

# SUNBURST CONSULTING

A G E O L O G Y S E R V I C E



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## GEOSTEERING LOG

### WellSight Systems

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

Well Name: Richard D. Knotts #513132  
Location: Rosemont 7.5' Quad; Booths Creek District; Taylor Co., West Virginia  
License Number: API#: 47-091-01230  
Spud Date: 20 August 2011  
Surface Coordinates: Latitude: 39.321944  
Longitude: 80.144964  
Bottom Hole Coordinates: 1,511.58' North and 2,740.53' West of surface location  
Ground Elevation (ft): 1328  
Logged Interval (ft): 6,384' To: 10,385'  
Formation: Elks through Marcellus  
Type of Drilling Fluid: Water Based Mud

Region: Appalachian Basin  
Drilling Completed: 05 Sept. 2011

K.B. Elevation (ft): 1343

Total Depth (ft): 10,385'

Printed by WellSight Log Viewer from WellSight Systems 1-800-447-1534 www.WellSight.co




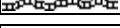
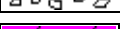

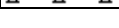
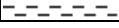








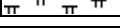

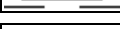
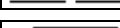
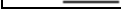



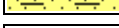

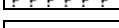
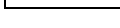
## OPERATOR

Company: EQT Production Company  
Address: EQT Plaza  
625 Liberty Avenue  
Pittsburgh, PA 15222








































































## GEOLOGISTS

**Name:** Isaah Land, Chris Adair, Josh Brewer  
**Company:** Sunburst Consulting, Inc.  
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 2150 Harnish Blvd, Billings, MT 59101  
 (406) 259-4124; geology@sunburstconsulting.com

## ROCK TYPES

 Anhy  Arg dol  Arg ls  Bent  Brec  Calc dol  Cht	 Clyst  Coal  Congl  Dol  Dol ls  Gyp  Igne	 Ls  Meta  Mrlst  Salt  Shale  Shblk  Schol	 Shgy  Sltst  Ss  Sssilty  Tuff  Unknown  Blank
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## ACCESSORIES

<b>FOSSIL</b>  Algae  Amph  Belm  Bioclst  Brach  Bryozoa  Cephal  Coral  Crin  Echin  Fish  Foram  Fossil  Gastro  Oolite  Ostra  Pelec  Pellet  Pisolite	 Plant  Strom  <b>MINERAL</b>  Anhy  Arggrn  Arg  Bent  Bit  Brecfrag  Calc  Carb  Chtdk  Chtlt  Dol  Feldspar  Ferrpel  Ferr  Glau  Gyp	 Hvymn  Kaol  Marl  Minxl  Nodule  Phos  Pyr  Salt  Sandy  Silt  Sil  Sulphur  Tuff  <b>STRINGER</b>  Anhy  Arg  Bent  Coal  Dol	 Gyp  Ls  Mrst  Sltstrg  Ssstrg  <b>TEXTURE</b>  Boundst  Chalky  Cryxln  Earthy  Finexln  Grainst  Lithogr  Microxln  Mudst  Packst  Wackest
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### OTHER SYMBOLS

#### INTERVALS

- None
- Core
- Dst

#### EVENTS

- Rft
- Sidewall
- Bit change

#### OIL SHOWS

- Even
- Spotted
- Ques
- Dead

#### POROSITY TYPE

- Earthy
- Fenest

- Fracture
- Inter
- Moldic
- Organic
- Pinpoint
- Vuggy

#### ROUNDING

- Rounded

- Subrnd
- Subang
- Angular

#### SORTING

- Well
- Moderate
- Poor

### COMMENTS

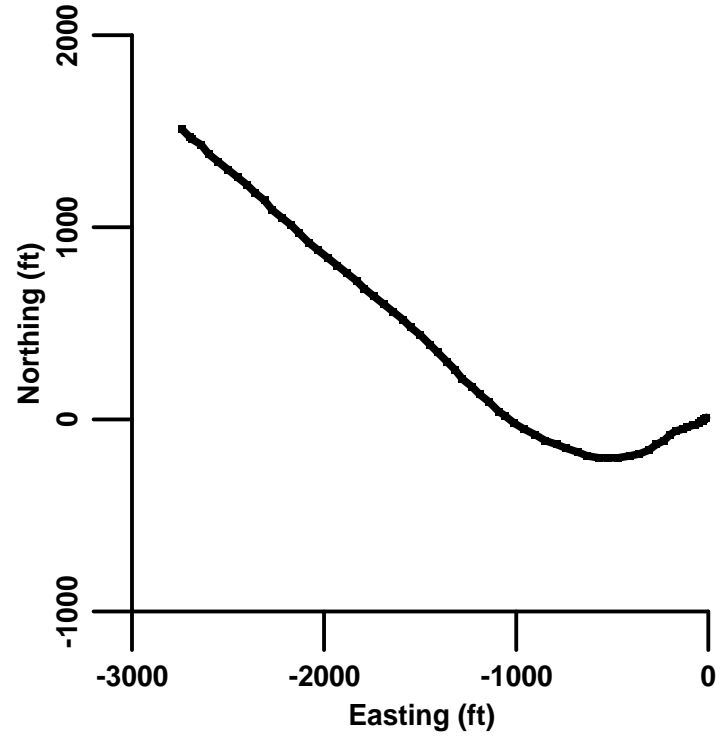
COMPANY MAN: Bill Ruff Teel, Jeff Lofton  
TOOLPUSHER: Bruce Lambert  
RIG: Savanna 640E

SURFACE CASING: 13 3/8" J-55, 54.5#, set to 890'  
INTERMEDIATE CASING: 9 5/8" MC-50, 40#, set to 2,627'

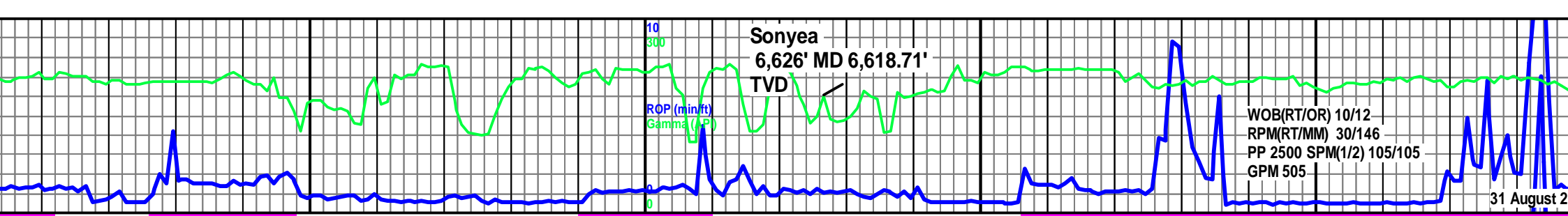
KOP: 6,385'

CLOSURE DIRECTION: 298.88°  
CLOSURE DISTANCE: 3,129.76'

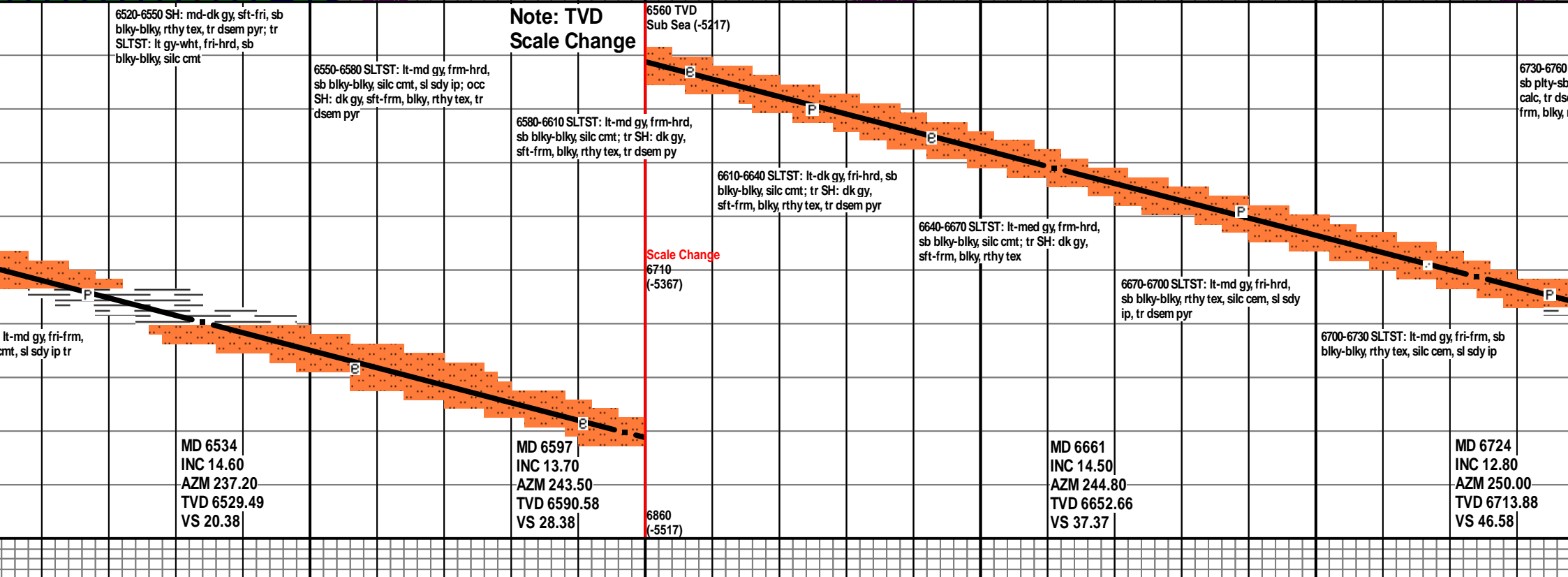
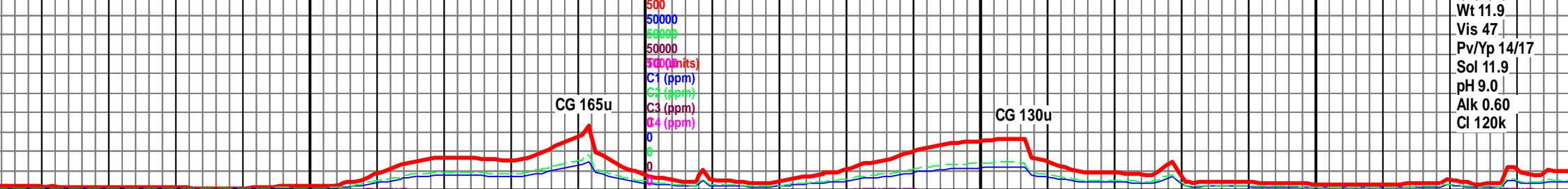
# Plan



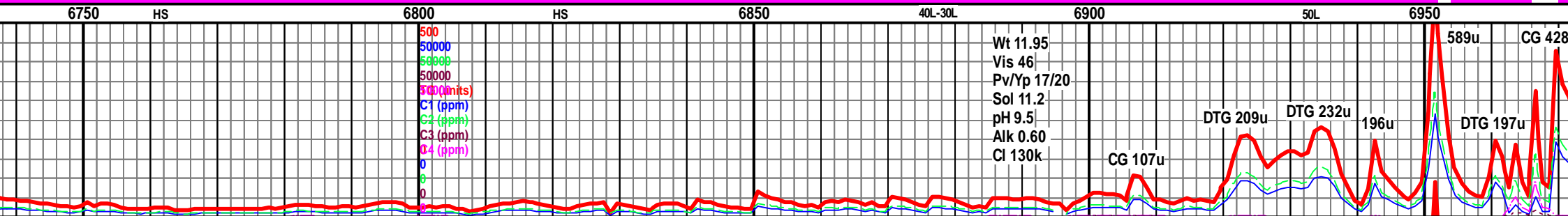
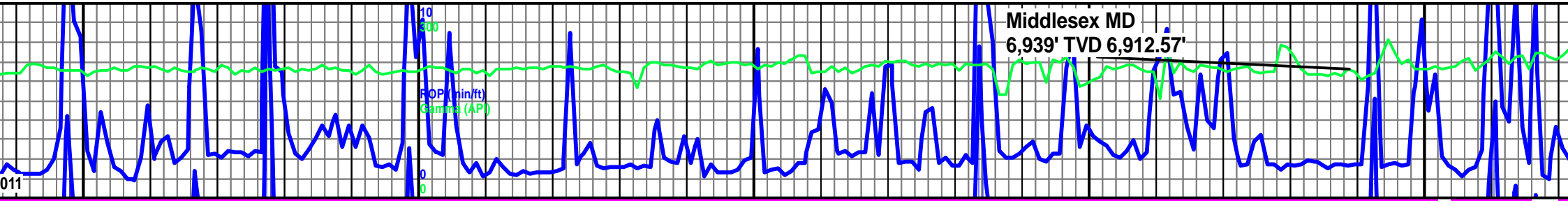




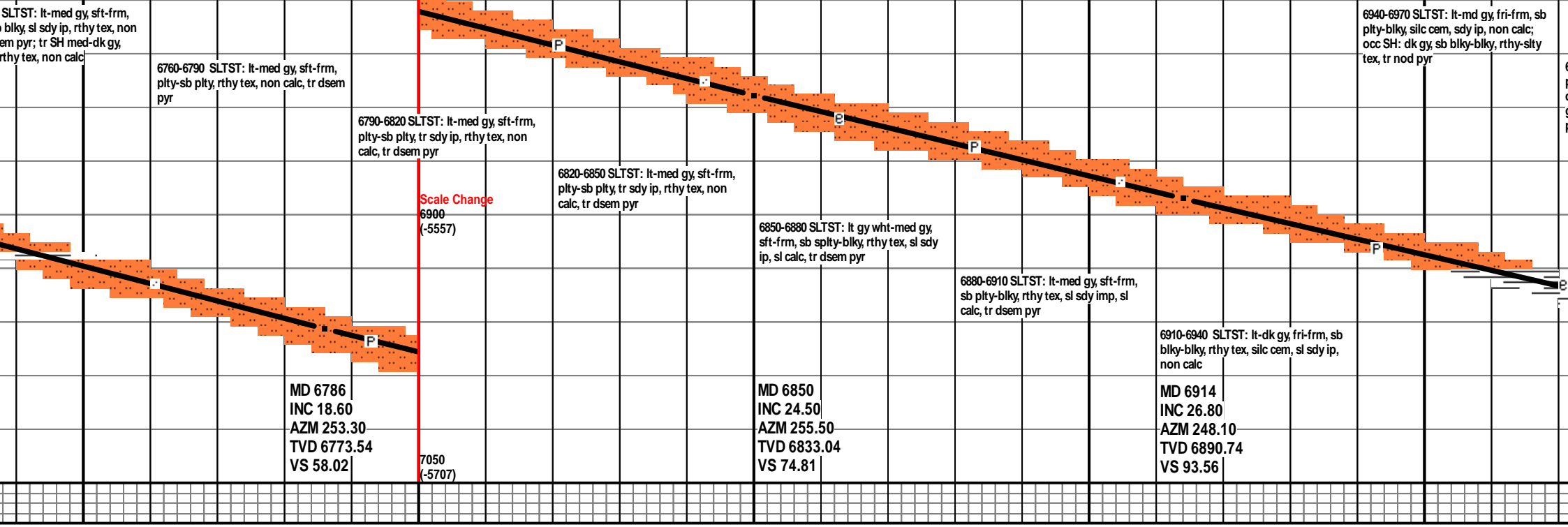
230M 6550 6600 10R 6650 HS-10R 6700



Middlesex MD  
6,939' TVD 6,912.57'

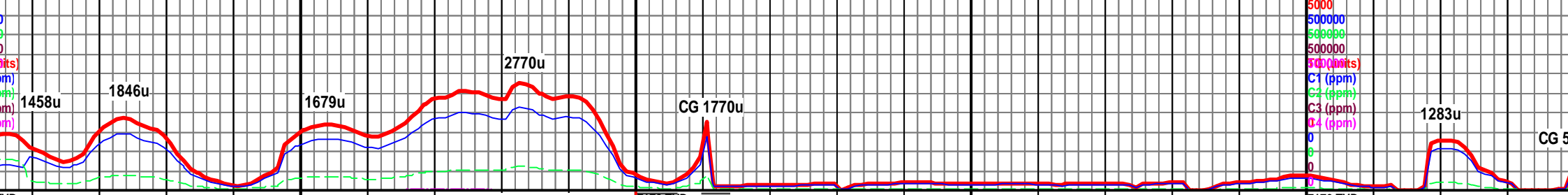
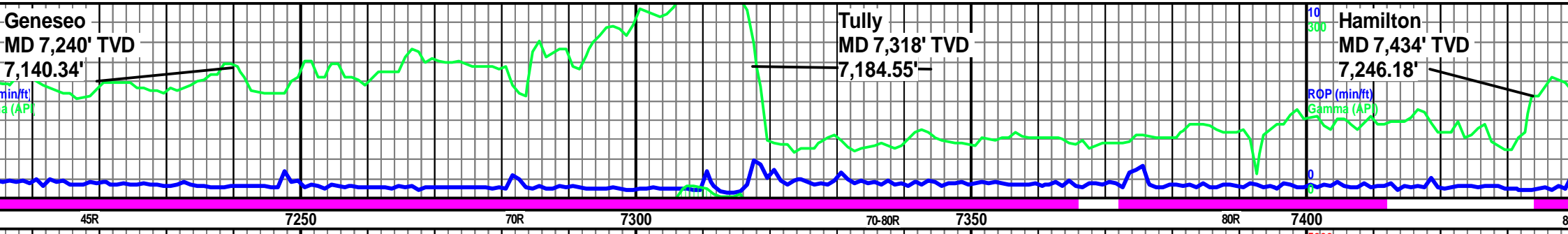


Note: TVD Scale Change





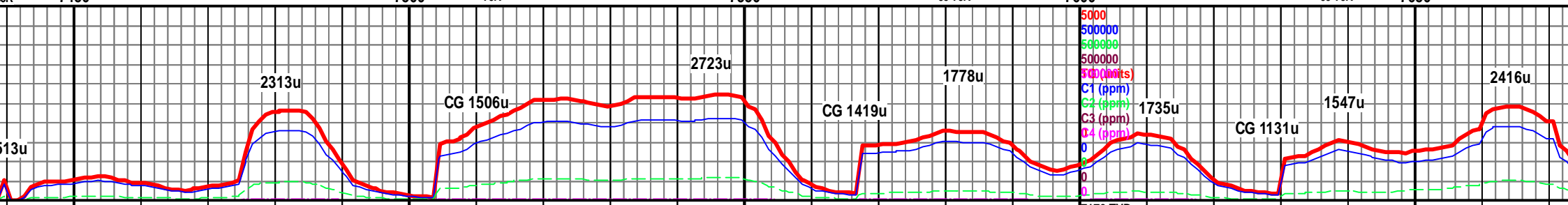
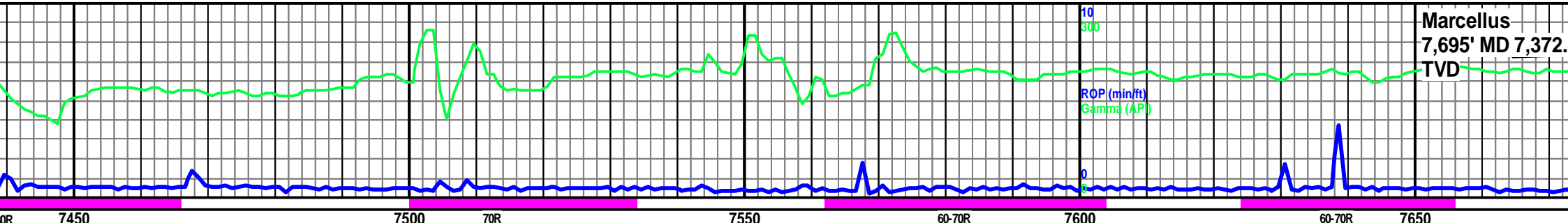




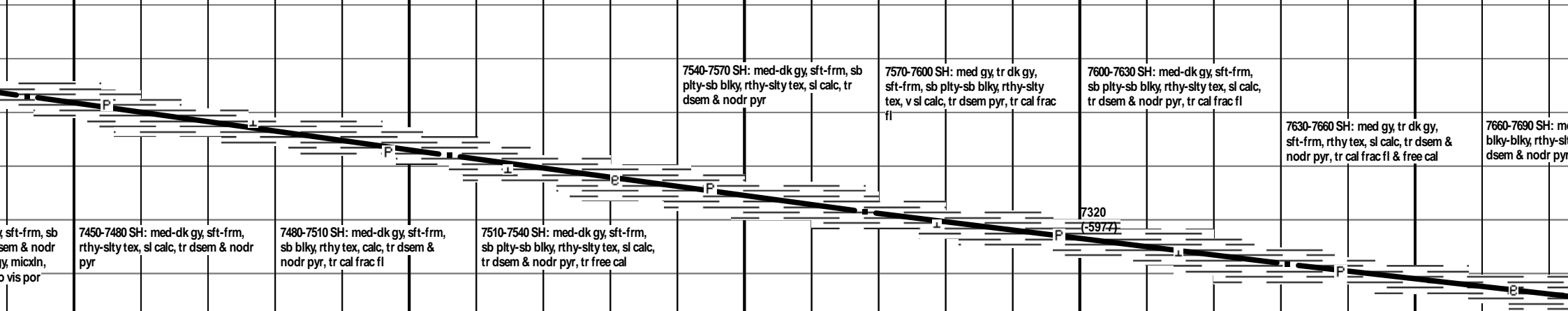
Note: TVD Scale Change  
 7320 (-5977)

7210-7240 SH: med-dk gy, frm, sb pily-sb blk, rthy tex, sl calc, tr dsem & nodr pyr, rr cal & tr pyr frac fl	7240-7270 SH: med-dk gy, sft-frm, sb blk, rthy tex, sl calc, tr dsem pyr	7270-7300 SH: med-dk gy, sft-frm, sb blk, rthy tex, sl calc, tr dsem pyr	7300-7330 SH: med gy, tr dk gy, sft-frm, sb blk-blk, rthy tex, sl calc, tr dsem pyr; com LS: mdst, wht-lt gy, micxn, sft, blk, rthy-chky tex, no vis por	7330-7360 LS: mdst, wht-lt gy, micxn, sft, blk, rthy-chky tex, no vis por; rr SH: med gy tr dk gy, sft-frm, sb blk, rthy tex, calc, tr dsem pyr	7360-7390 LS: mdst, wht-lt gy, tr med gy, micxn, sft, blk, chky tex, no vis por; occ SH: med-dk gy, sft-frm, sb blk-blk, rthy tex, sl calc, tr dsem & rr nodr pyr	7390-7420 SH: dk gy, rr med gy, sft-frm, sb blk-blk, rthy-slty tex, sl calc, tr dsem & com nodr pyr, tr pyr frac fl; com LS: mdst, wht-lt gy, tr med gy, micxn, sft, blk, chky tex, tr nodr pyr, no vis por	7420-7450 SH: med-dk gy, blk, rthy tex, sl calc, tr dsem pyr; rr LS: mdst, wht-lt gy, sft, blk, rthy-chky tex, no vis por
MD 7253 INC 54.50 AZM 242.60 TVD 7148.35 VS 197.52			Scale Change 7320 (-5977)				
			MD 7316 INC 57.80 AZM 251.10 TVD 7183.48 VS 229.68				
			7470 (-6127)				

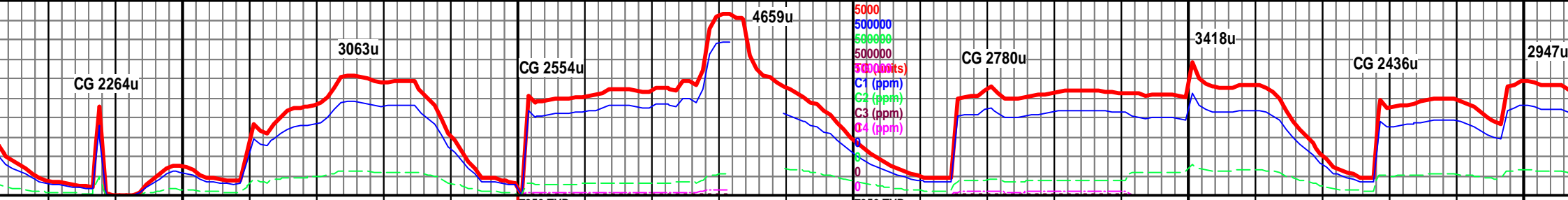
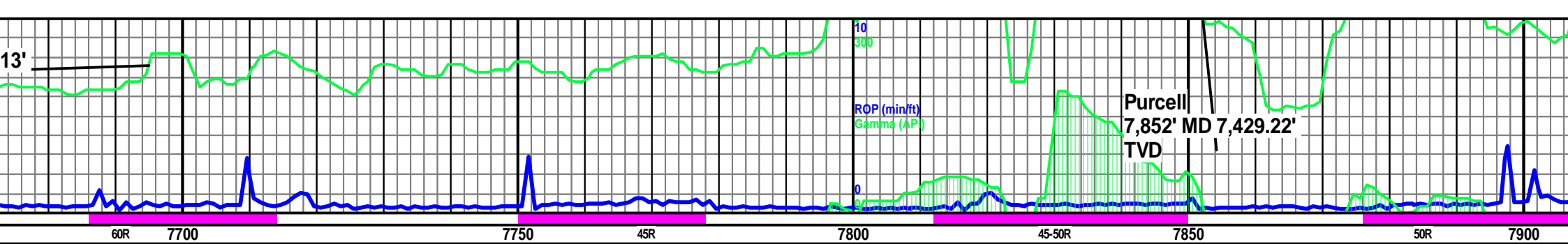
Marcellus  
7,695' MD 7,372.  
TVD



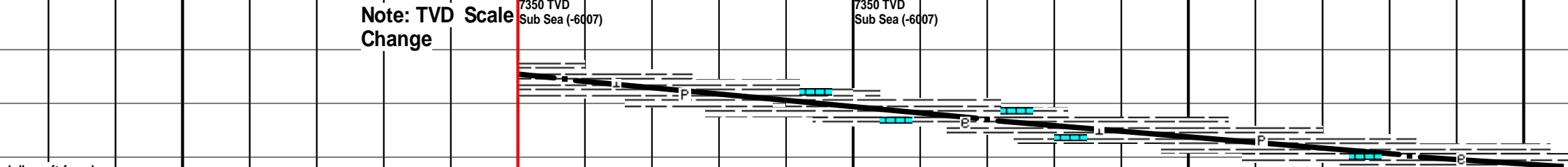
7170 TVD  
Sub Sea (-5827)



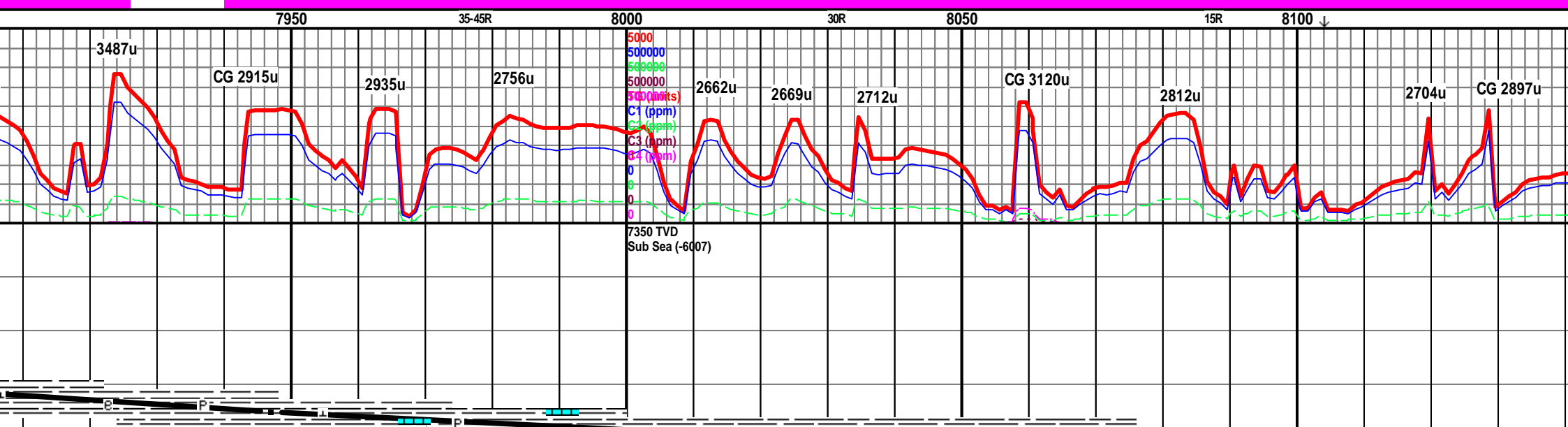
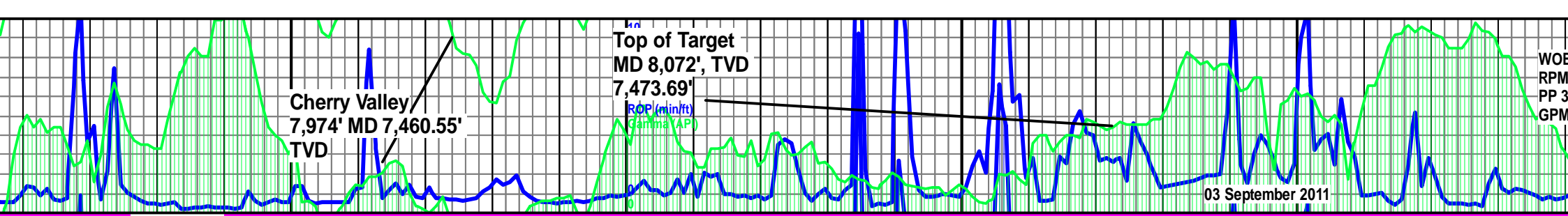
7443 INC 58.10 AZM 267.00 TVD 7250.91 VS 313.21	MD 7506 INC 58.60 AZM 271.00 TVD 7283.98 VS 359.67	MD 7568 INC 60.90 AZM 276.80 TVD 7315.23 VS 408.18	MD 7631 INC 64.00 AZM 282.50 TVD 7344.38 VS 460.88
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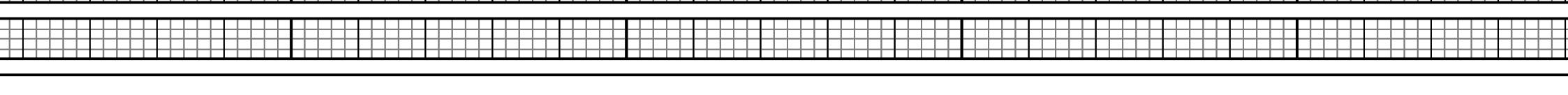
Note: TVD Scale Change



ed-dk gy, sft-frm, sb rthy tex, sl calc, tr	7690-7720 SH: md-dk gy, sft-frm, sb blkly-blky, rthy tex, tr dsem pyr, tr free cal, sl calc	7720-7750 SH: md-dk gy, sft-frm, sb blkly-blky, rthy tex, tr dsem & nod pyr, tr free cal	7750-7780 SH: md-dk gy, sft-frm, sb blkly-blky, rthy tex, tr dsem pyr, tr free cal, sl calc  Scale Change 7500 (-6157)	7780-7810 SH: md-dk gy, sft-frm, sb blkly-blky, rthy tex, tr free cal; tr LS: wkst, md gy,vf gr, fri-hrd, rthy tex  7500 (-6157)	7810-7840 SH: md-dk gy, sft-frm, sb blkly-blky, rthy tex, tr free cal tr dsem pyr; tr LS: wkst, md gy,vf gr, fri-hrd, rthy tex	7840-7870 SH: md-dk gy, sft-frm, sb blkly-blky, rthy tex, tr dsem pyr, tr free cal, sl calc	7870-7900 SH: dk gy-blk, sft-frm, sb plty-blky, rthy tex, tr dsem & nod pyr, tr free cal, sl cal; tr LS: wkst, md gy,vf gr, fri-hrd, rthy tex	7900-7930 plty-blky tr free cal
MD 7694 INC 65.10 AZM 288.00 TVD 7371.74 VS 516.13			MD 7757 INC 68.00 AZM 288.90 TVD 7396.54 VS 572.95  7650 (-6307)	MD 7820 INC 70.1 AZM 291.80 TVD 7419.07 VS 631.12  7650 (-6307)			MD 7883 INC 72.90 AZM 293.50 TVD 7439.06 VS 690.50	



7350 TVD Sub Sea (-6007)		7500 (-6157)		7650 (-6307)	
7930-7960 SH: dk gy-blk, sft-frm, sb pily-blky, rthy-wxy tex, occ free cal, occ nod pyr, tr dsem pyr	7960-7990 SH: dk gy-blk, sf-frm, sb pily-blky, rthy tex, tr cal frac fl, occ free cal, occ nod & dsem pyr; tr LS: wkst, lt-md-gy, vf gr, frm-hrd, rthy tex	7990-8020 SH: dk gy-blk, sf-frm, sb pily-blky, rthy tex, tr cal frac fl & free cal, occ nod & dsem pyr; occ LS: wkst, lt-md-gy, vf gr, frm-hrd, rthy tex	8020-8050 SH: dk gy-blk, sf-frm, sb pily-blky, rthy tex, tr cal frac fl & free cal, occ nod & dsem pyr	8050-8080 SH: dk gy-blk, sft-fri, rthy tex, tr free cal, tr dsem & nod pyr	8080-8110 SH: dk gy-blk, frm, sb blkly-blky, rthy tex, sl calc, tr dsem & r nodr pyr, tr cal frac fl & free cal
MD 7947 INC 77.10 AZM 298.30 TVD 7455.63 VS 752.20			MD 8010 INC 81.90 AZM 300.00 TVD 7467.11 VS 814.12	MD 8073 INC 85.90 AZM 305.30 TVD 7473.80 VS 876.60	MD 8136 INC 88.40 AZM 307.30 TVD 7476.60 VS 938.90



B(RT/OR) 23/28  
 (RT/MM) 30/151  
 400 SPM(1/2) 107/107  
 520

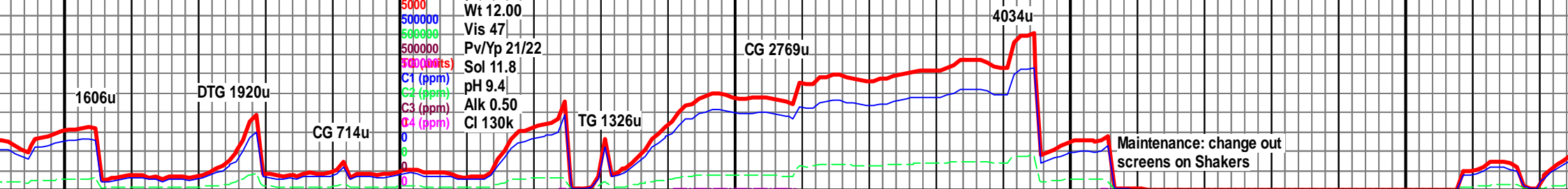
WOB(RT/OR) 18/30  
 RPM(RT/MM) 30/148  
 PP 3300 SPM(1/2) 105/105  
 GPM 510

ROP (min/ft)  
 Gamma (AP)

04 September 2011

Bit #7; Size: 7 7/8  
 Make: Security; Model: FXD54M  
 S/N: 11818491; Jets: 5x14  
 1.15 Mud motor; in @ 8,224'

8150 0-15R 8200 8250 8300 180R 8350



Wt 12.00  
 Vis 47  
 Pv/Yp 21/22  
 Sol 11.8  
 pH 9.4  
 Alk 0.50  
 Cl 130k

Note: TVD  
 Scale Change

Visible Gas Escaping From Sample

Visible Gas Escap

7400 TVD  
 Sub Sea (-6057)

8200-8230 SH: blk, frm, sb blkly-blky, rthy-sm tex, sl calc, tr dsem & rr nodr pyr, rr cal frac fl, tr LS: wkst, lt-med gy mot, micxn, blk, sft, rthy tex, no vis por

8230-8260 SH: blk, tr dk gy, frm-hd, rthy tex, sl calc, tr dsem & occ nodr pyr, tr cal frac fl

8260-8290 SH: dk gy-blk, frm, sb blkly-blky, rthy tex, sl calc, tr dsem & nodr pyr, tr cal frac fl

8290-8320 SH: dk gy-blk, frm, sb blkly-blky, rthy tex, sl calc, tr dsem & rr nodr pyr, tr cal frac fl

8320-8350 SH: dk gy-blk, sft-frm, sb blkly-blky, rthy tex, sl calc, tr dsem & nodr pyr, tr cal frac fl; tr LS: wkst-mdst, lt-med gy mot, micxn, blk, sft, rthy tex, no vis por

8350-8380 SH: dk gy-blk, sft-frm blkly-blky, rthy tex, sl calc, tr dsem & nodr pyr, tr cal frac fl; rr LS: wkst-mdst, lt-med gy mot, micxn, blk, sft, rthy tex, no vis por

Scale Change  
 7450  
 (-6107)

8140-8170 SH: dk gy-blk, frm, sb blkly-blky, rthy tex, sl calc, tr dsem & nodr pyr, tr cal frac fl & free cal

8170-8200 SH: dk gy-blk, frm-hd, sb blkly-blky, rthy tex, sl calc, tr dsem & nodr pyr, rr cal frac fl; com LS: wkst; lt-med gy mot, micxn, blk, sft, rthy tex, no vis por

30  
 .94  
 9

MD 8176  
 INC 90.50  
 AZM 309.90  
 TVD 7477.32  
 VS 978.42

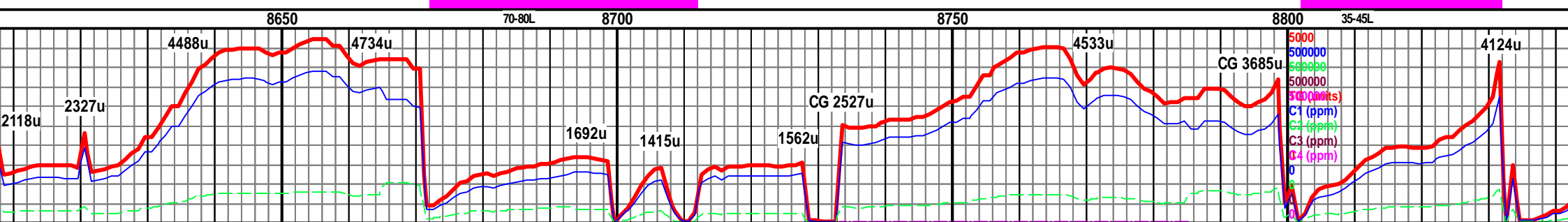
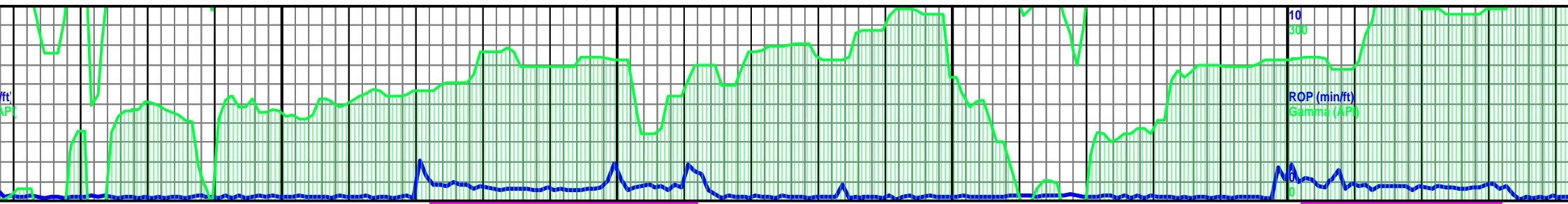
7500  
 (-6157)

MD 8239  
 INC 95.60  
 AZM 312.80  
 TVD 7473.97  
 VS 1039.83

MD 8302  
 INC 94.20  
 AZM 312.80  
 TVD 7468.59  
 VS 1100.77

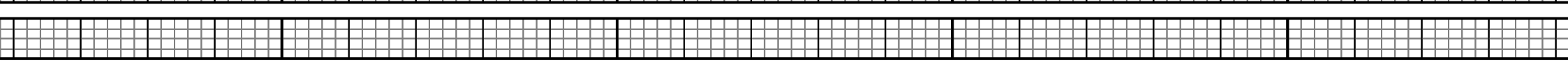
MD 8363  
 INC 92.90  
 AZM 313.70  
 TVD 7464.81  
 VS 1159.76

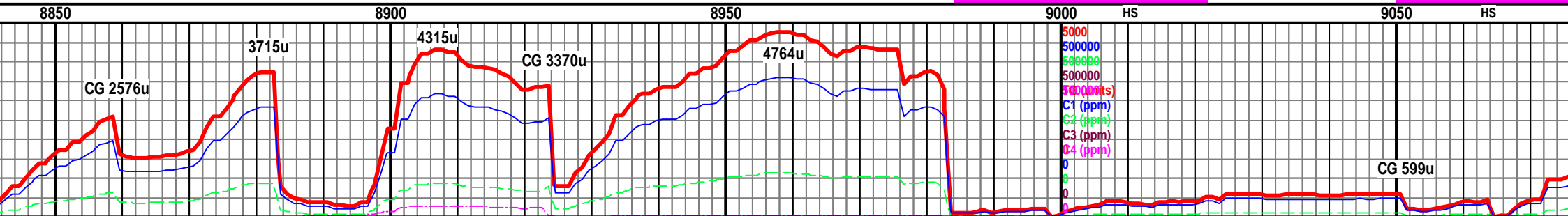
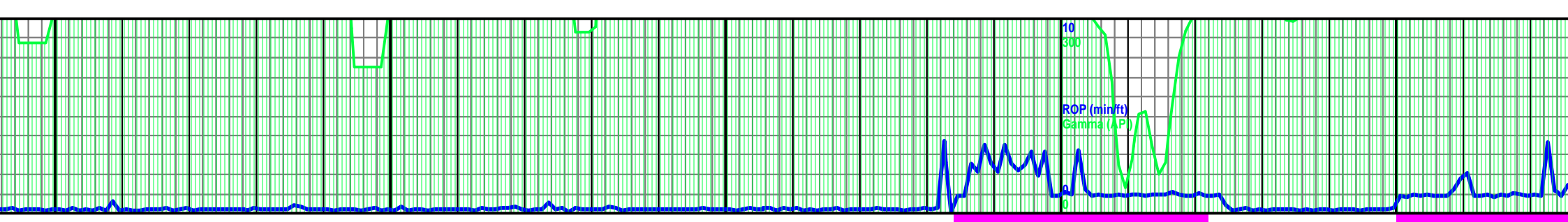




6057	Visible Gas Escaping From Sample				Visible Gas Escaping From Sample				7400 TVD Sub Sea (-6057)
8620-8650 SH: dk gy-blk, sft-frm, sb plty-sb blk, rthy tex, calc, tr dsem & nodr pyr, tr cal frac fl	8650-8680 SH: dk gy-blk, sft-frm, sb blk, rthy tex, sl calc, tr dsem & nodr pyr, tr cal frac fl & free cal	8680-8710 SH: dk gy-blk, frm, sb blk, rthy tex, sl calc, tr dsem & rr nodr pyr, tr cal frac fl; tr LS: wkst, lt-med gy mot, micxn, blk, sft, rthy tex, no vis por	8710-8740 SH: dk gy-blk, frm, sb blk, rthy tex, sl calc, tr dsem & rr nodr pyr, tr cal frac fl; occ LS: wkst, lt-med gy mot, micxn, blk, sft, rthy tex, no vis por	8740-8770 SH: dk gy-blk, frm, sb blk, rthy tex, sl calc, tr dsem & nodr pyr, tr cal frac fl; tr LS: wkst, lt-med gy mot, micxn, sft, blk, rthy tex, no vis por	8770-8800 SH: dk gy-blk, sft-frm, sb blk, rthy tex, sl calc, tr dsem & nodr pyr, tr cal fac fl & free cal	8800-8830 SH: dk gy-blk, sft-frm, sb blk, rthy tex, sl calc, tr dsem & nodr pyr, tr cal fac fl	8830-8860 SH: dk gy-blk, sft-frm, sb blk, rthy tex, sl calc, tr dsem & nodr pyr, tr cal fac fl	7450 (-6107)	

MD 8614 INC 89.10 AZM 315.00 TVD 7457.34 VS 1400.20	MD 8677 INC 89.00 AZM 313.50 TVD 7458.39 VS 1460.95	MD 8740 INC 88.60 AZM 312.00 TVD 7459.71 VS 1522.11	MD 8803 INC 88.80 AZM 310.90 TVD 7461.14 VS 1583.59
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Visible Gas Escaping From Sample

7400 TVD  
Sub Sea (-6057)

dk gy-blk, sft-frm, sb tex, sl calc, tr dsem & fac fl & free cal	8860-8890 SH: dk gy-blk, sft-frm, sb pty-blky, rthy tex, sl calc, tr nodr pyr, tr cal fac fl & free cal	8890-8920 SH: dk gy-blk, sft-fri, sb pty-blky, rthy tex, sl calc, tr dsem & nodr pyr, tr cal fac fl & free cal	8920-8950 SH: dk gy-blk, sft-frm, sb pty-sb blky, rthy tex, tr free cal, tr dsem pyr, sl calc	8950-8980 SH: dk gy-blk, sft-frm, sb pty-sb blky, rthy tex, tr free cal, tr dsem pyr, sl calc	8980-9010 SH: dk gy-blk, sft-frm, sb pty-sb blky, rthy tex, tr free cal & cal frac fl, tr dsem pyr	9010-9040 SH: dk gy-blk, sft-frm, sb pty-sb blky, rthy tex, tr free cal & cal frac fl, tr dsem & nod pyr, sl calc	9040-9070 SH: dk gy-blk, sft-frm, sb pty-sb blky, rthy tex, tr free cal, tr dsem pyr, sl calc	9070-9 pty-bl pyr
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7450  
(-6107)

MD 8867  
INC 90.20  
AZM 309.30  
TVD 7461.69  
VS 1646.38

MD 8930  
INC 89.90  
AZM 310.40  
TVD 7461.64  
VS 1708.23

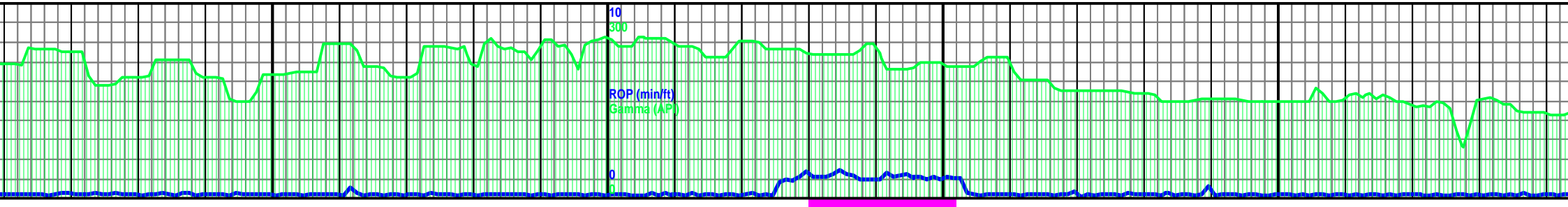
MD 8993  
INC 90.40  
AZM 311.00  
TVD 7461.47  
VS 1769.91

7500  
(-6157)

MD 9056  
INC 92.60  
AZM 310.40  
TVD 7459.83  
VS 1831.56







9350 9400 90R 9450 9500

Maintenance: Work on Shaker

5000  
50000  
500000  
500000  
500000  
300 (units)  
C1 (ppm)  
C2 (ppm)  
C3 (ppm)  
C4 (ppm)  
0  
0  
0  
0

1053u

CG 1029u

7400 TVD  
Sub Sea (-6057)

Visible Gas Escaping From Sample

9310-9340 SH: dk gy-blk, sft-frm, sb plty-blky, rthy tex, tr free & frac fl cal, tr nod & dsem pyr, sl calc

9340-9370 SH: dk gy-blk, sft-frm, sb blky-blky, rthy tex, tr free cal, tr nod & dsem pyr, sl calc

9370-9400 SH: dk gy-blk, sft-fri, sb blky-blky, rthy tex, tr free & frac fl cal, tr nod pyr

9400-9430 SH: dk gy-blk, sft-frm, sb plty-blky, rthy tex, tr free & frac fl cal, tr nod & dsem pyr

9430-9460 SH: dk gy-blk, sft-frm, sb plty-blky, rthy tex, tr free & frac fl cal, tr nod & dsem pyr, sl calc

7450  
(-6107)

9460-9490 SH: dk gy-blk, sft-fri, blky, rthy tex, tr free cal, tr nod pyr, tr qtz, sl calc

9490-9520 SH: dk gy-blk, sft-fri, blky, rthy tex, tr free cal, tr nod pyr, tr qtz, sl calc

9520-9550 SH: dk gy-blk, sft-frm, blky-blky, rthy tex, tr free & frac fl cal, tr nod & dsem pyr

MD 9372  
INC 92.90  
AZM 309.60  
TVD 7443.80  
VS 2141.88

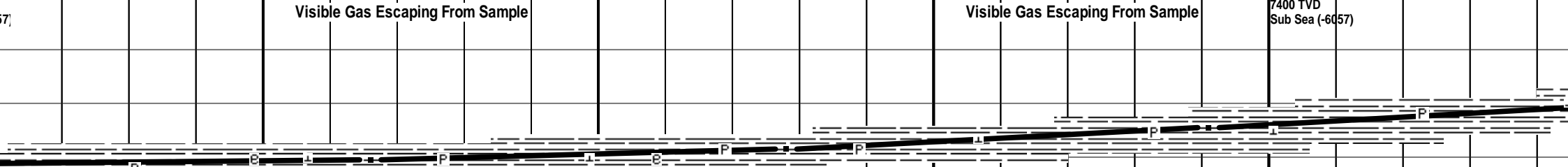
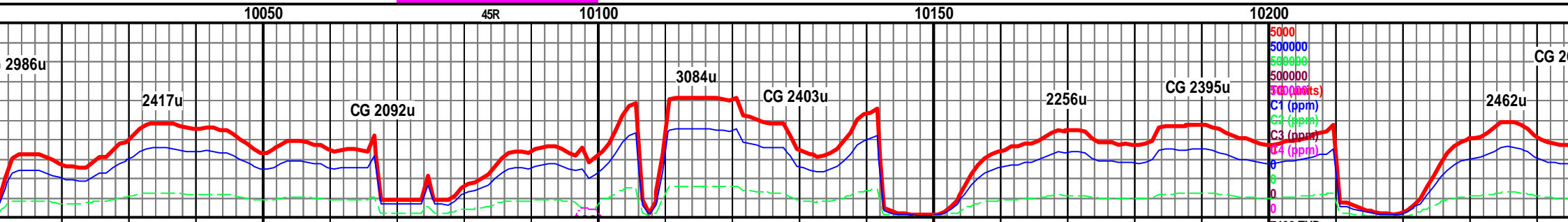
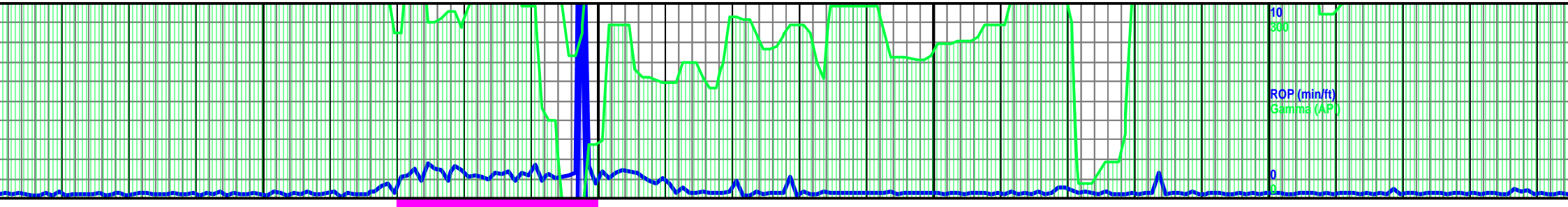
7500  
(-6157)

MD 9435  
INC 92.50  
AZM 310.10  
TVD 7440.83  
VS 2203.67

MD 9499  
INC 92.80  
AZM 311.20  
TVD 7437.87  
VS 2266.26







10003 90.80 309.40 7431.24 2756.71	10030-10060 SH: dk gy-blk, sft-frm, sb pty-sb blk, rthy tex, sl calc, tr dsem & nodr pyr, tr free cal	10060-10090 SH: dk gy-blk, sft-frm, sb pty-sb blk, rthy tex, calc, tr dsem & nodr pyr, tr free cal	10090-10120 SH: dk gy-blk, sft-frm, sb pty-sb blk, rthy tex, sl calc, tr dsem & nodr pyr, tr free cal	10120-10150 SH: dk gy-blk, frm, sb pty-sb blk, rthy tex, sl calc, tr dsem & nodr pyr; tr LS: wkst, lt-med gy mot, micln, blk, sft, rthy tex, tr vis por	10150-10180 SH: dk gy-blk, frm, sb pty-sb blk, rthy tex, sl calc, tr dsem & nodr pyr; tr LS: wkst, lt-med gy mot, micln, blk, sft, rthy tex, tr vis por	10180-10210 SH: dk gy-blk, sft-frm, sb blk-blk, rthy tex, sl calc, tr dsem & nodr pyr	10210-10240 SH: dk gy-blk, sft-frm, sb blk-blk, rthy tex, sl calc, tr dsem & nodr pyr	10240-10270 SH: dk gy-blk, sft-frm, sb blk-blk, rthy tex, sl calc, tr dsem & nodr pyr
MD 10066 INC 90.50 AZM 309.60 TVD 7430.53 VS 2818.63				MD 10128 INC 93.40 AZM 311.30 TVD 7428.42 VS 2879.34		MD 10191 INC 93.80 AZM 311.60 TVD 7424.46 VS 2940.72		

ROP (min/ft)  
Gamma (AP)

5000  
50000  
500000  
5000000  
50000000

300 (units)  
C1 (ppm)  
C2 (ppm)  
C3 (ppm)  
0.4 (ppm)

7400 TVD  
Sub Sea (-6057)

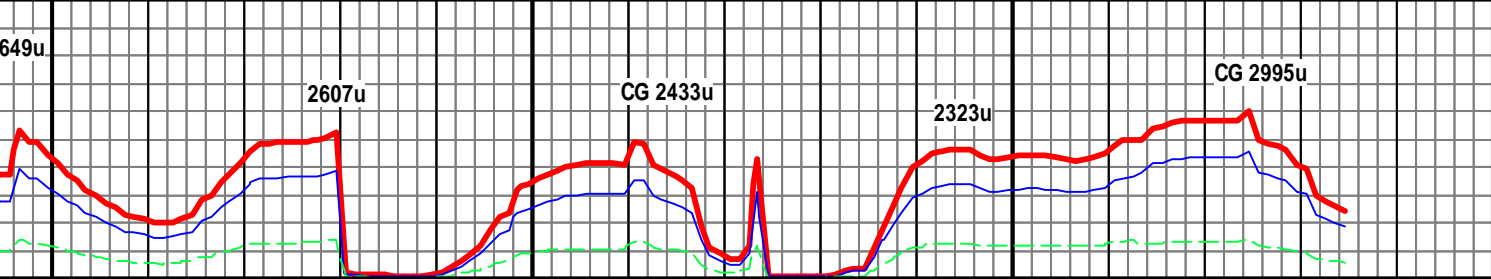
7450  
(-6107)

7500  
(-6157)

Total Depth of 10,385'  
reached @ 1322 hrs EDT on  
05 September 2011

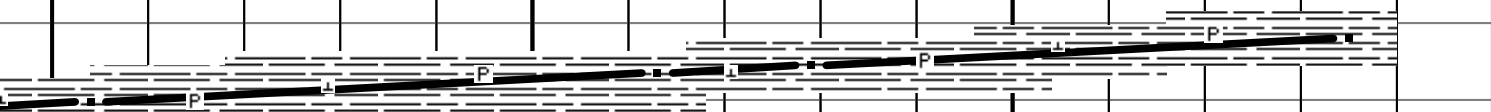
Bit #7 2,161' in  
16.8 hours

10250 10300 10350 10400



Visible Gas Escaping From Sample

Visible Gas Escaping From Sample



Bottom Hole Location:  
1,511.58' North & 2,740.53' West of  
Surface Location

10270-10270 SH: dk gy-blk, sft-frn, sb  
blky, rthy tex, sl calc, tr dsem &  
pyr, tr pyr frac fl

10270-10300 SH: dk gy-blk, sft-frn, sb  
blky-blky, rthy tex, sl calc, tr dsem &  
nodr pyr

10300-10330 SH: dk gy-blk, sft-frn, sb  
blky-blky, rthy tex, sl calc, tr dsem &  
nodr pyr

10330-10360 SH: dk gy-blk, sft-frn, sb  
blky-blky, rthy tex, sl calc, tr dsem pyr

10360-10385 SH: dk gy-blk, sft-frn, sb  
blky-blky, rthy tex, sl calc, tr dsem &  
nodr pyr

MD 10254  
INC 93.70  
AZM 311.20  
TVD 7420.34  
VS 3002.10

MD 10313  
INC 93.70  
AZM 311.50  
TVD 7416.34  
VS 3059.60

MD 10329  
INC 93.70  
AZM 311.40  
TVD 7415.50  
VS 3075.19

Projection to Bit:  
MD 10385  
INC 93.70  
AZM 311.40  
TVD 7411.89  
VS 3129.75