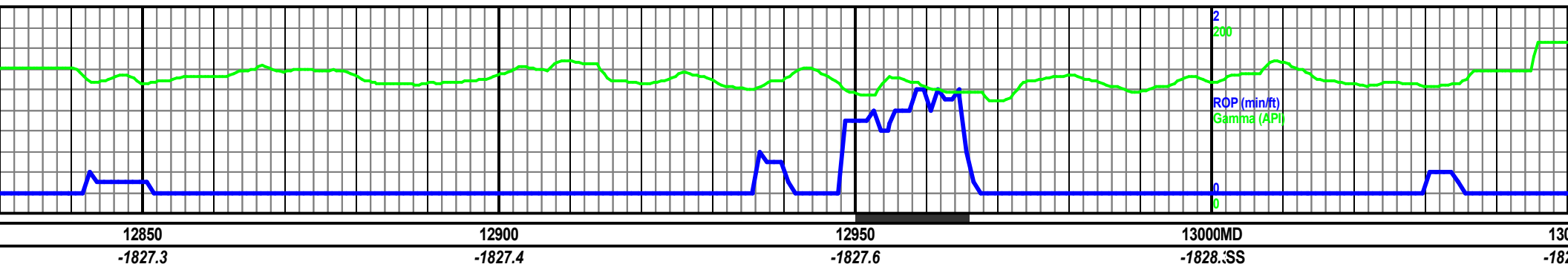
12800-12900 70% Marl: dk gy-blk,  
sl mott ip, blkly-sbbiky, sl frm, rthy

MD 12680 TVD 7788.39  
INC 89.91 AZ 270.16  
N-641.39 E-4668.49  
VS 4698.44 DL 2.31

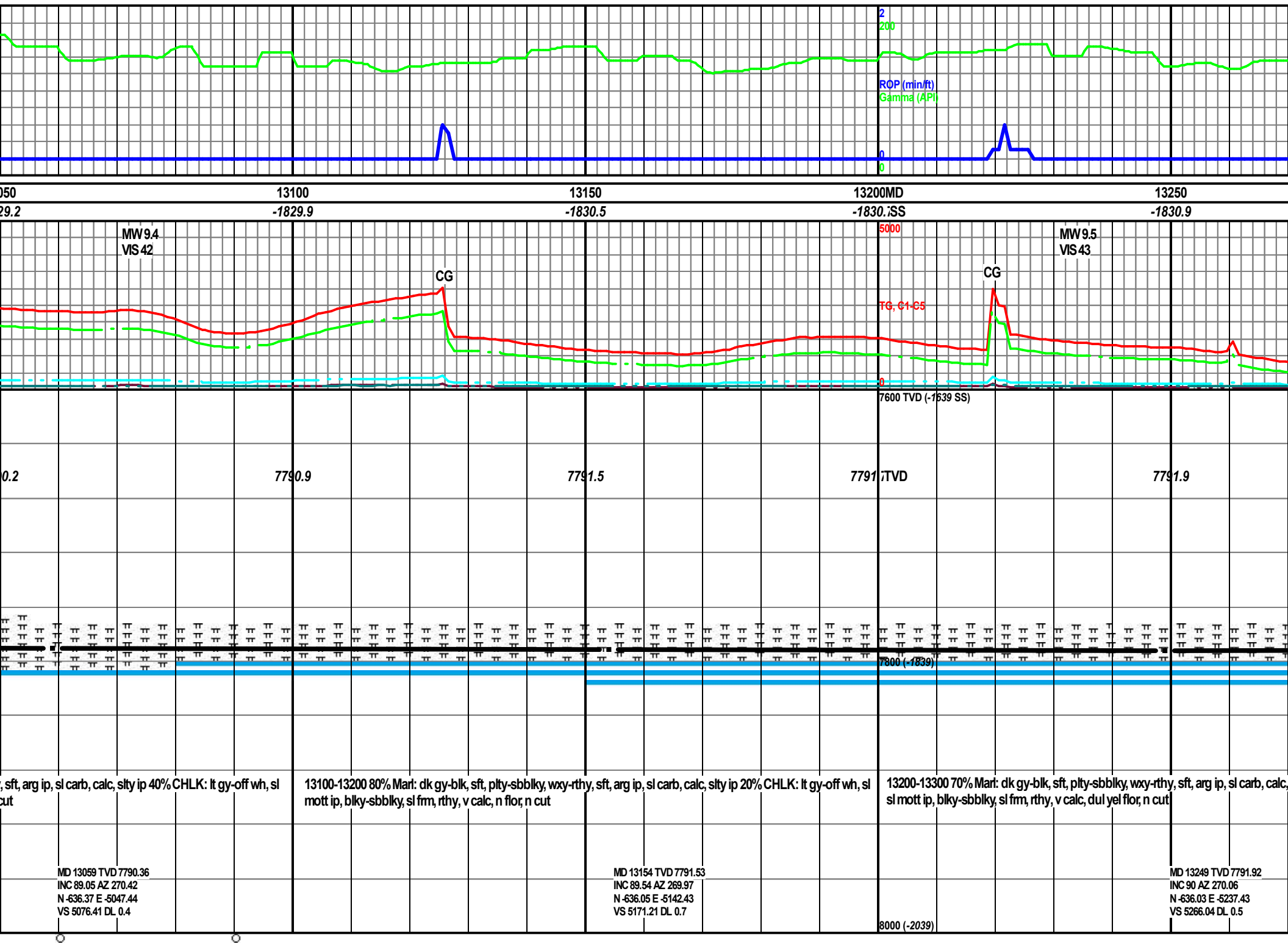
MD 12775 TVD 7788.59  
INC 89.85 AZ 270.85  
N-640.56 E-4763.49  
VS 4793.22 DL 0.73

8000 (-2039)

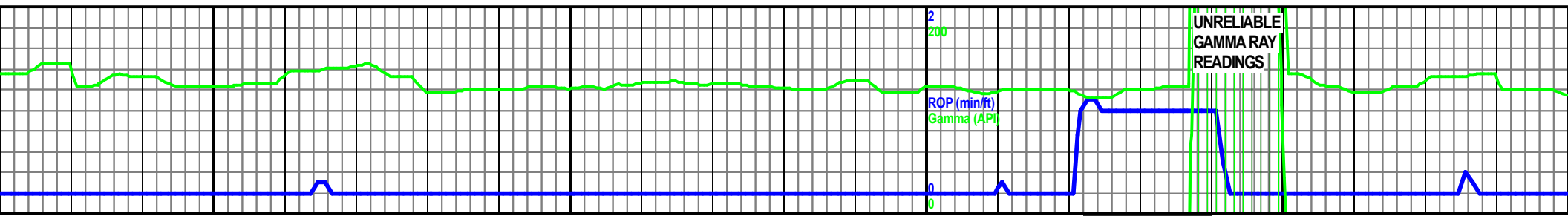










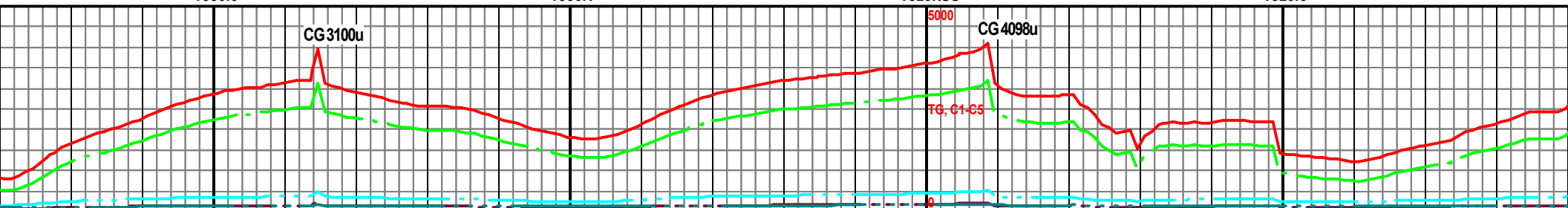


13300  
-1830.5

13350  
-1830.1

13400MD  
-1829.1SS

13450  
-1829.5

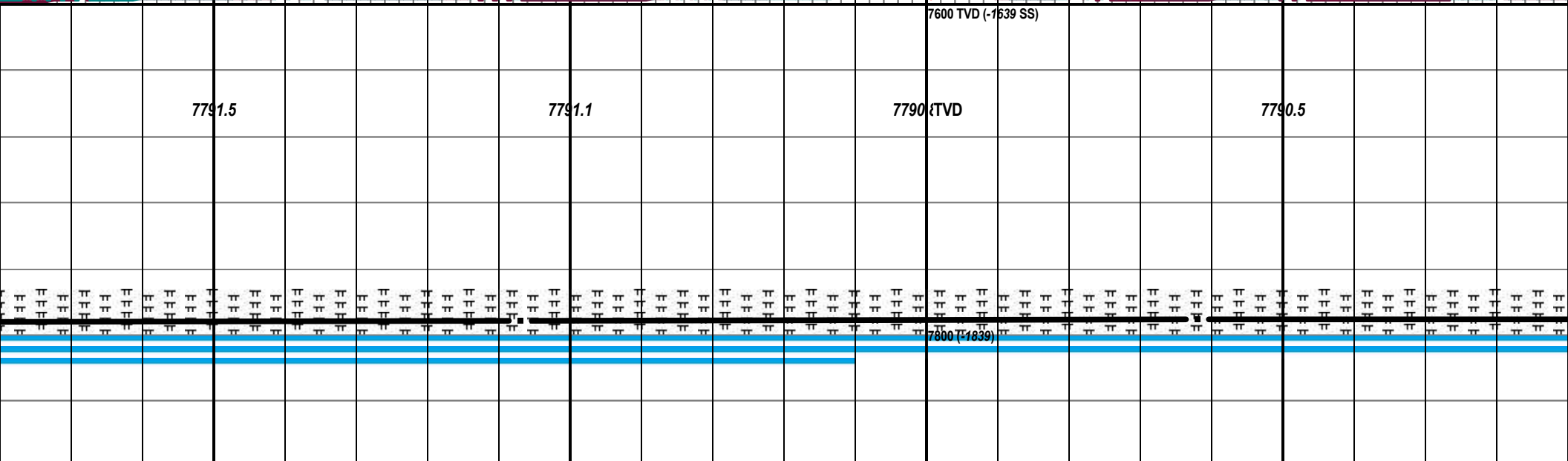


7791.5

7791.1

7790.1TVD

7790.5



sity ip 30% CHLK: lt gy-off wh,

13300-13400 70% Marl: dk gy-blk, sft, plty-sbblky, wxy-rthy, sft, arg ip, sl carb, calc, sity ip 30% CHLK: lt gy-off wh, sl mott ip, blk-sbblky, sl fm, rthy, v calc, fnt yel dul flor, fr slow mlky cut

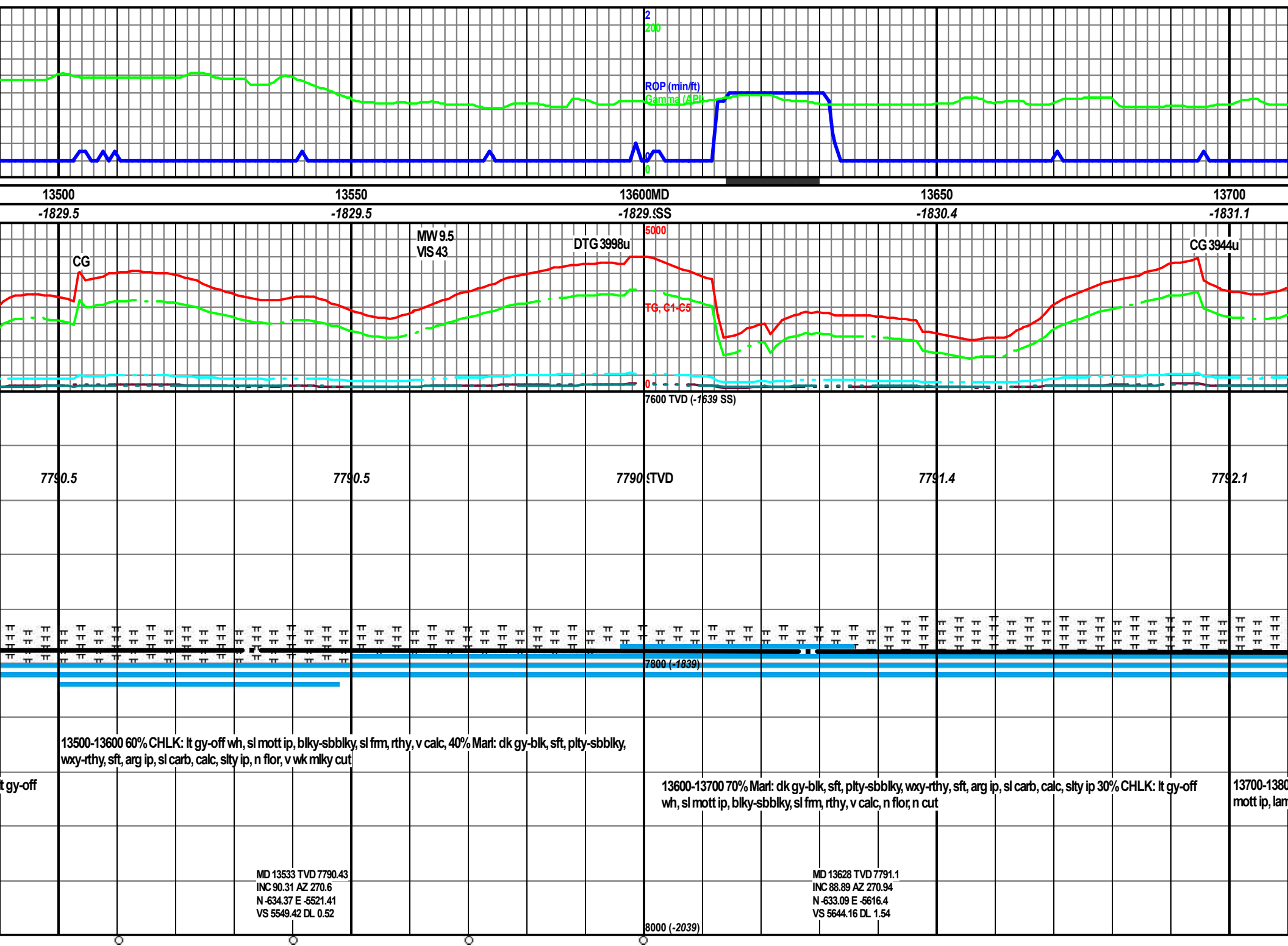
13400-13500 80% Marl: dk gy-blk, sft, plty-sbblky, wxy-rthy, sft, arg ip, sl carb, calc, sity ip 20% CHLK: wh, sl mott ip, blk-sbblky, sl fm, rthy, v calc, n flor, n cut

MD 13343 TVD 7791.16  
INC 90.92 AZ 270.16  
N -635.86 E -5331.42  
VS 5359.86 DL 0.99

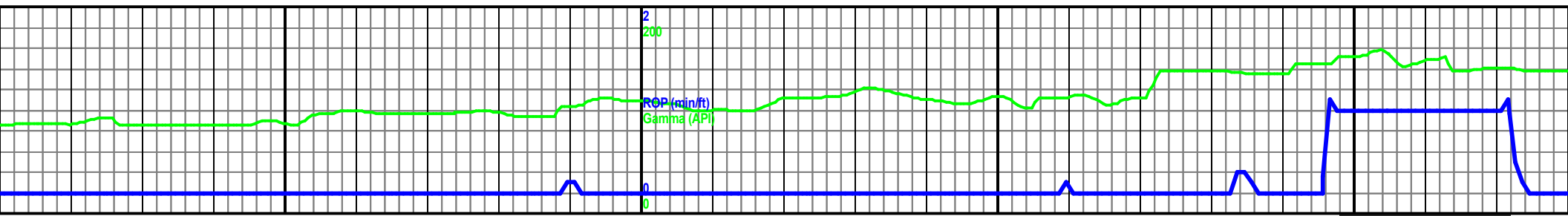
MD 13438 TVD 7790.54  
INC 89.82 AZ 270.52  
N -635.3 E -5426.42  
VS 5454.65 DL 1.22

8000 (-2039)







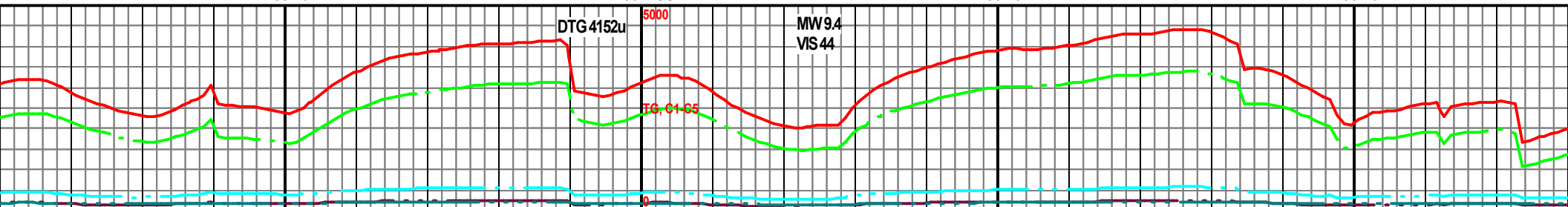


13750  
-1831.5

13800MD  
-1831.5SS

13850  
-1831.5

13900  
-1831.6



7600 TVD (-1839 SS)

7792.5

7792.4TVD

7792.5

7792.6



0 60% Mar: dk gy-blk, sft, plty-sbbiky, wxy-rthy, sft, arg ip, sl carb, calc, slty ip 40% CHLK: lt gy-off wh, sl  
n, blk-sbbiky, sl frm, rthy, v calc, tr pl yel flor, slow yel milky cut

13800-13900 60% Mar: dk gy-blk, sft, plty-sbbiky, wxy-rthy, sft, arg ip, sl carb, calc, slty ip 40% CHLK: lt gy-off wh, sl  
mott ip, blk-sbbiky, sl frm, rthy, v calc, tr spty br yel mnrl flor, n cut

13900-14000 70% Mar: dk gy-blk, sft, plty-sbbiky, wxy-rthy, sft, arg ip, sl carb, calc, slty ip 40% CHLK: lt gy-off wh, sl  
mott ip, blk-sbbiky, sl frm, rthy, v calc, tr spty br yel mnrl flor, n cut

MD 13723 TVD 7792.47  
INC 89.45 AZ 271.39  
N -631.16 E -5711.37  
VS 5738.85 DL 0.75

MD 13818 TVD 7792.42  
INC 90.62 AZ 271.65  
N -628.64 E -5806.33  
VS 5833.5 DL 1.27

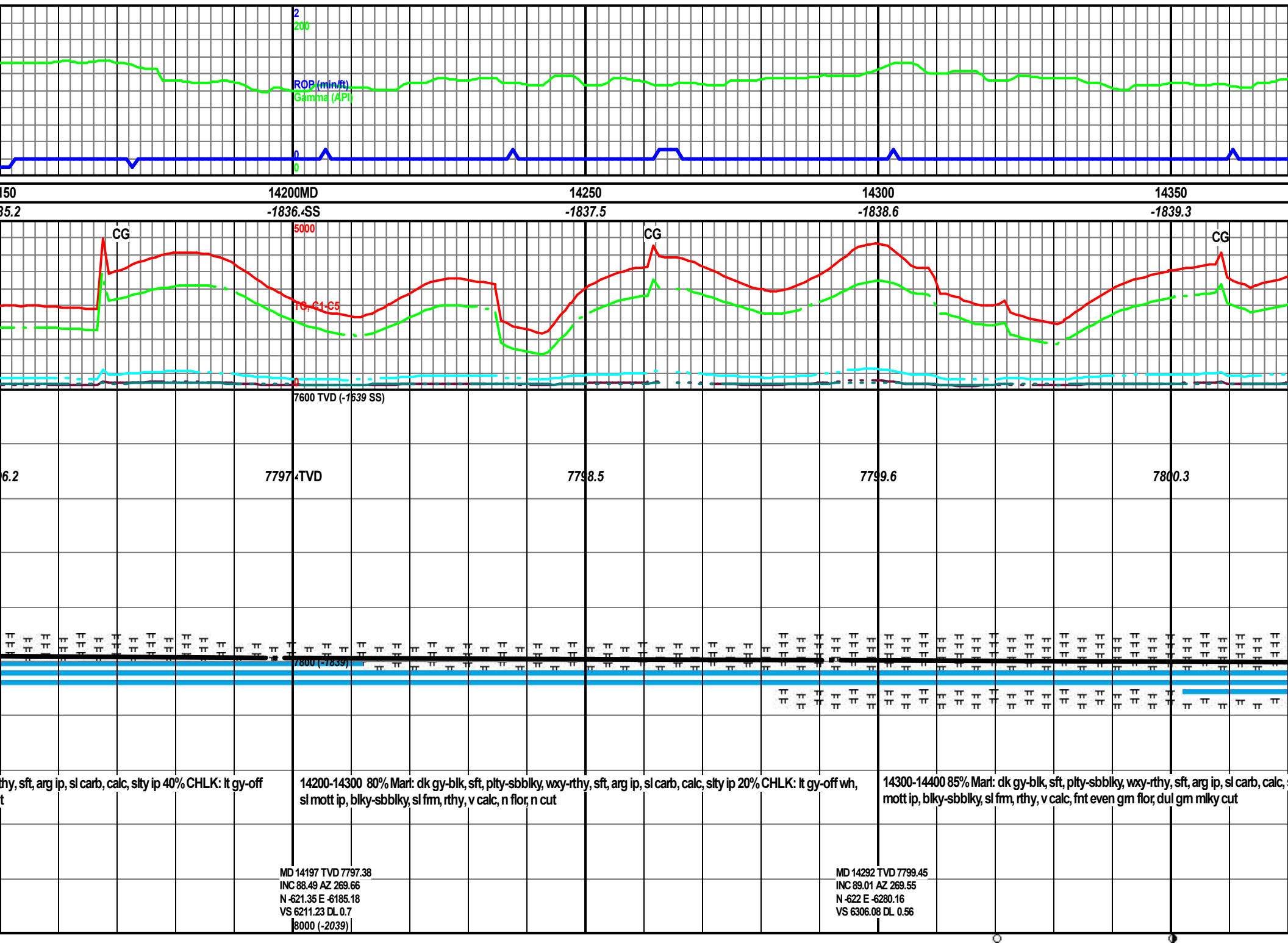
MD 13913 TVD 7792.59  
INC 89.17 AZ 271.68  
N -625.88 E -5901.29  
VS 5928.12 DL 1.53

8000 (-2039)

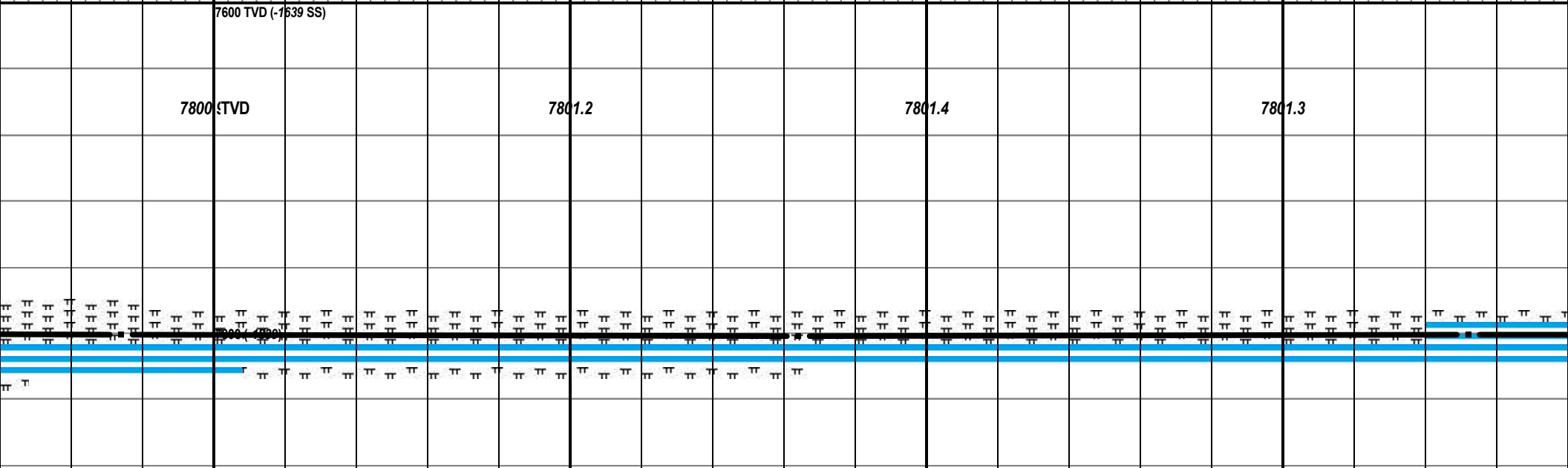
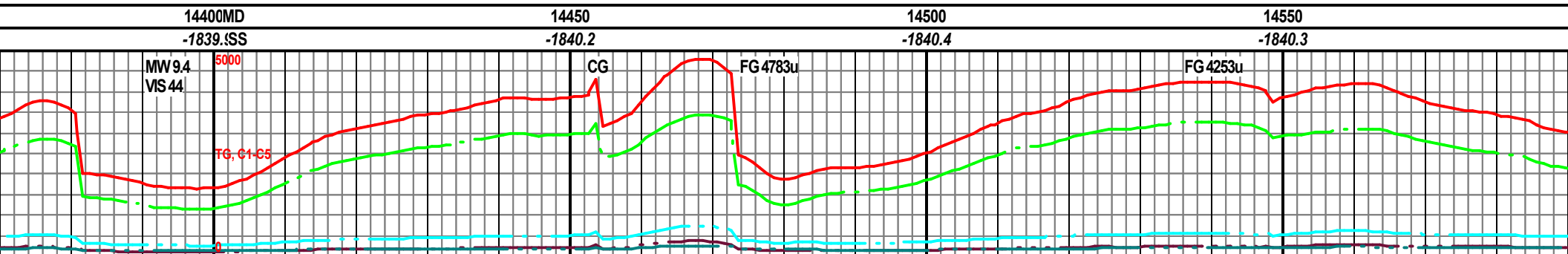
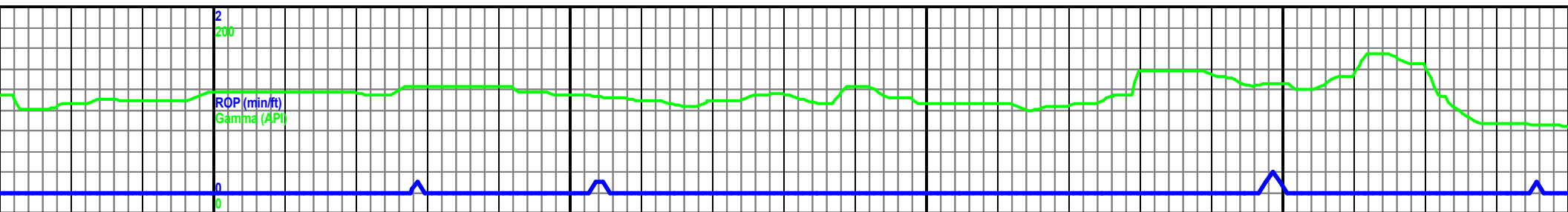












silty ip 15% CHLK: lt gy-off wh, sl  
14400-14500 80% Marl: dk gy-blk, sft, pty-sbbiky, wxy-rthy, sft, arg ip, sl carb, calc, silty ip 20% CHLK: lt gy-off wh, sl  
mott ip, biky-sbbiky, sl frm, rthy, v calc, fnt even gm flor, dul gm milky cut  
14500-14600 80% Marl: dk gy-blk, sft, pty-sbbiky, wxy-rthy, sft, arg ip, sl carb, calc, silty ip 20% CHLK: lt gy-off wh, sl  
mott ip, biky-sbbiky, sl frm, rthy, v calc, fnt even gm flor, dul gm milky cut

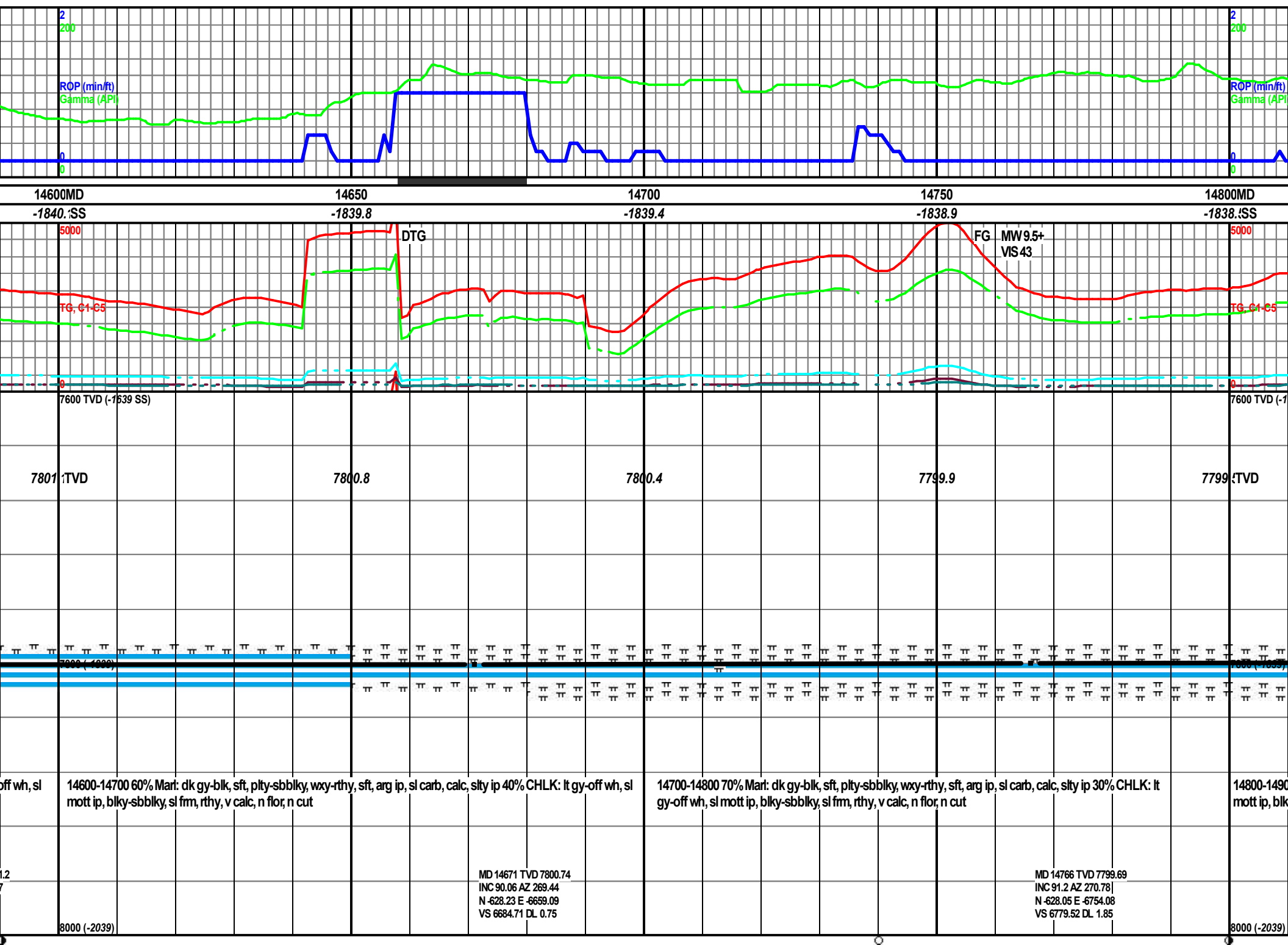
MD 14387 TVD 7800.78  
INC 89.38 AZ 269.08  
N -623.14 E -6375.14  
VS 6400.96 DL 0.63

MD 14482 TVD 7801.45  
INC 89.82 AZ 268.79  
N -624.9 E -6470.12  
VS 6495.88 DL 0.55

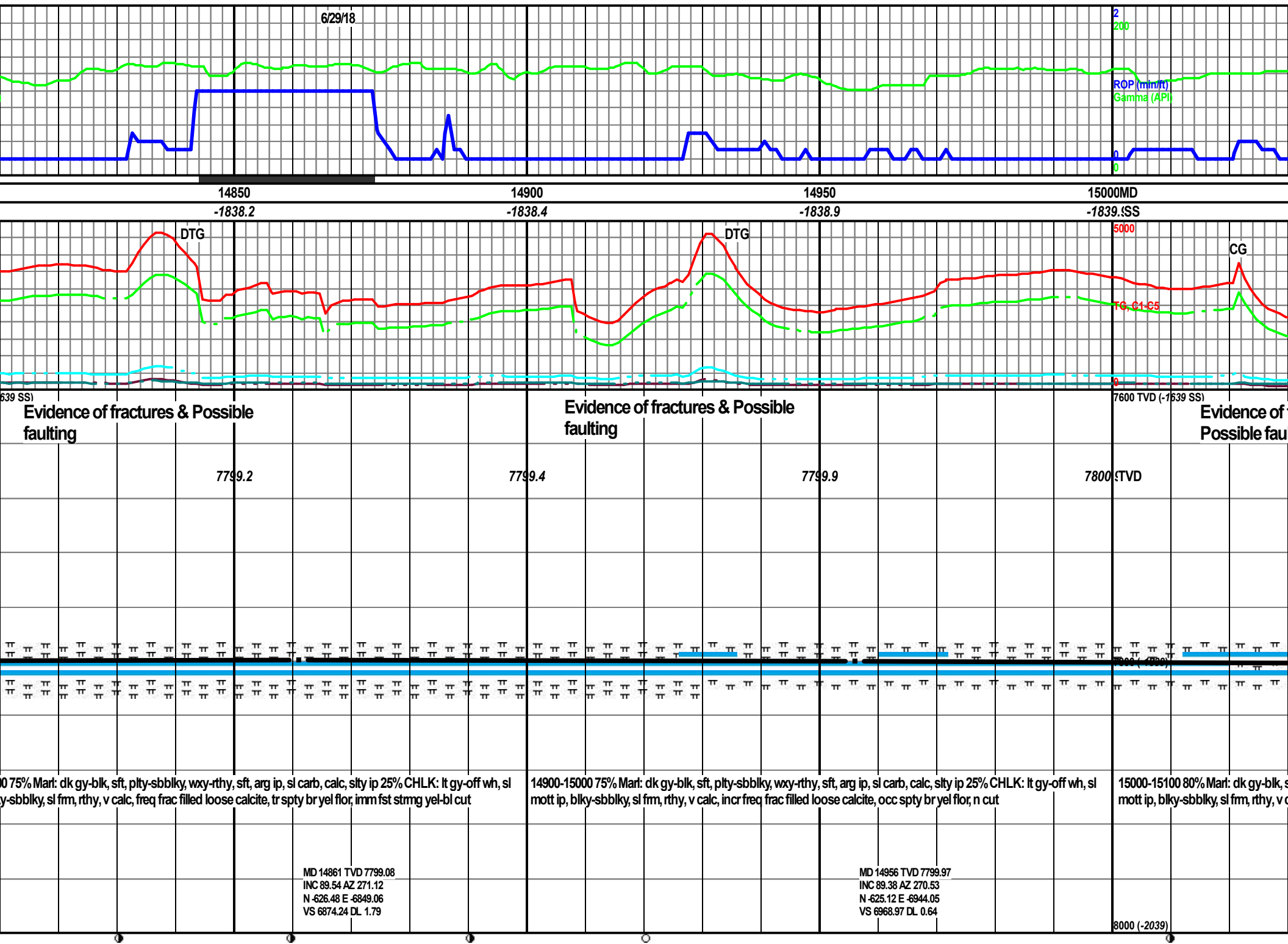
MD 14576 TVD 7801.45  
INC 90.49 AZ 268.8  
N -626.83 E -6564.1  
VS 6589.8 DL 0.73

8000 (-2039)

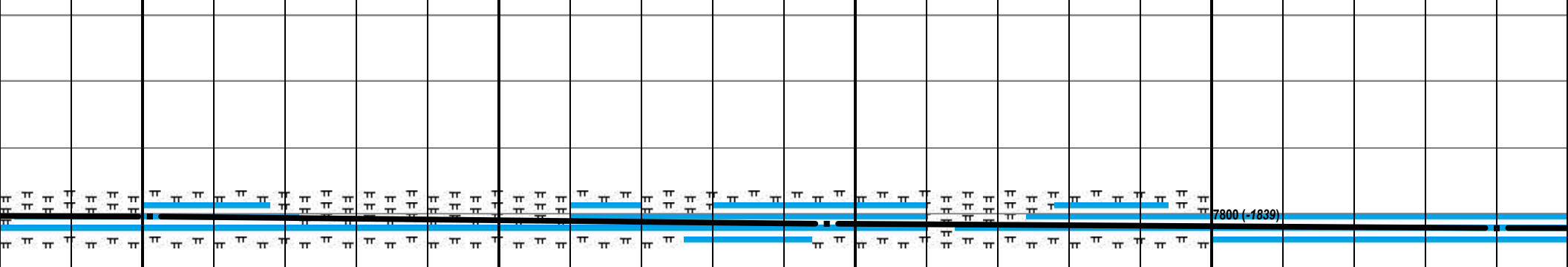
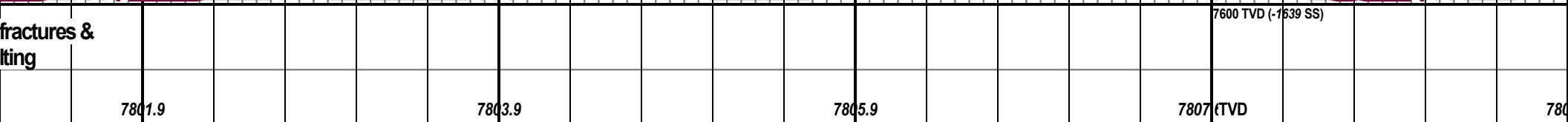
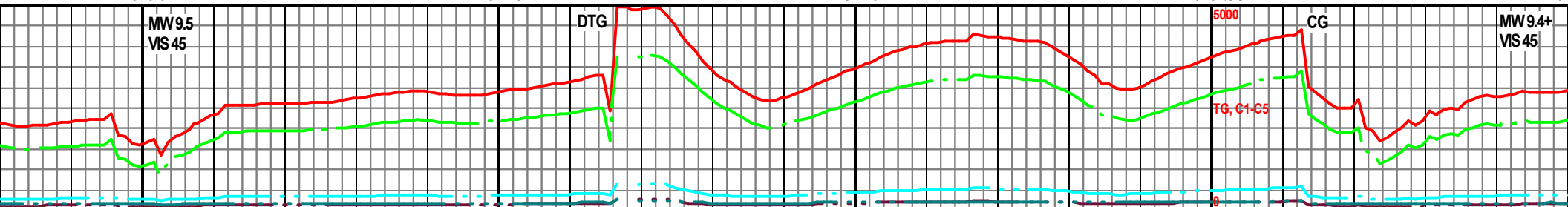
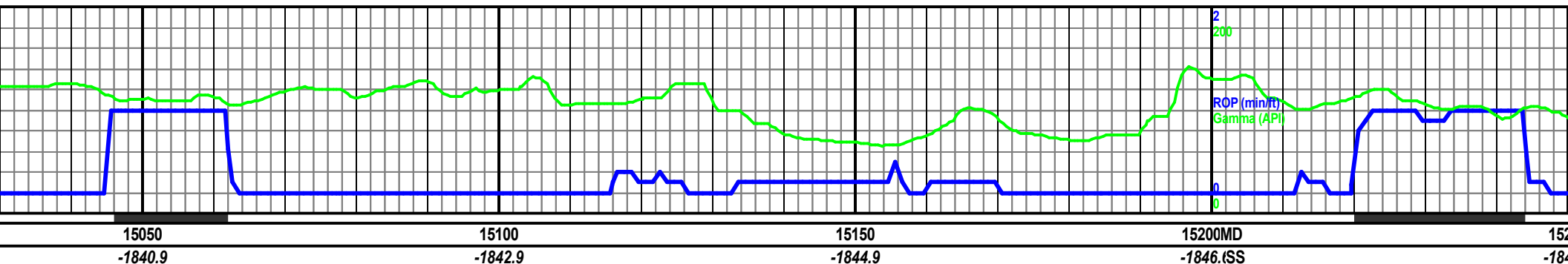












15100-15200 60% CHLK: lt gy-off wh, sl mott ip, blkly-sbbkly, sl fm, rthy, v calc, incr abnt frac filled loose calcite 40%  
Marl: dk gy-blk, sft, plty-sbbkly, wxy-rthy, sft, arg ip, sl carb, calc, slty ip, occ spty br yel mnrl flr, n cut

15200-15300 60% CHLK: lt gy-off wh, sl mott ip, blkly-sbbkly, sl fm, rthy, v calc, incr abnt frac filled loose calcite 40%  
Marl: dk gy-blk, sft, plty-sbbkly, wxy-rthy, sft, arg ip, sl carb, calc, slty ip, occ spty br yel mnrl flr, dul gm mlky cut

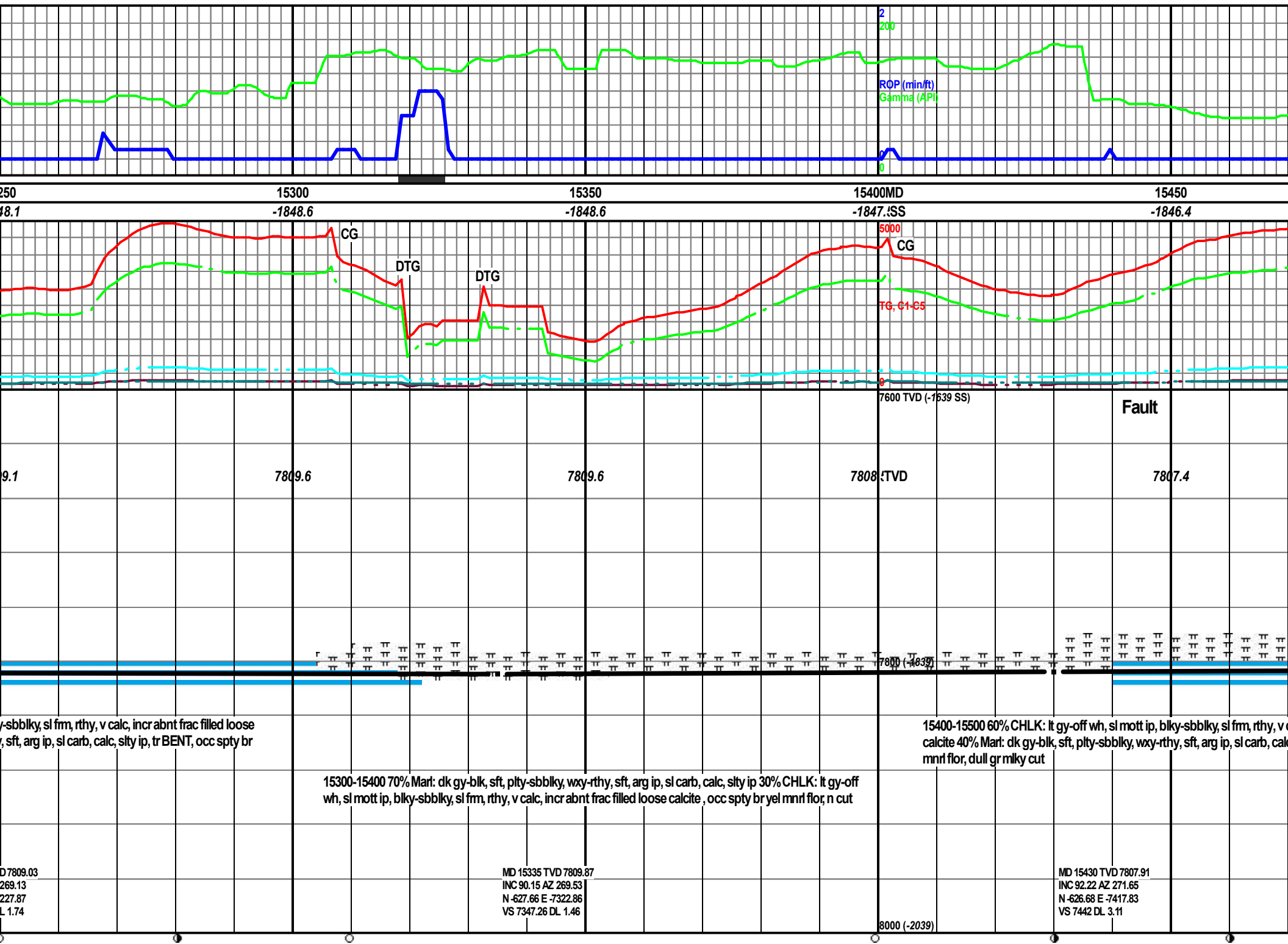
sft, plty-sbbkly, wxy-rthy, sft, arg ip, sl carb, calc, slty ip 20% CHLK: lt gy-off wh, sl mott ip, blkly-sbbkly, sl fm, rthy, v calc, incr abnt frac filled loose calcite, scat dul-br yel flr, str slow mlky yel cut

MD 15051 TVD 7801.96  
INC 88.21 AZ 270.06  
N -624.63 E -7039.02  
VS 7063.75 DL 1.33

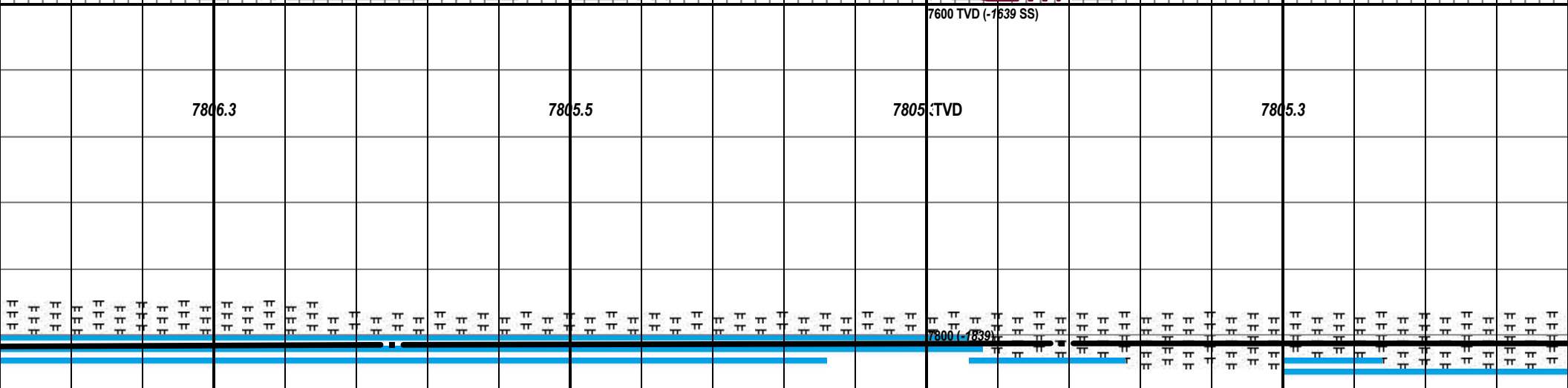
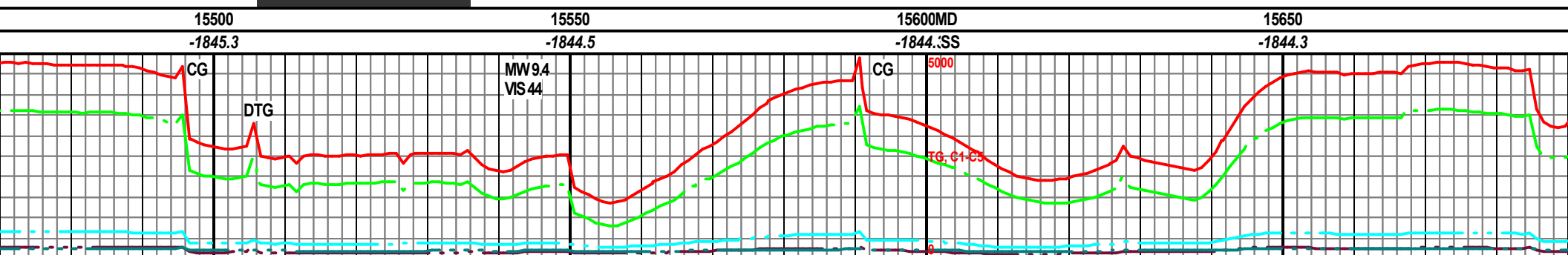
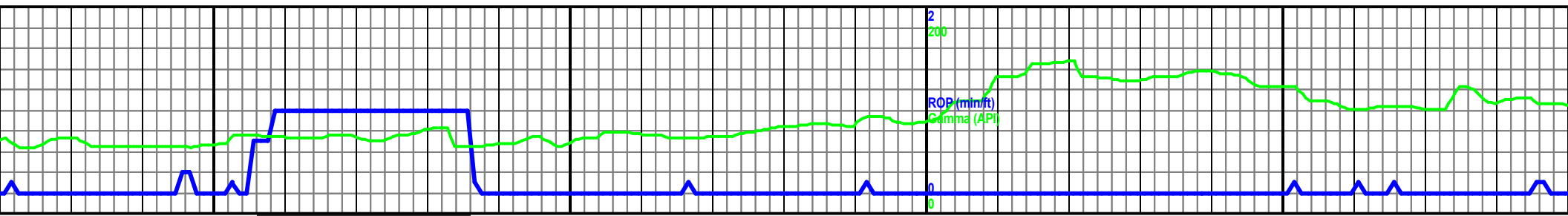
MD 15146 TVD 7805.77  
INC 87.2 AZ 269.24  
N -625.21 E -7133.94  
VS 7158.53 DL 1.37

MD 15240 TVD 7809.77  
INC 88.83 AZ 270.06  
N -626.54 E -7133.94  
VS 7252.38 DL 1.37









calc, incr abnt frac filled loose  
c, sity ip, tr Bent. occ spty bryel

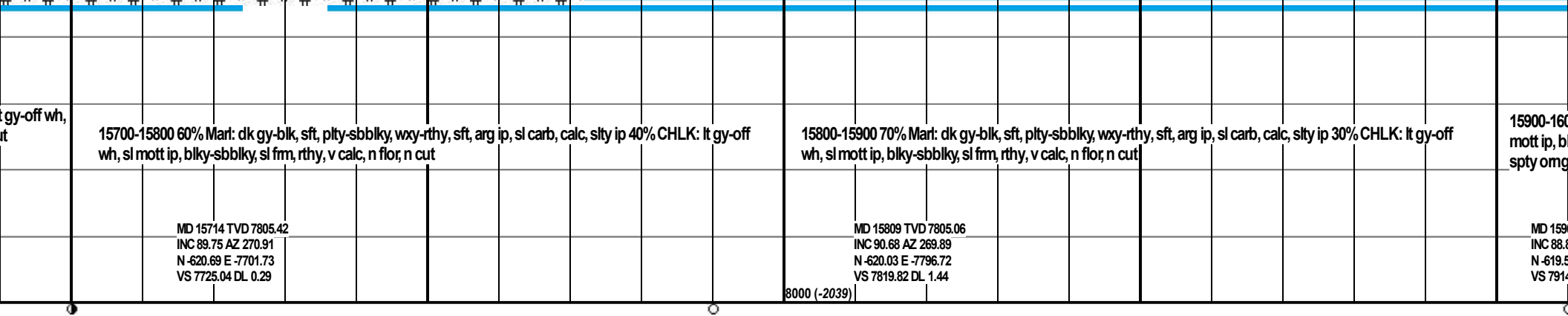
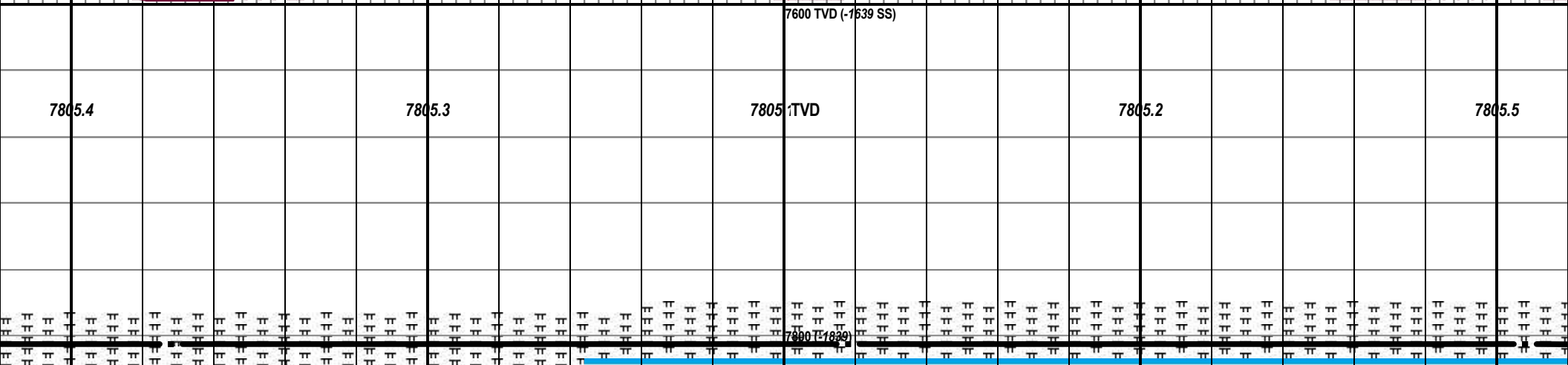
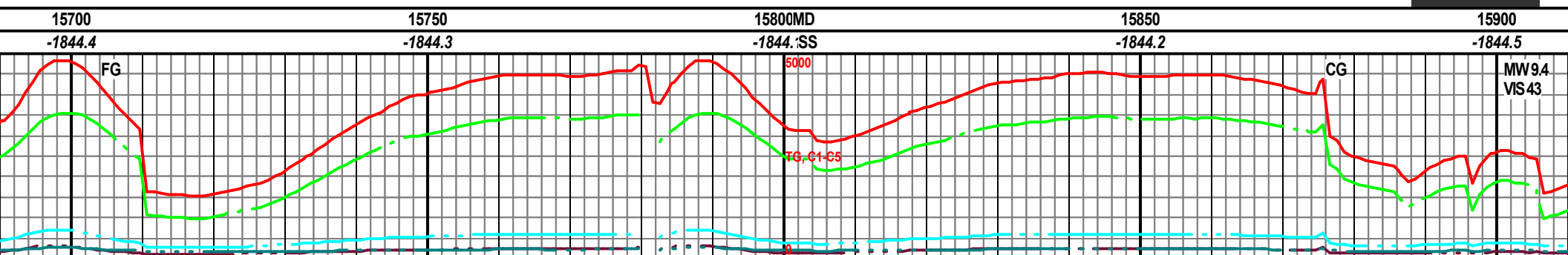
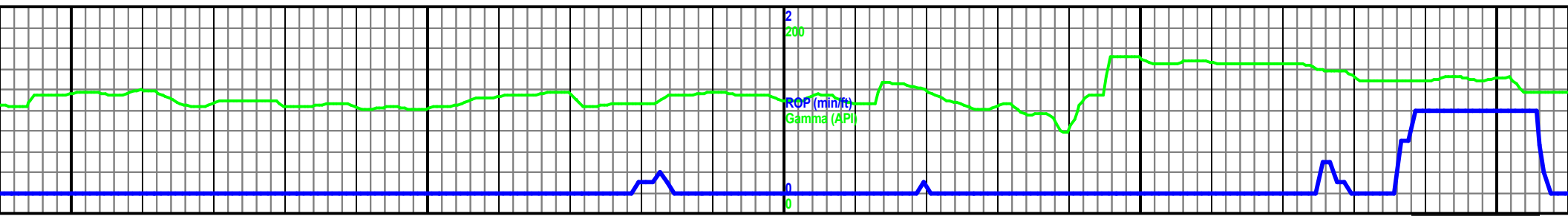
15500-15600 60% CHLK: lt gy-off wh, sl mott ip, blkly-sbbkly, sl frm, rthy, v calc, incr abnt frac filled loose calcite  
40% Marl: dk gy-blk, sft, plty-sbbkly, wxy-rthy, sft, arg ip, sl carb, calc, sity ip, tr Bent. occ spty bryel mnrl flr,  
dull grmlky cut

MD 15525 TVD 7805.66  
INC 90.49 AZ 271.47  
N -624.1 E -7512.76  
VS 7536.61 DL 1.83

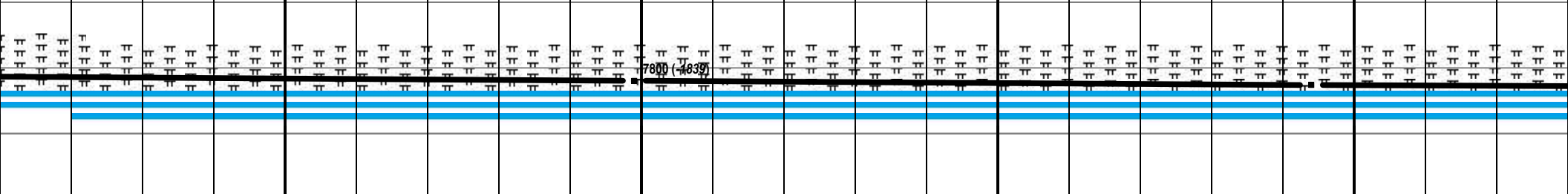
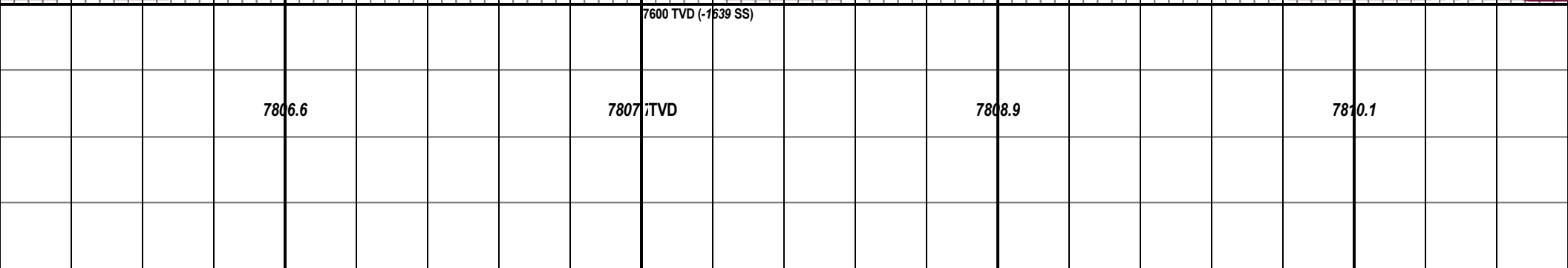
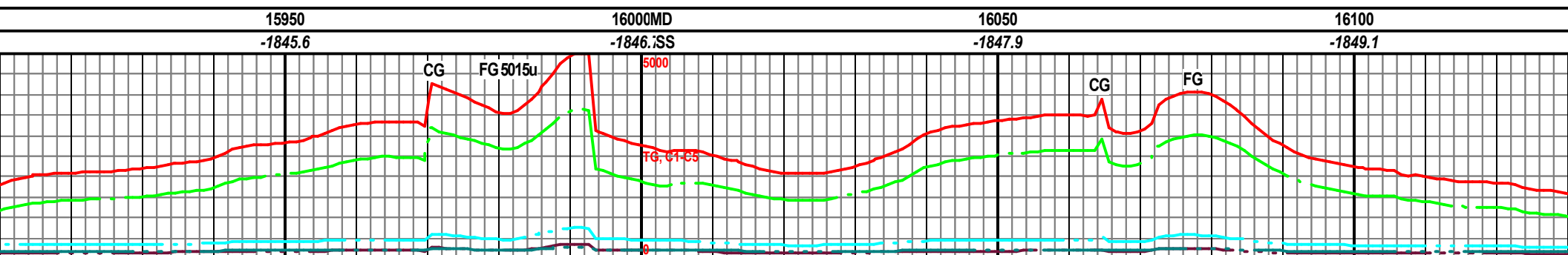
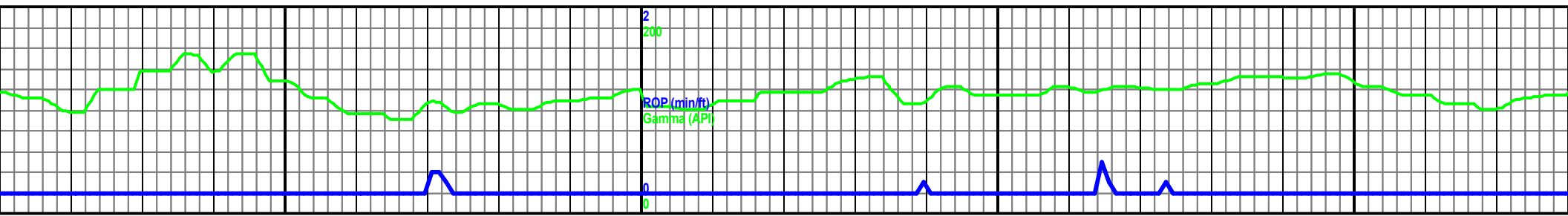
15600-15700 70% Marl: dk gy-blk, sft, plty-sbbkly, wxy-rthy, sft, arg ip, sl carb, calc, sity ip 30% CHLK: lt  
sl mott ip, blkly-sbbkly, sl frm, rthy, v calc, incr abnt frac filled loose calcite, occ spty bryel mnrl flr, n cu

MD 15619 TVD 7805.24  
INC 90.03 AZ 270.88  
N -622.17 E -7606.74  
VS 7630.31 DL 0.8









000 60% Mar: dk gy-blk, sft, plty-sbbly, wxy-rthy, sft, arg ip, sl carb, calc, slty ip 40% CHLK: lt gy-off wh, sl  
bly-sbbly, sl fm, rthy, v calc, r BENT, tr SS: vf gr, sbmd-md, w srt, w cons, sil cmtd w/dk bm-blk bio incls,  
flor, str mly cut

16000-16100 70% Mar: dk gy-blk, sft, plty-sbbly, wxy-rthy, sft, arg ip, sl carb, calc, slty ip 40% CHLK: lt gy-off wh, sl  
mott ip, bly-sbbly, sl fm, rthy, v calc, r BENT, tr SS: vf gr, sbmd-md, w srt, w cons, sil cmtd w/dk bm-blk bio incls,  
abndt spotty omg flor, stmg mly cut

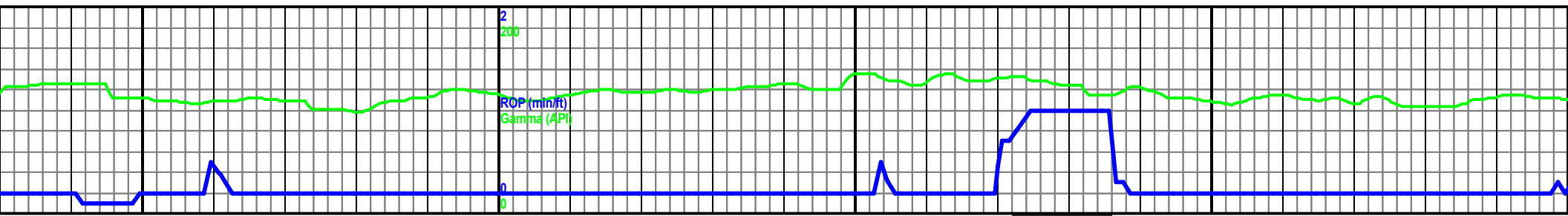
16100-16200 60% Mar: dk gy-blk, sft, plty-sbbly, wxy-rthy, sft, arg ip, sl carb, calc, slty ip 40% CHLK: lt gy-off wh, sl  
mott ip, bly-sbbly, sl fm, rthy, v calc, r BENT, tr SS: vf gr, sbmd-md, w srt, w cons, sil cmtd w/dk bm-blk bio incls,  
spotty omg flor, stmg mly cut

04 TVD 7805.49  
8 AZ 270.64  
9 E -7891.71  
4.62 DL 2.13

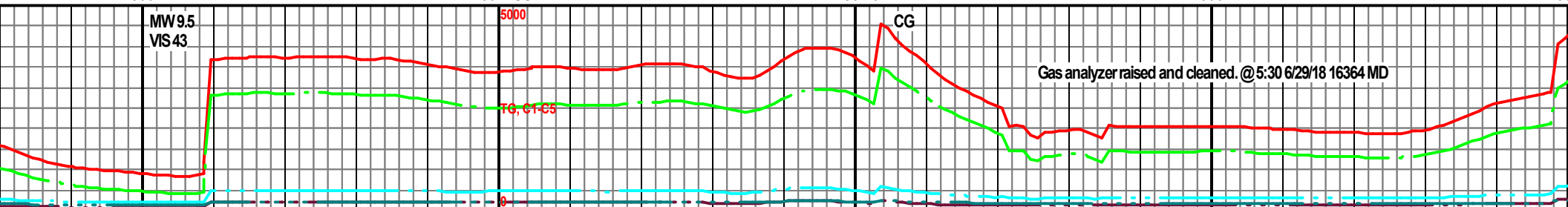
MD 15999 TVD 7807.69  
INC 88.55 AZ 270.7  
N -618.48 E -7986.68  
VS 8009.35 DL 0.27  
8000 (-2039)

MD 16094 TVD 7809.93  
INC 88.74 AZ 270.49  
N -617.49 E -8081.65  
VS 8104.09 DL 0.3





16150 -1850.2 16200MD -1851.1SS 16250 -1852.3 16300 -1853.1 16350 -1854.1



Gas analyzer raised and cleaned. @ 5:30 6/29/18 16364 MD

7811.2 7812.1TVD 7813.3 7814.1 7815.1



sft, plty-sbblky, wxy-rthy, sft, arg ip, sl carb, calc, slty ip 40% CHLK: lt gy-off wh, sl calc, tr SS: vf gr, sbmd-md, w srt, w cons, sil cntd wdk bm-blk bio incls, abndt

16200-16300 75% Mar: dk gy-blk, sft, plty-sbblky, wxy-rthy, sft, arg ip, sl carb, calc, slty ip 25% CHLK: lt gy-off wh, sl mott ip, blk-sbblky, sl frm, rthy, v calc, n flor, n cut

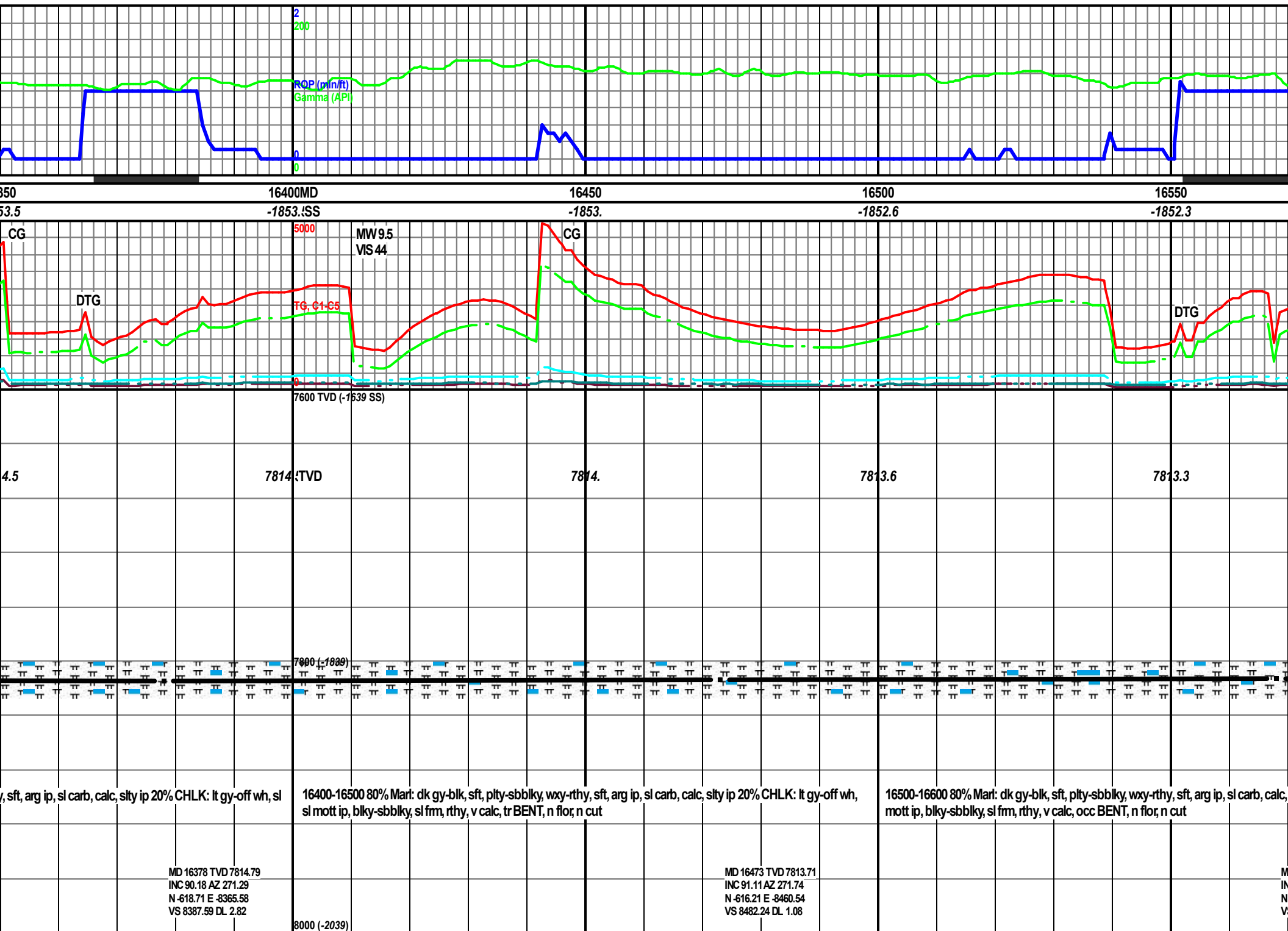
16300-16400 80% Mar: dk gy-blk, sft, plty-sbblky, wxy-rthy, sft, arg ip, sl carb, calc, slty ip 20% CHLK: lt gy-off wh, sl mott ip, blk-sbblky, sl frm, rthy, v calc, n flor, n cut

MD 16189 TVD 7812  
INC 88.77 AZ 269.38  
N -617.6 E -8176.63  
VS 8198.91 DL 1.17

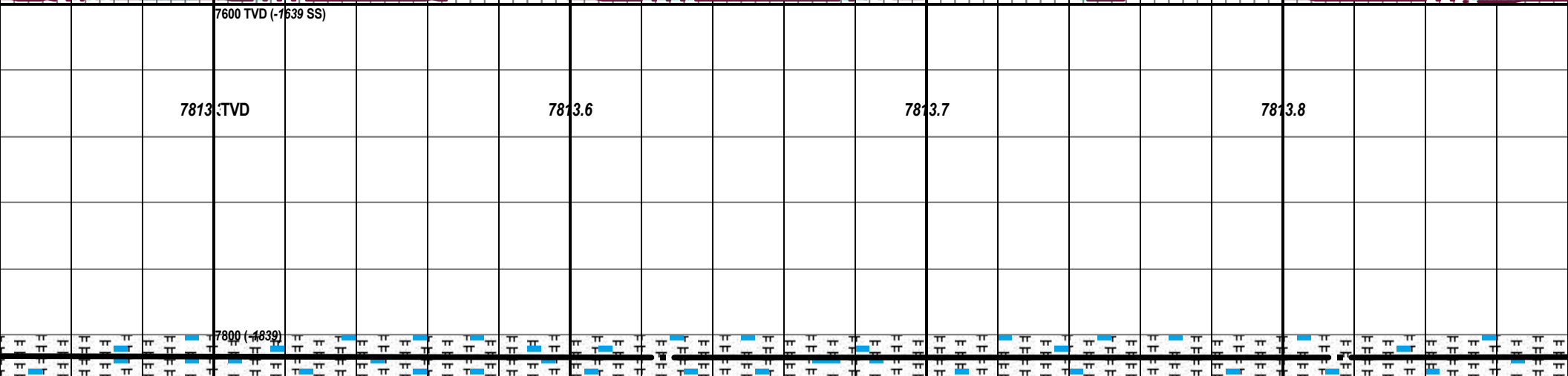
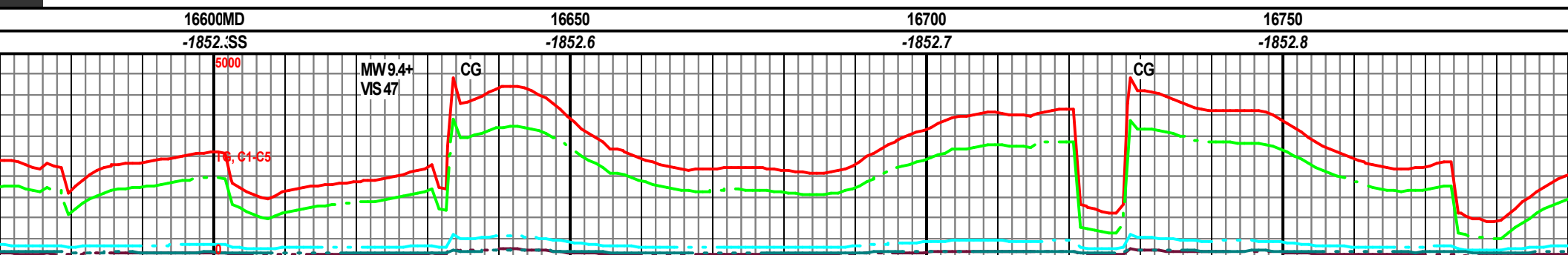
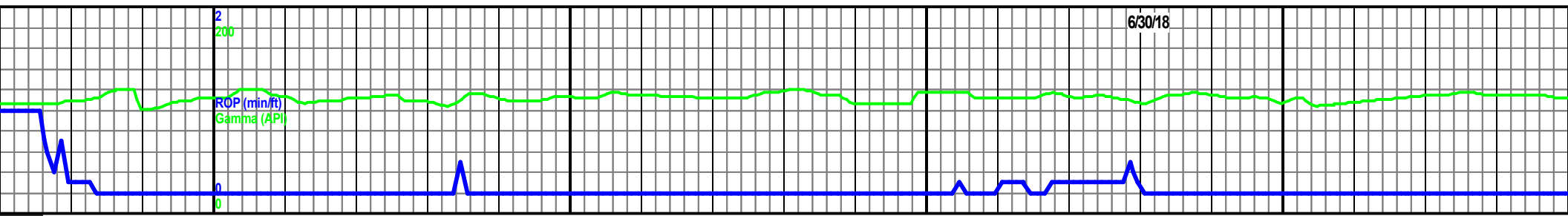
MD 16283 TVD 7813.97  
INC 88.83 AZ 268.98  
N -618.94 E -8270.6  
VS 8292.79 DL 0.43

8000 (-2039)









sity ip 20% CHLK: lt gy-off wh, sl

16600-16700 80% Mar: dk gy-blk, sft, plty-sbbiky, wxy-rthy, sft, arg ip, sl carb, calc, sity ip 20% CHLK: lt gy-off wh, sl mott ip, blk-ssbiky, sl frm, rthy, v calc, tr BENT, n flor, n cut

16700-16800 80% Mar: dk gy-blk, sft, plty-sbbiky, wxy-rthy, sft, arg ip, sl carb, calc, sity ip 20% CHLK: lt gy-mott ip, blk-ssbiky, sl frm, rthy, v calc, tr BENT, n flor, n cut

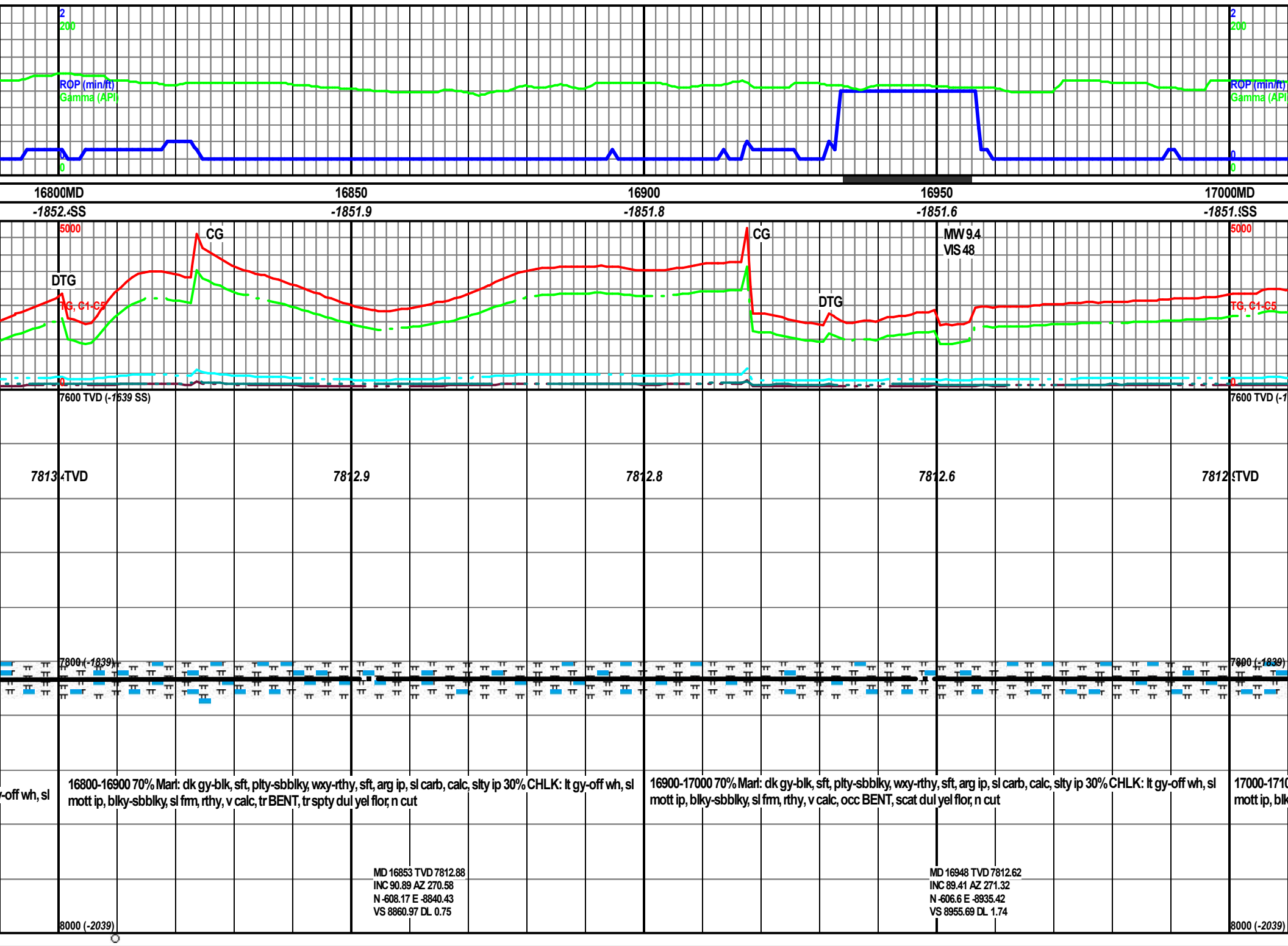
D 16568 TVD 7813.15  
IC 89.57 AZ 271.71  
-613.35 E -8555.5  
S 8576.85 DL 1.62

MD 16663 TVD 7813.72  
INC 89.75 AZ 271.4  
N -610.77 E -8650.46  
VS 8671.49 DL 0.38

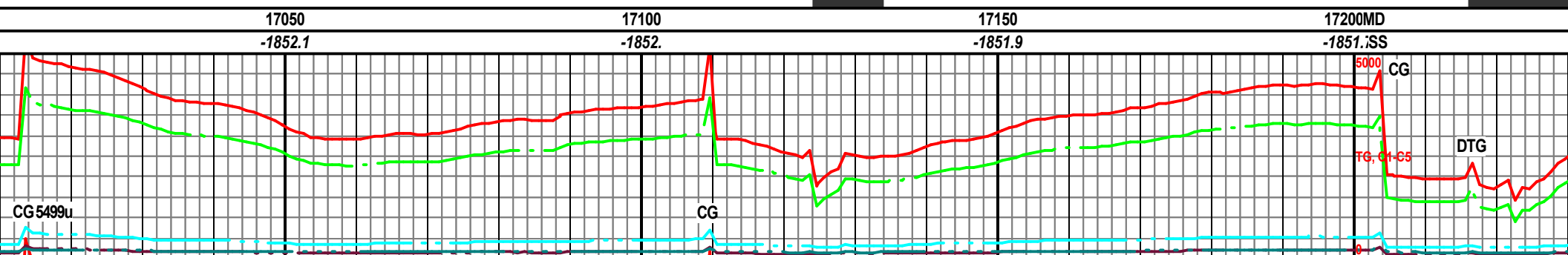
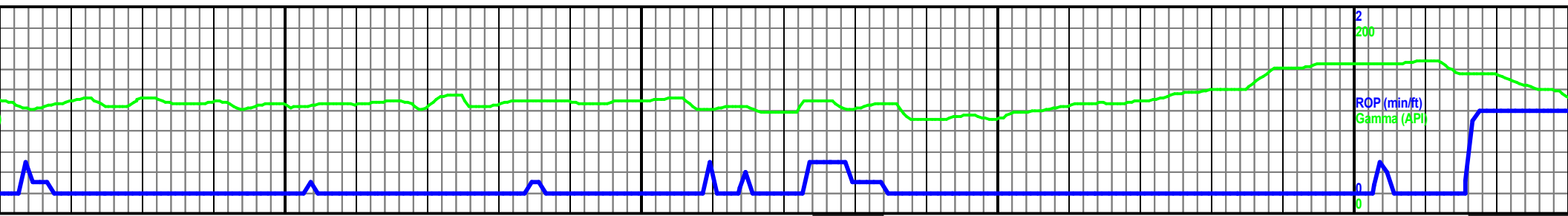
MD 16758 TVD 7813.77  
INC 90.18 AZ 270.58  
N -609.13 E -8745.44  
VS 8766.21 DL 0.98

8000 (-2039)

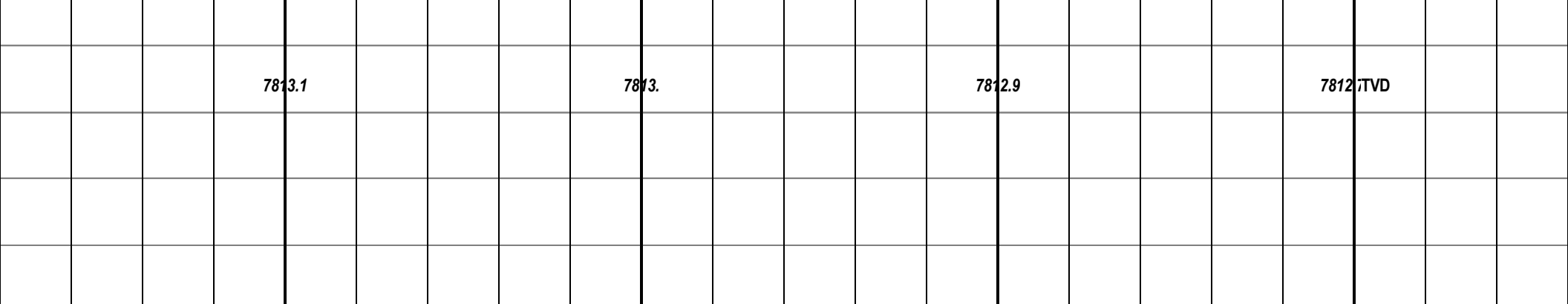








639 SS) 7600 TVD (-1639 SS)



00 70% Mar: dk gy-blk, sft, plty-sbbly, wxy-rthy, sft, arg ip, sl carb, calc, slty ip 30% CHLK: lt gy-off wh, sl gy-sbbly, sl fm, rthy, v calc, occ BENT, scat dul yel flor, n cut

17100-17200 70% Mar: dk gy-blk, sft, plty-sbbly, wxy-rthy, sft, arg ip, sl carb, calc, slty ip 30% CHLK: lt gy-off wh, sl mott ip, blk-sbbly, sl fm, rthy, v calc, occ BENT, scat dul yel flor, n cut

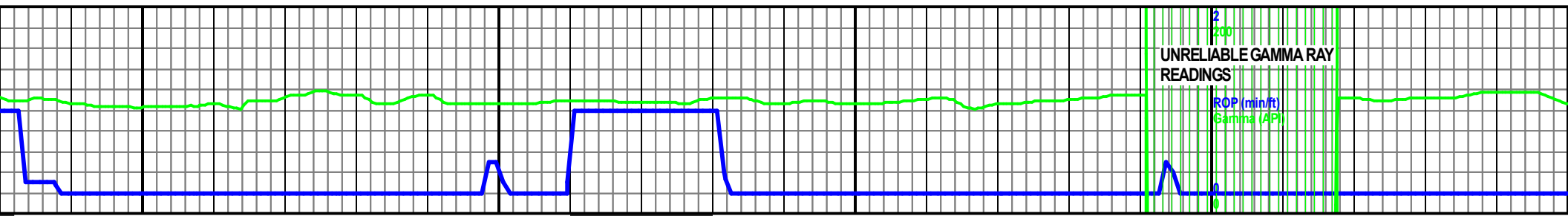
17200-17300 60% Mar: dk gy-blk, sft, plty-sbbly, wxy-rthy, sft, arg ip, sl carb, calc, slty ip 30% CHLK: lt gy-off wh, sl mott ip, blk-sbbly, sl fm, rthy, v calc, occ BENT, scat dul yel flor, n cut

MD 17042 TVD 7813.17  
INC 89.91 AZ 271.72  
N -604.1 E -9029.38  
VS 9049.34 DL 0.67

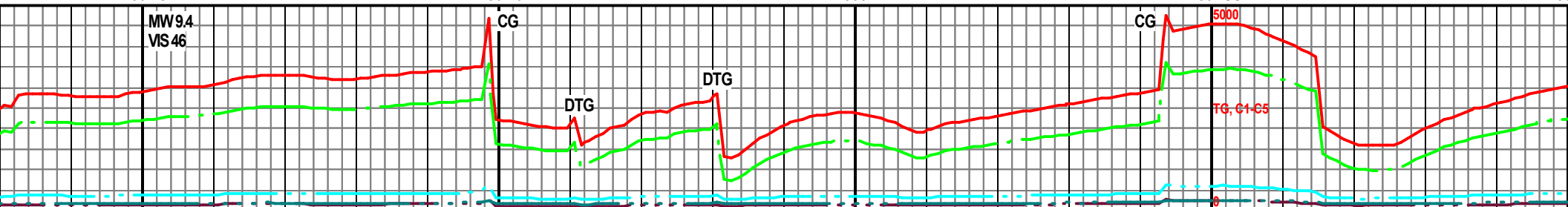
MD 17137 TVD 7812.92  
INC 90.4 AZ 271.89  
N -601.11 E -9124.33  
VS 9143.94 DL 0.55

8000 (-2039)

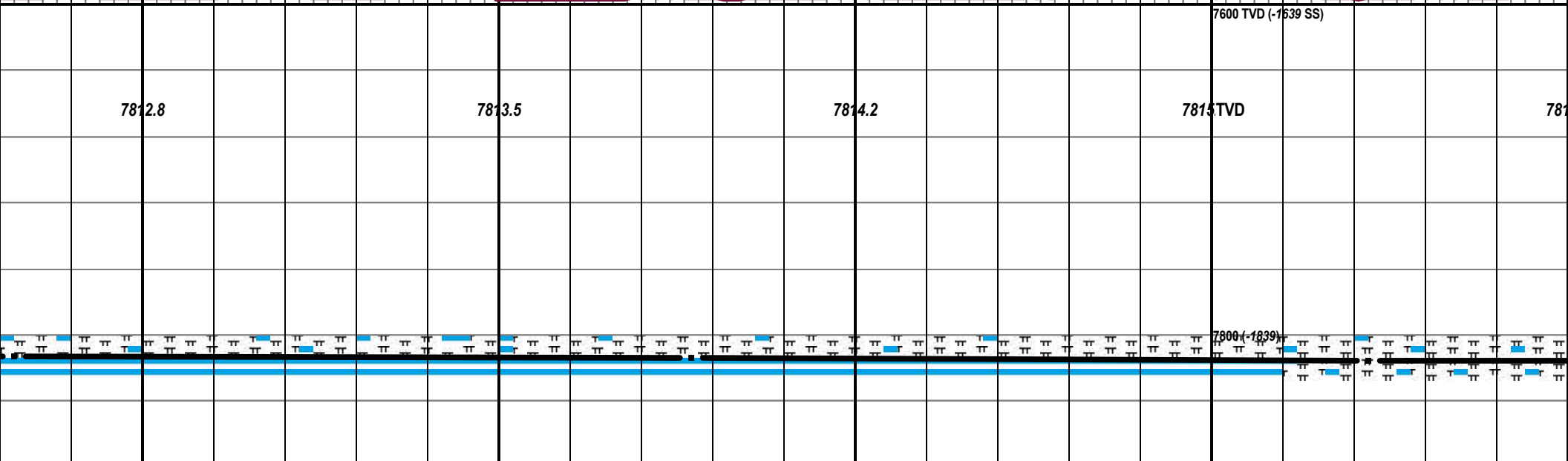




17250	17300	17350	17400MD	17450
-1851.8	-1852.5	-1853.2	-1854SS	-1854.8



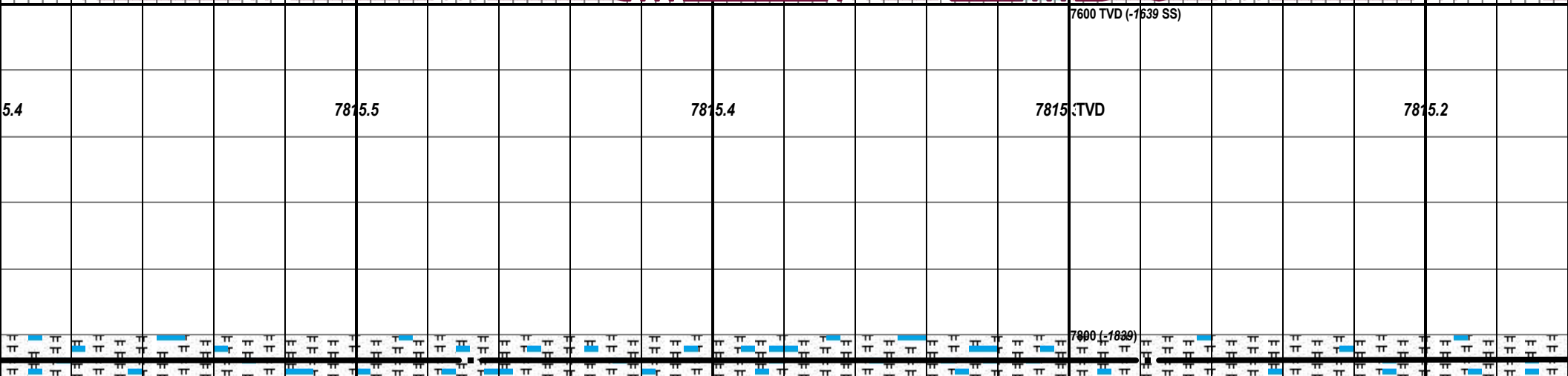
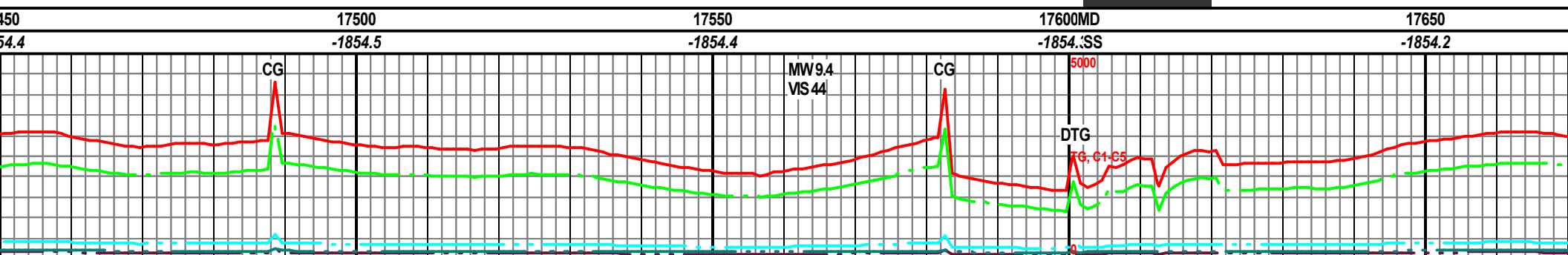
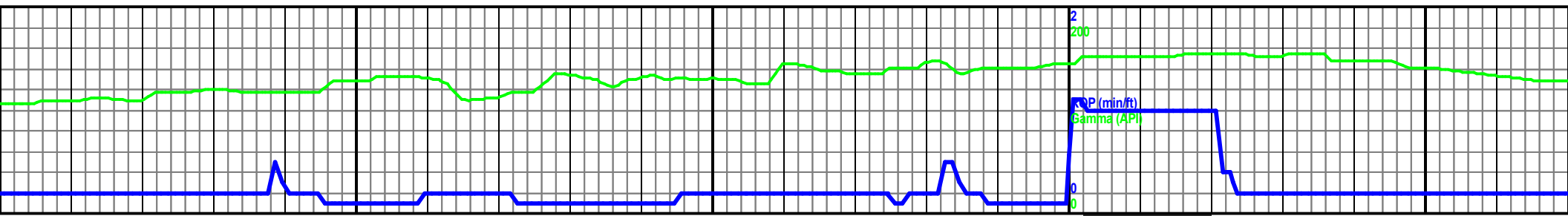
7812.8	7813.5	7814.2	7815TVD	7816TVD
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sft, plty-sbblky, wxy-rthy, sft, arg ip, sl carb, calc, slty ip 40% CHLK: lt gy-off wh, sl calc, sl incr in BENT, trspty mnrl flr, n cut	17300-17400 60% Marl: dk gy-blk, sft, plty-sbblky, wxy-rthy, sft, arg ip, sl carb, calc, slty ip 40% CHLK: lt gy-off wh, sl mott ip, blk-sbblky, sl frm, rthy, v calc, sl incr BENT, n flr, n cut	17400-17500 70% Marl: dk gy-blk, sft, plty-sbblky, wxy-rthy, sft, arg ip, sl carb, calc, slty ip 40% CHLK: lt gy-off wh, sl mott ip, blk-sbblky, sl frm, rthy, v calc, occ BENT, n flr, n cut
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MD 17232 TVD 7812.61 INC 89.97 AZ 271.75 N -598.1 E -9219.29 VS 9238.55 DL 0.48	MD 17327 TVD 7813.79 INC 88.61 AZ 270.24 N -596.45 E -9314.26 VS 9333.25 DL 2.14	MD 17422 TVD 7815.4 INC 89.45 AZ 269.75 N -596.46 E -9409.24 VS 9428.07 DL 1.02
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sft, arg ip, sl carb, calc, slty ip 30% CHLK: lt gy-off wh, sl cut

17500-17600 75% Marl: dk gy-blk, sft, plty-sbbiky, wxy-rthy, sft, arg ip, sl carb, calc, slty ip 25% CHLK: lt gy-off wh, sl mott ip, biky-sbbiky, sl frm, rthy, v calc, occ BENT, n flor, n cut

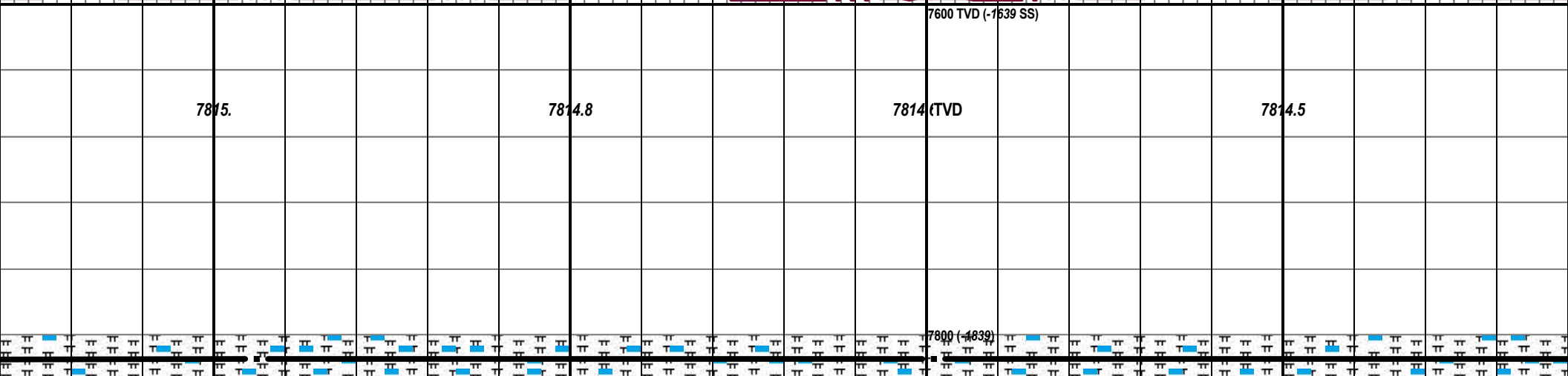
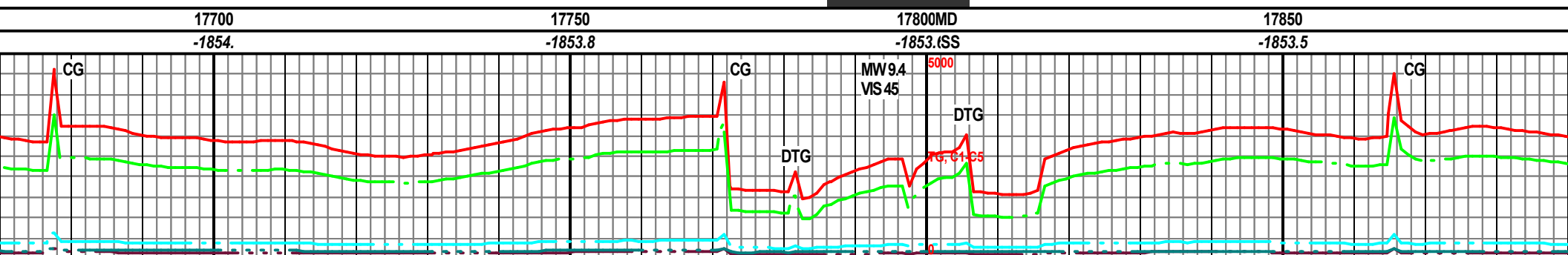
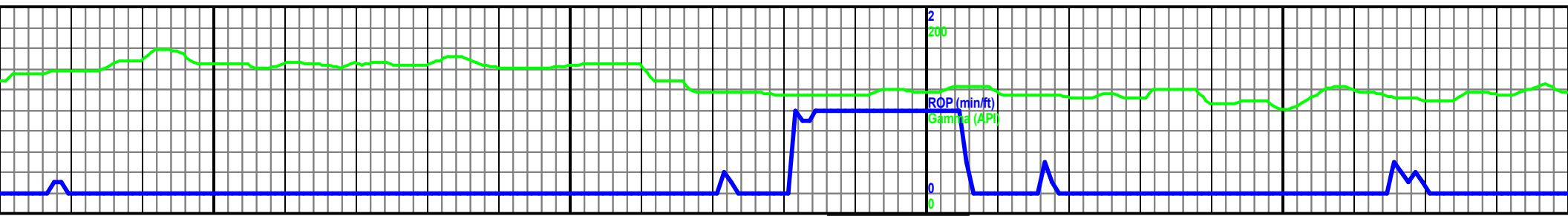
17600-17700 90% Marl: dk gy-blk, sft, plty-sbbiky, wxy-rthy, sft, arg ip, sl carb, calc, mott ip, biky-sbbiky, sl frm, rthy, v calc, occ BENT, n flor, n cut

MD 17516 TVD 7815.5  
INC 90.43 AZ 270.26  
N -596.45 E -9503.24  
VS 9521.9 DL 1.18

MD 17611 TVD 7815.32  
INC 89.78 AZ 270.01  
N -596.22 E -9598.24  
VS 9616.72 DL 0.73

8000 (-2039)





17700-17800 75% Mar: dk gy-blk, sft, plty-sbblky, wxy-rthy, sft, arg ip, sl carb, calc, slty ip 25% CHLK: lt gy-off wh, sl mott ip, blk-sbblky, sl fm, rthy, v calc, occ BENT, n flor, n cut

17800-17900 80% Mar: dk gy-blk, sft, plty-sbblky, wxy-rthy, sft, arg ip, sl carb, calc, slty ip 20% CHLK: lt gy-off wh, sl mott ip, blk-sbblky, sl fm, rthy, v calc, occ BENT, n flor, n cut

MD 17706 TVD 7814.94  
INC 90.68 AZ 270.08  
N -596.14 E -9693.24  
VS 9711.54 DL 0.94

MD 17801 TVD 7814.58  
INC 89.75 AZ 270.08  
N -596.01 E -9788.24  
VS 9806.36 DL 0.97  
8000 (-2039)



