



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

Well Name: Horsetail 07E-1804  
Well Id: 05-123-41645-00  
Location: Sec 7-T10N-R57W  
License Number: 05-123-41645-00  
Spud Date: 2/16/2016  
Surface Coordinates: Lat.: 40.85395 Long.: -103.800825

Region: Redtail Field  
Drilling Completed: 2/20/2016

Bottom Hole  
Coordinates:  
Ground Elevation (ft): 4927  
Logged Interval (ft): 5124 To: 13948  
Formation: Pierre, Sharon Springs, Niobrara A, Niobrara B  
Type of Drilling Fluid: Water Based Mud

K.B. Elevation (ft): 4948  
Total Depth (ft): 13948

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

#### OPERATOR

Company: Whiting Oil & Gas Corp.  
Address: 1700 Broadway Suite 2300  
Denver, CO 80290

#### GEOLOGIST

Name: Eli DenBesten and Todd Nakata  
Company: Acme Geologic Consulting  
Address: 108 Berry Street  
Little Rock, AR 72205

## Drilling Company

Unit Drilling Company  
Rig 409

## Gas Detection

Mudlogging Systems, Inc., M Logger, Model TGC, Total Gas and Chromatograph

## Comments

Lithologies and tops at drilled depths, not corrected to elogs. Where the well bore gas is 100% methane, the C1 line is moved to 85% for graphical purposes only.

## ROCK TYPES

 Anhy  
 Bent  
 Brec  
 Cht  
 Clyst

 Coal  
 Congl  
 Dol  
 Gyp  
 Igne

 Lmst  
 Meta  
 Cyan mrlst  
 Mrlst  
 Salt

 Shale  
 Shcol  
 Shgy  
 Sltst  
 Ss







 Till  
 Cyan chk  
 Chalk

## ACCESSORIES

**MINERAL**  
 Anhy  
 Arggrn  
 Arg  
 Bent  
 Bit  
 Brecfrag  
 Calc  
 Carb  
 Chtdk  
 Chtlt  
 Dol  
 Feldspar  
 Ferrpel  
 Ferr  
 Glau

 Gyp  
 Hvymin  
 Kaol  
 Marl  
 Minxl  
 Nodule  
 Phos  
 Pyr  
 Salt  
 Sandy  
 Silt  
 Sil  
 Sulphur  
 Tuff








**FOSSIL**  
 Algae  
 Amph  
 Belm  
 Bioclst  
 Brach  
 Bryozoa  
 Cephal  
 Coral  
 Crin  
 Echin  
 Fish  
 Foram  
 Fossil  
 Gastro  
 Oolite

 Ostra  
 Pelec  
 Pellet  
 Pisolite  
 Plant  
 Strom











**STRINGER**  
 Anhy  
 Arg  
 Bent  
 Coal  
 Dol  
 Gyp  
 Ls  
 Mrst

 Sltstrg  
 Ssstrg

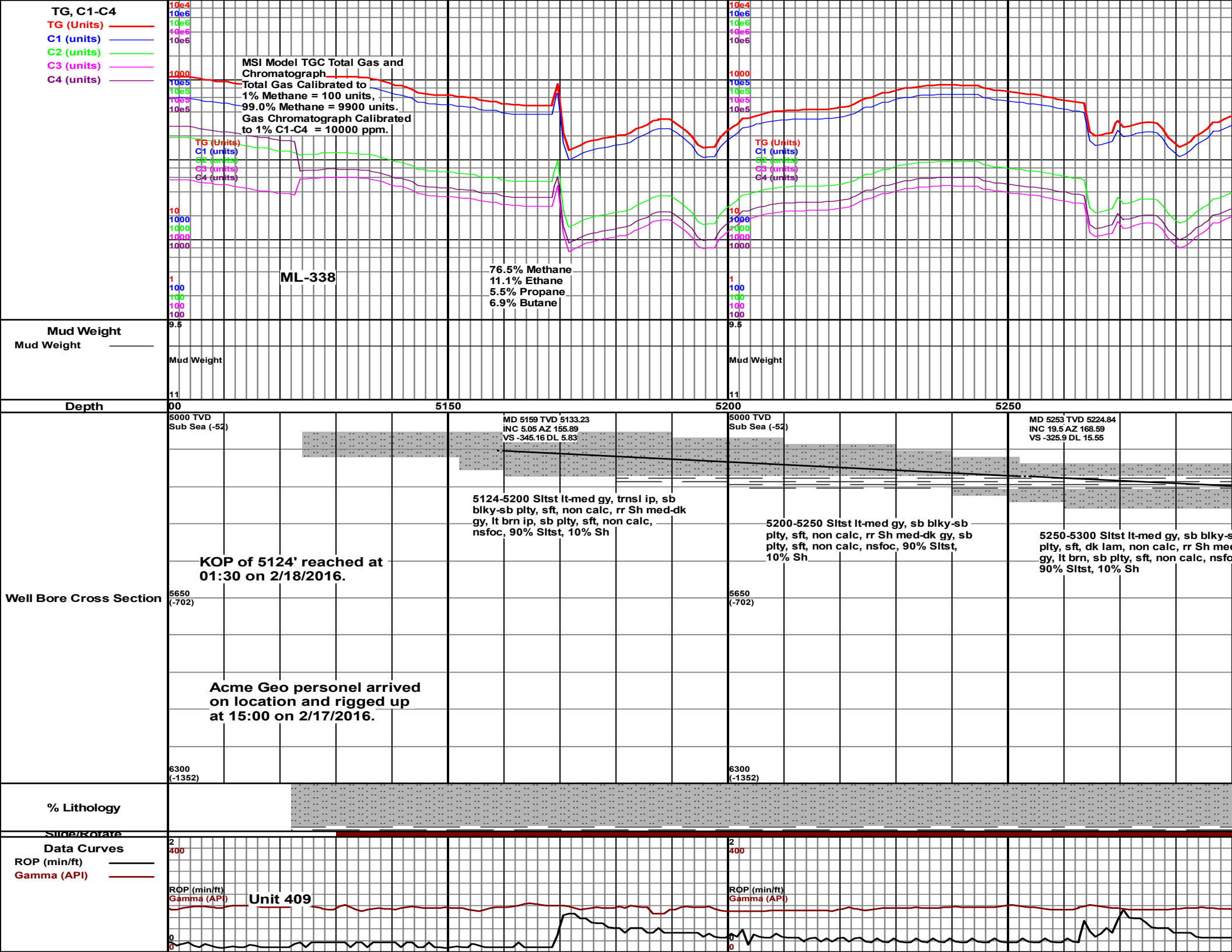
**TEXTURE**  
 Boundst  
 Chalky  
 Cryxln  
 Earthy  
 Finexln  
 Grainst  
 Lithogr  
 Microxln  
 Mudst  
 Packst  
 Wackest

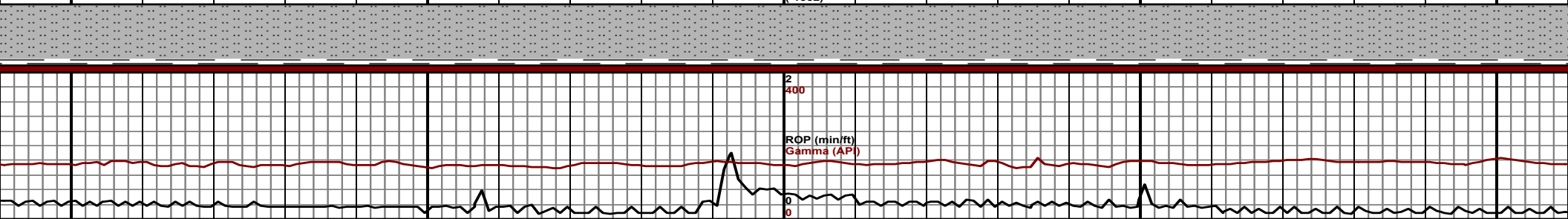
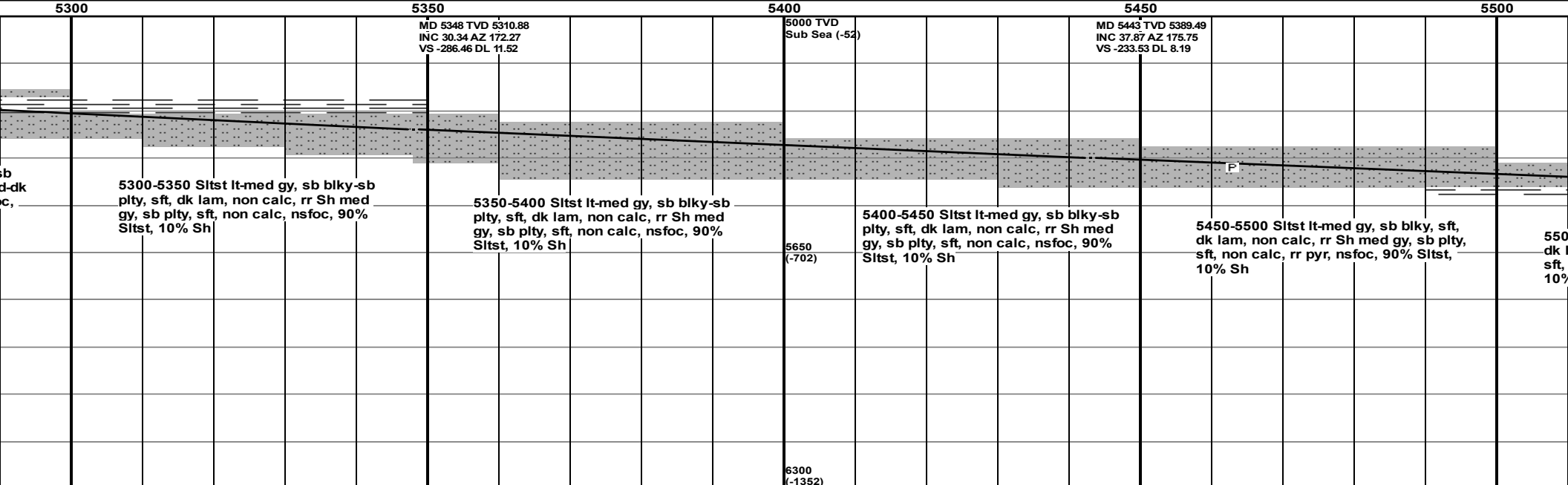
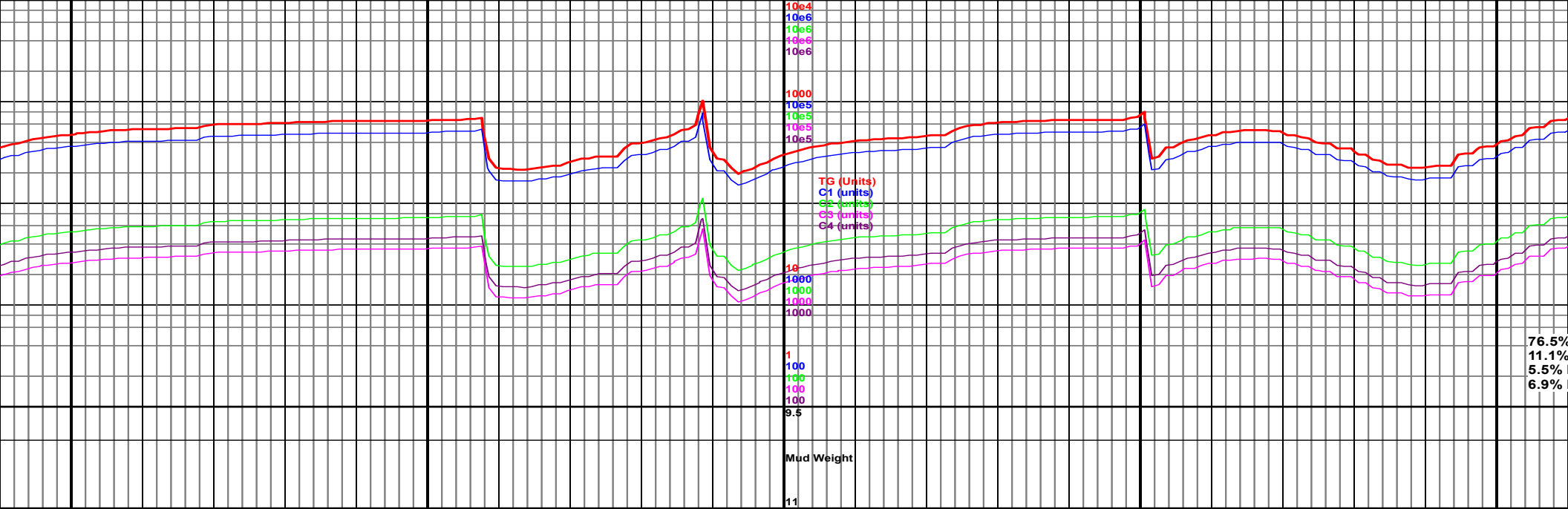
**POROSITY**  
 Earthy  
 Fenest  
 Fracture  
 Inter  
 Moldic  
 Organic  
 Pinpoint

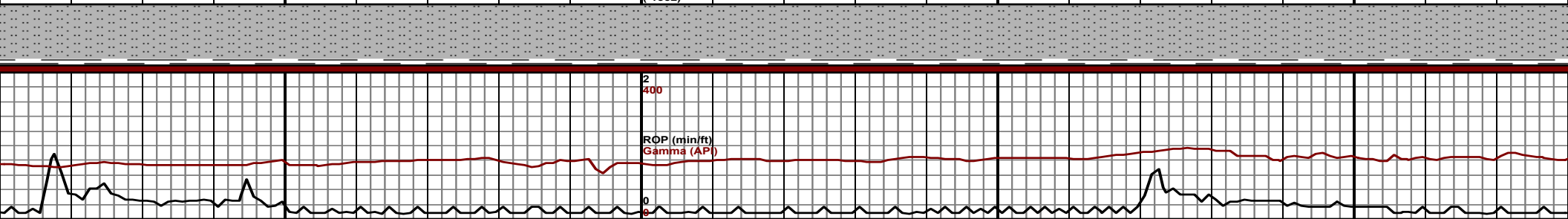
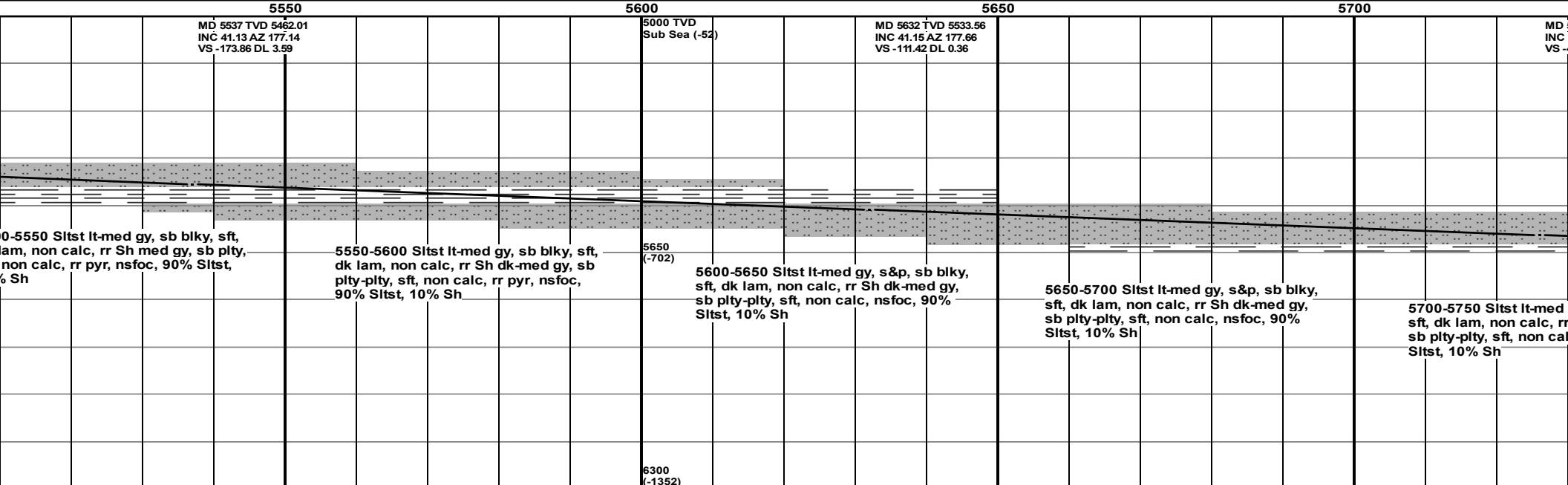
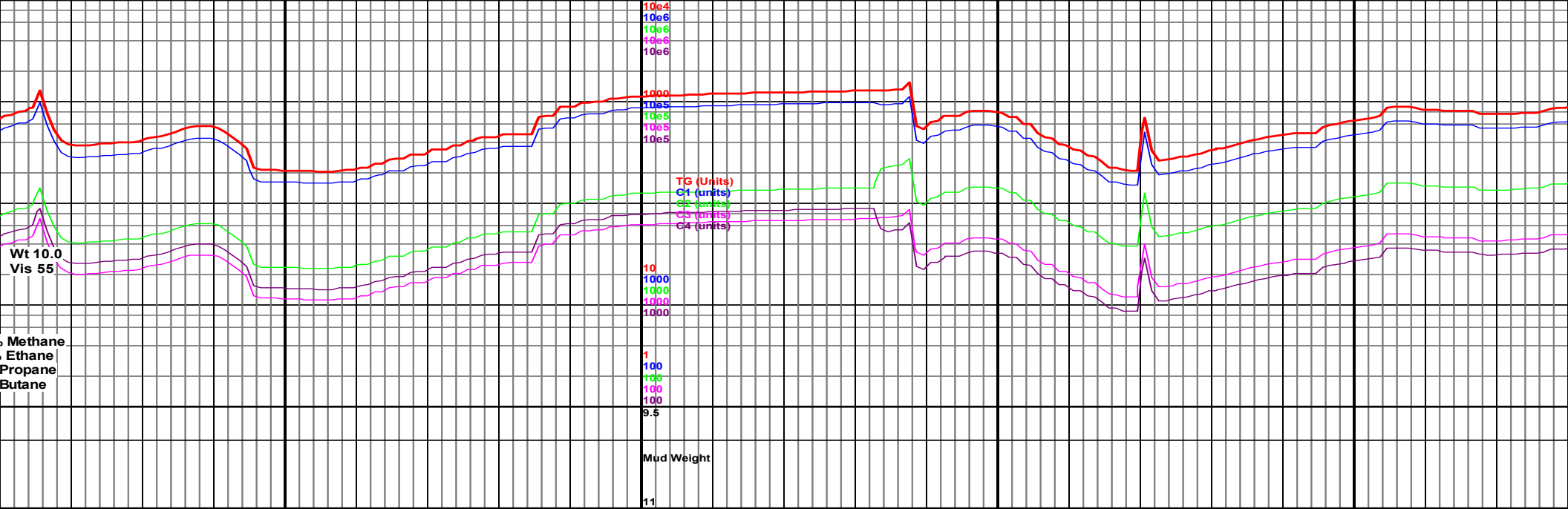
 Vuggy  
  
**SORTING**  
 Well  
 Moderate  
 Poor

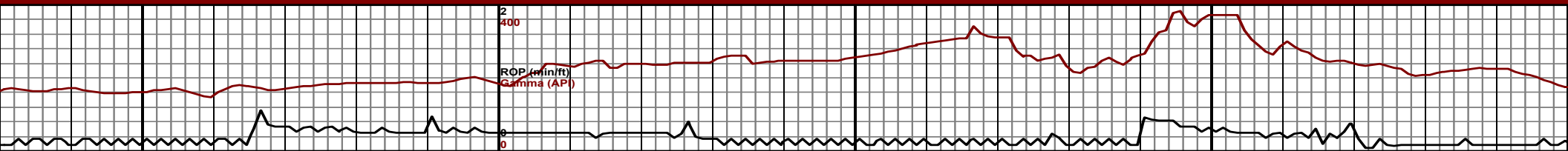
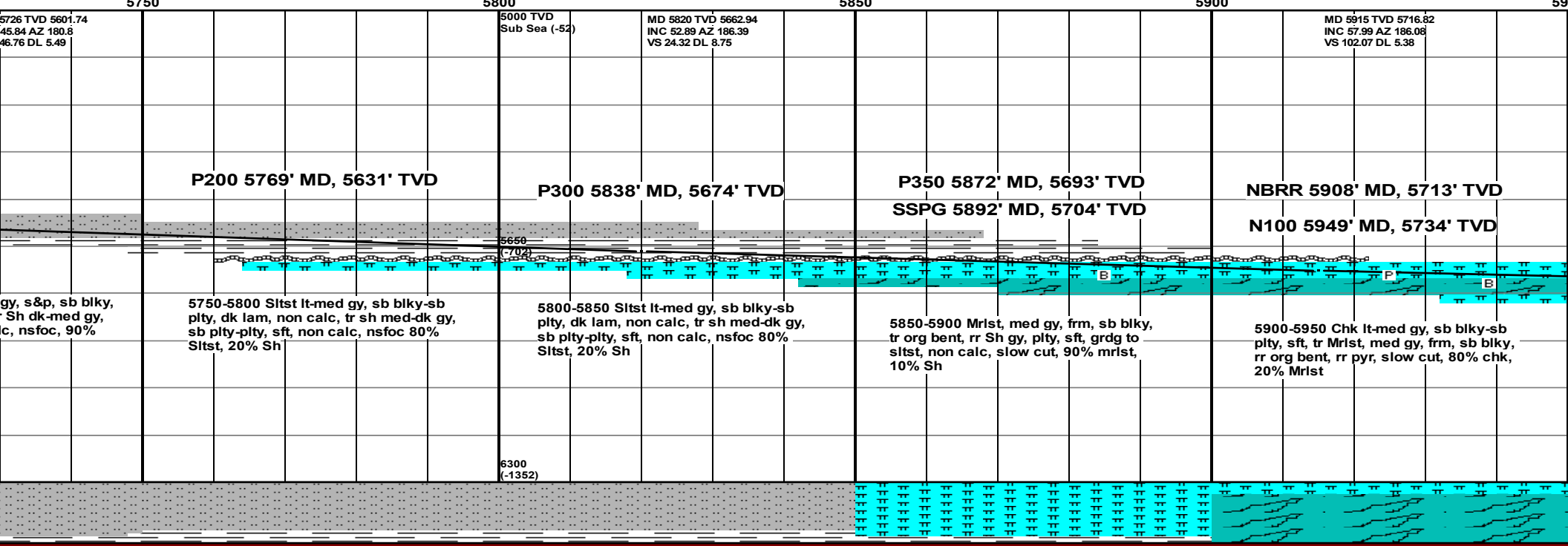
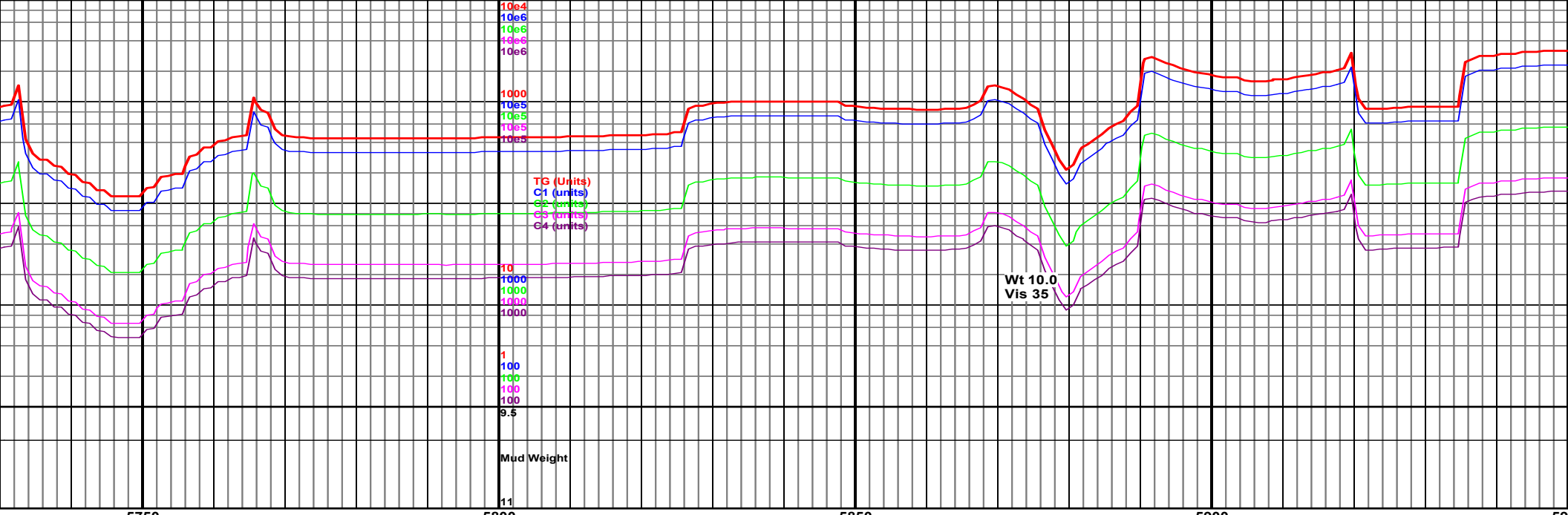
**OTHER SYMBOLS**  
  
**ROUNDING**  
 Rounded  
 Subrnd  
 Subang  
 Angular  
  
**OIL SHOW**  
 Even  
  
 Spotted  
 Ques  
 Dead  
  
**INTERVAL**  
 Core  
 Dst

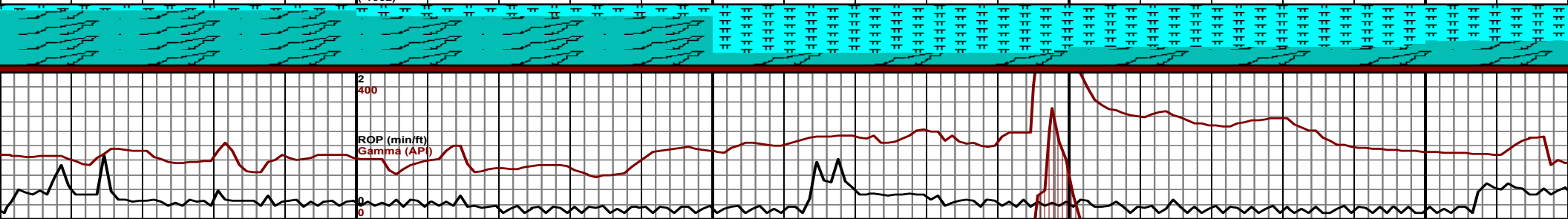
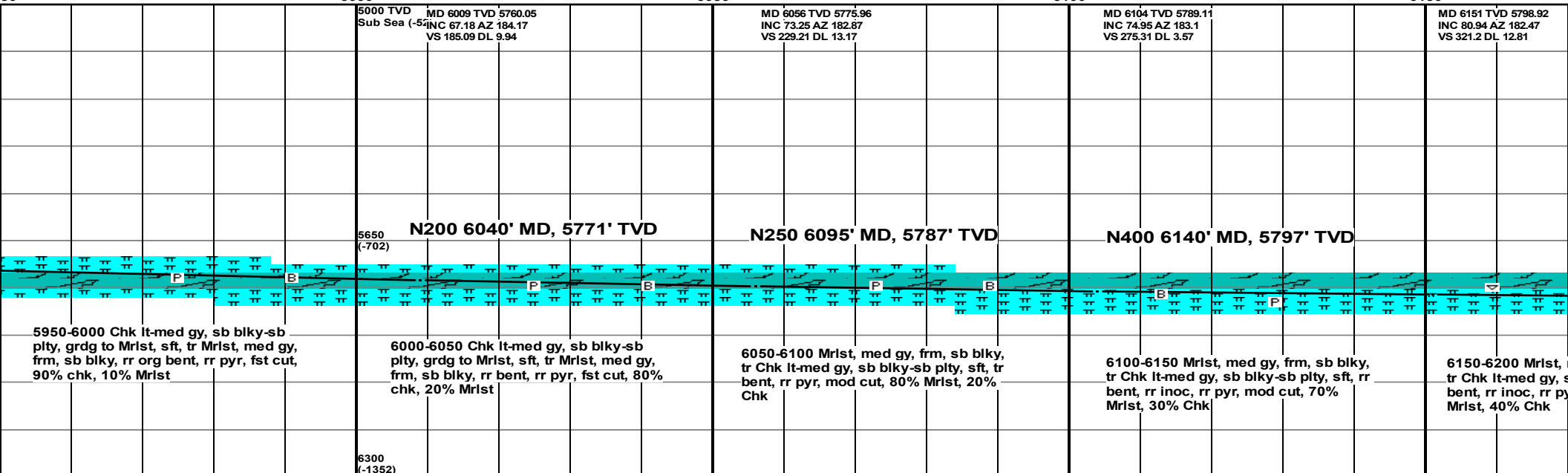
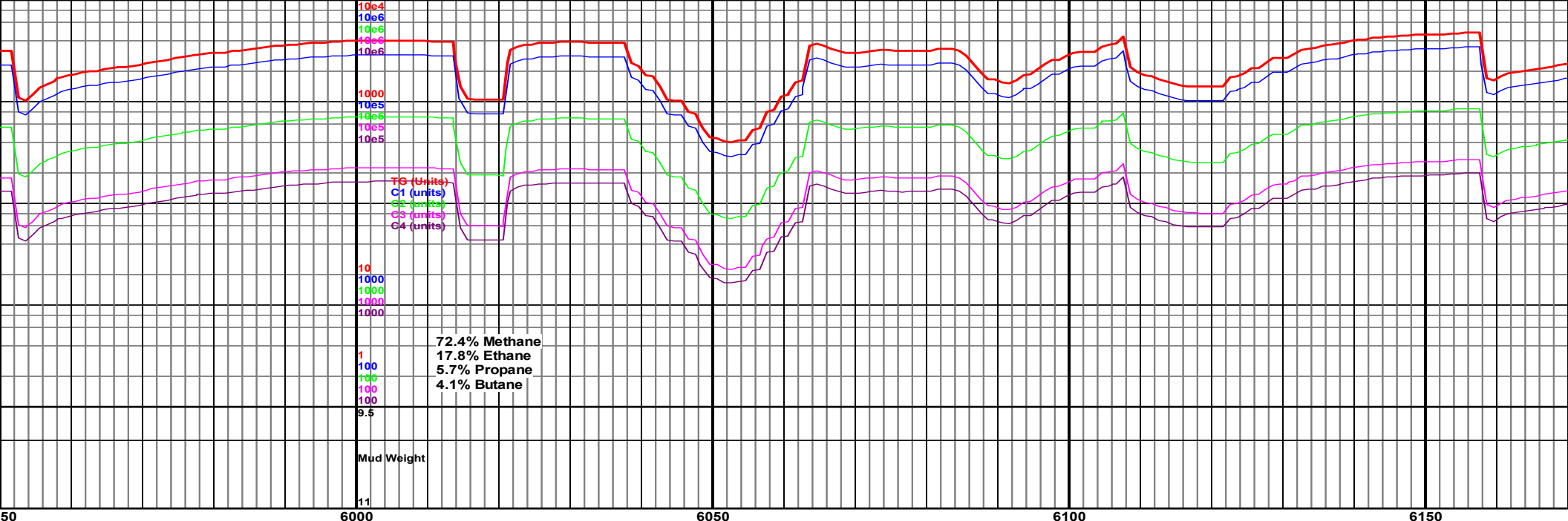
**EVENT**  
 Rft  
 Sidewall



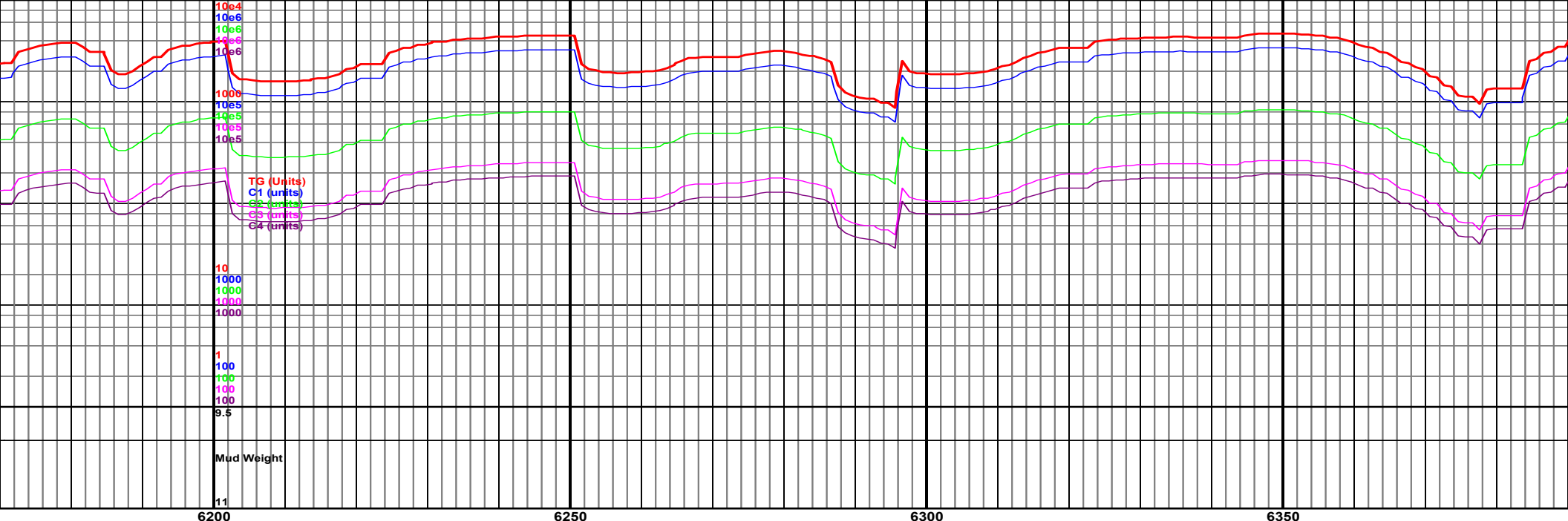












MD 6198 TVD 5905.63  
INC 82.64 AZ 182.93  
VS 367.66 DL 3.74

MD 6292 TVD 5810.91  
INC 90.91 AZ 179.94  
VS 461.39 DL 9.35

MD 6392 TVD 5710.91  
INC 90.91 AZ 179.94  
VS 461.39 DL 9.35

Curve landed at 6292' MD at  
8:33 on 2/18/2016. Lateral  
drilling continued with no  
intermediate casing break.

5650  
(-702)

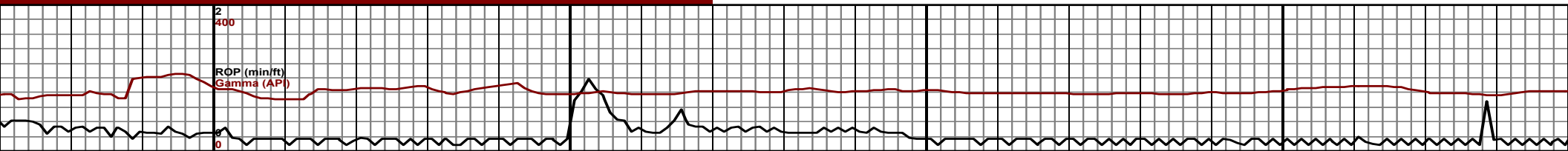
med gy, frm, sb blk, sb blk-sb plty, sft, rr bent, rr inoc, rr pyr, mod cut, 60% Mrst, 50% Chk

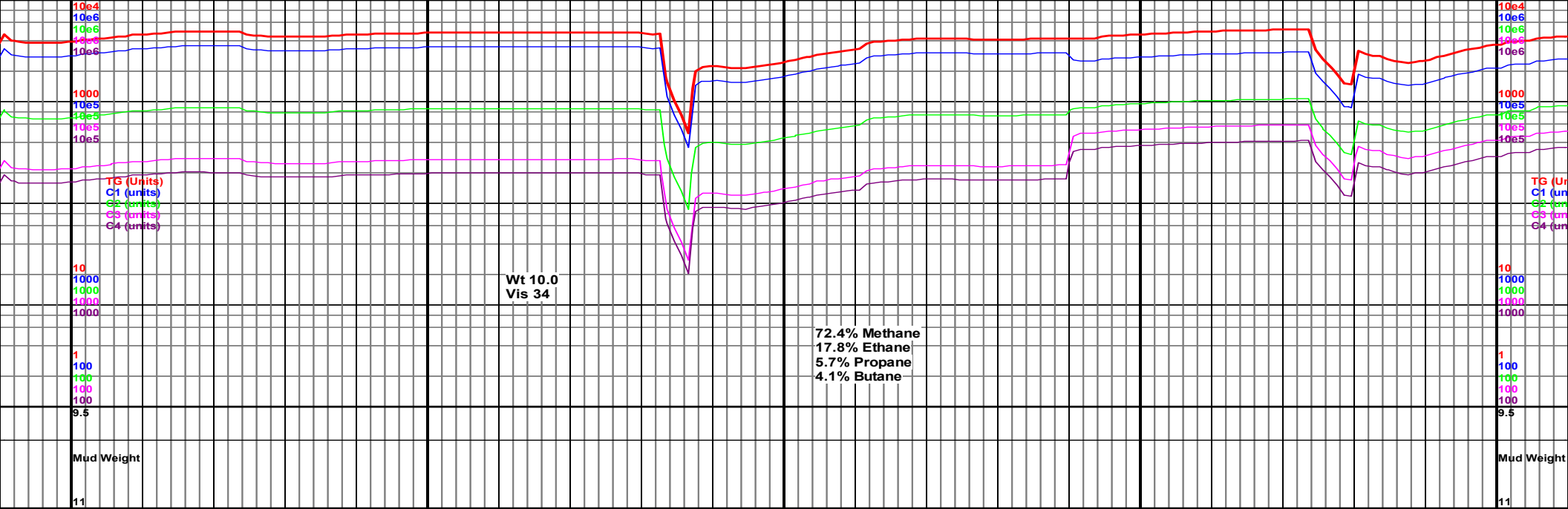
6200-6250 Mrst, med gy, frm, sb blk, tr Chk lt-med gy, sb blk-sb plty, sft, rr bent, rr inoc, rr pyr, mod cut, 50% Mrst, 50% Chk

6250-6300 Mrst, med gy, frm, sb blk, tr Chk lt-med gy, sb blk-sb plty, sft, rr bent, rr inoc, rr pyr, mod cut, 60% Mrst, 40% Chk

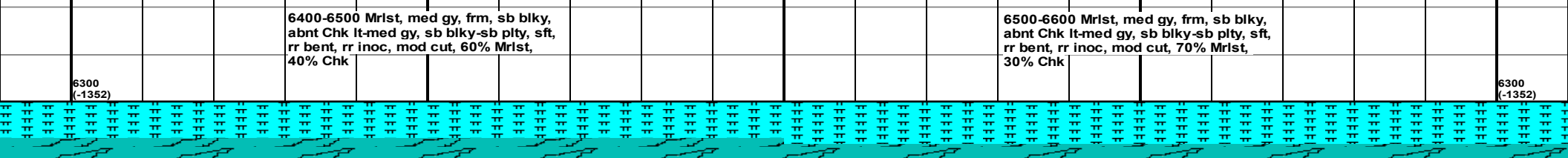
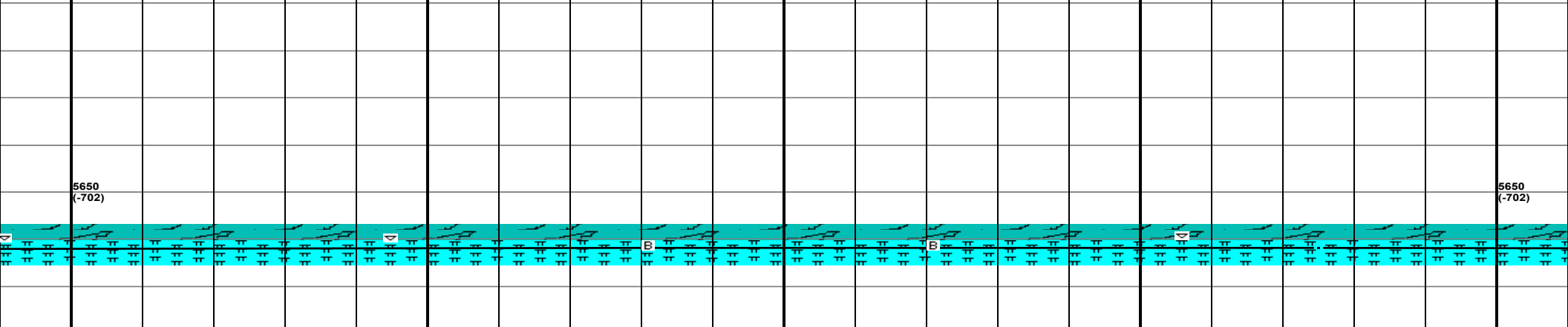
6300-6400 Mrst, med gy, frm, sb blk, abnt Chk lt-med gy, sb blk-sb plty, sft, rr bent, rr inoc, mod cut, 60% Mrst, 40% Chk

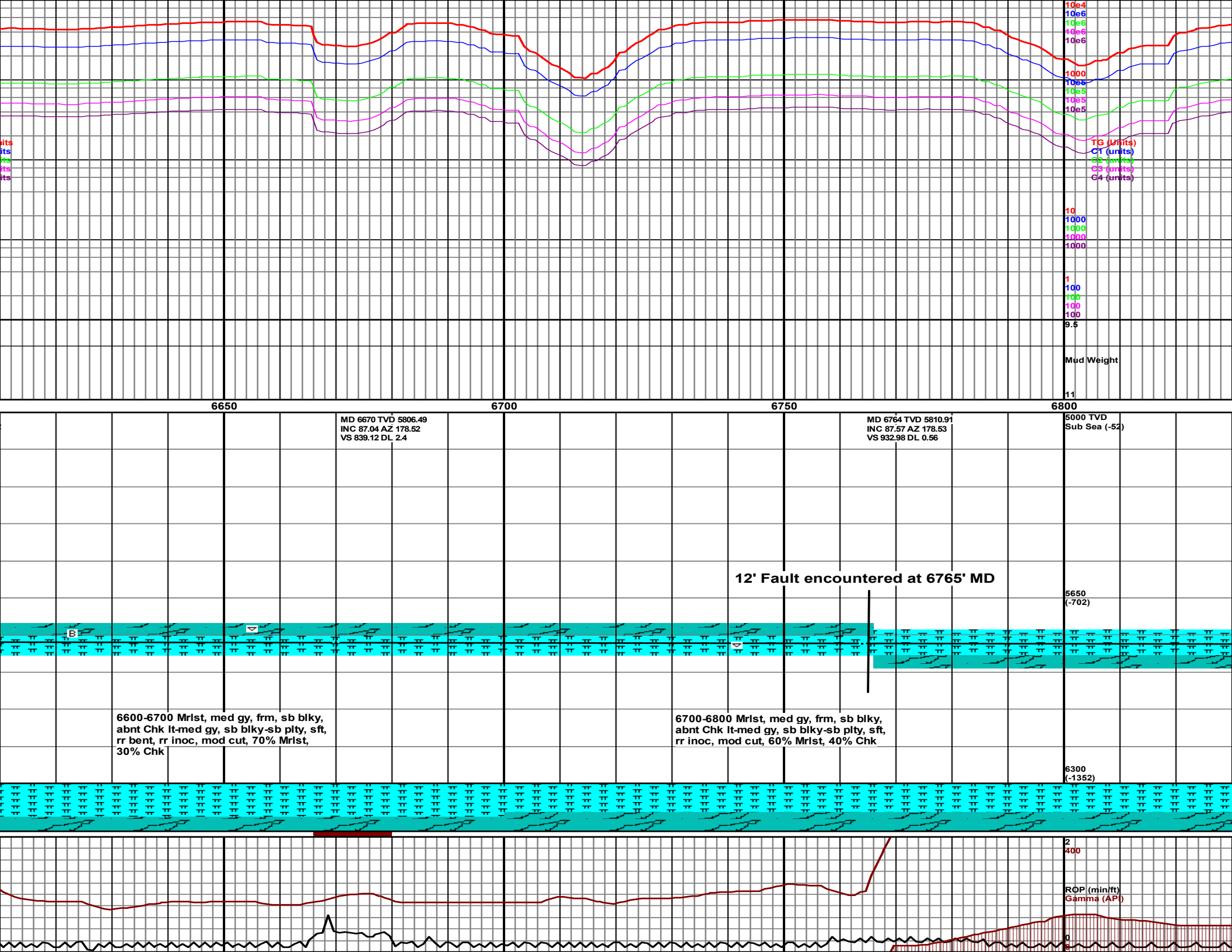
6300  
(-1352)

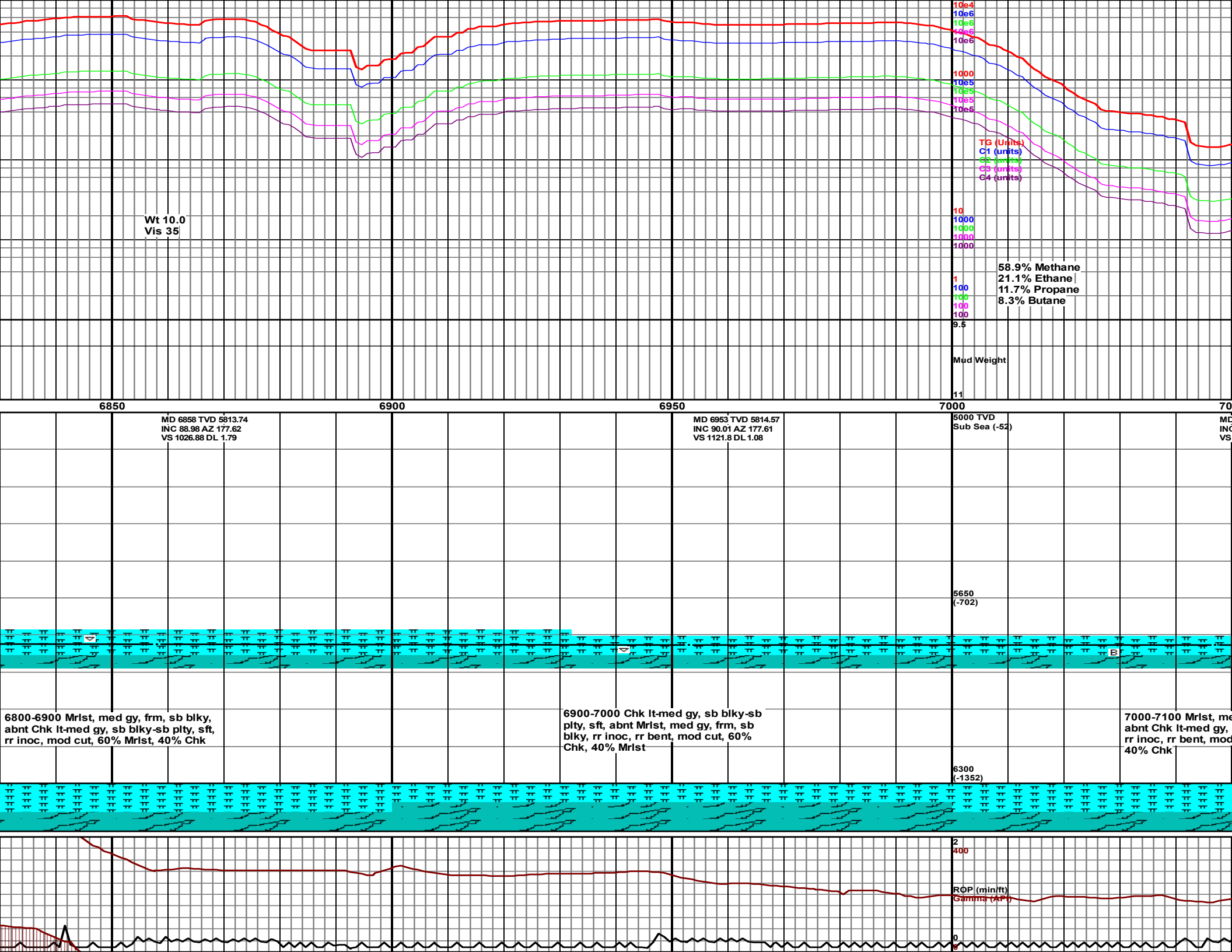


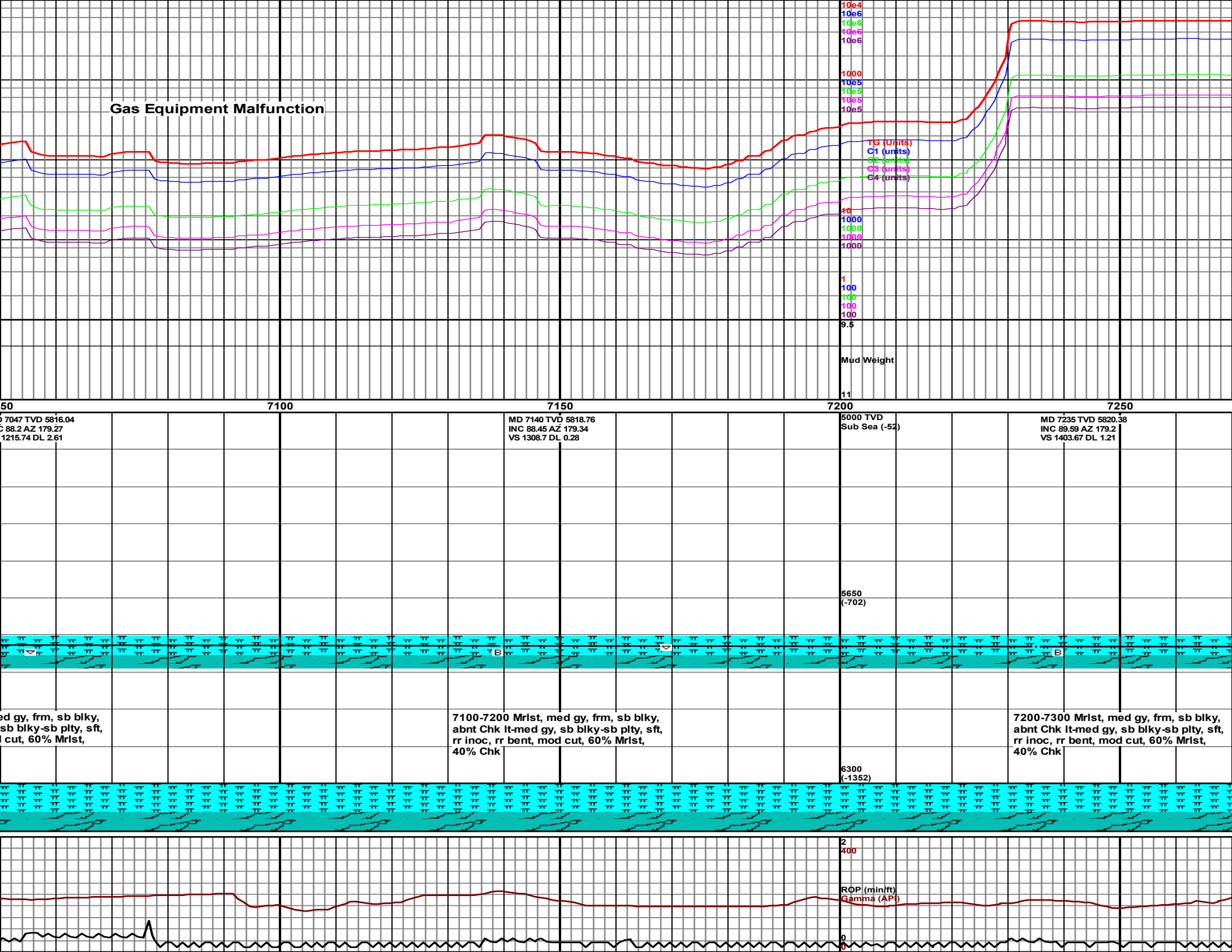


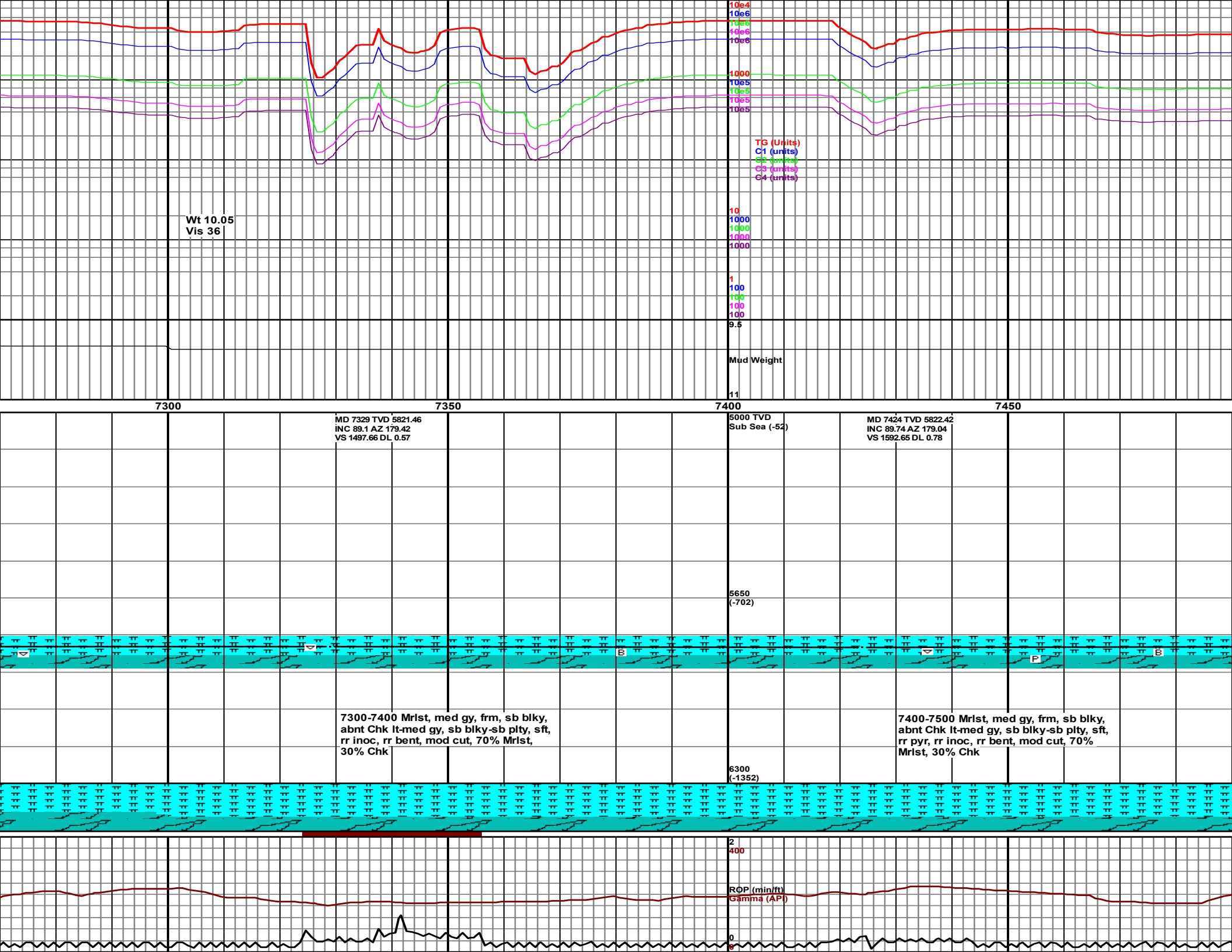
6396 TVD 5807.86 MD 6481 TVD 5904.09 MD 6575 TVD 5803.34 5000 TVD  
92.81 AZ 180.04 INC 91.74 AZ 180.45 INC 89.17 AZ 177.7 Sub Sea (-52)  
55.34 DL 2.02 VS 650.26 DL 1.21 VS 744.23 DL 4.

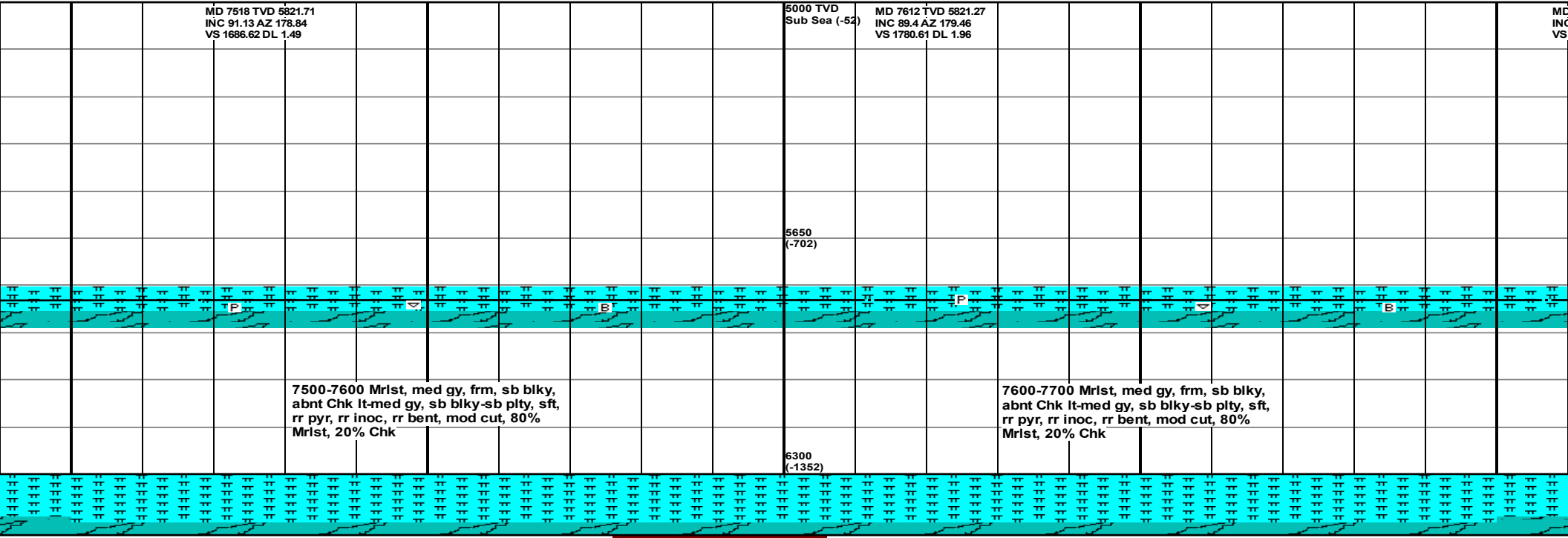


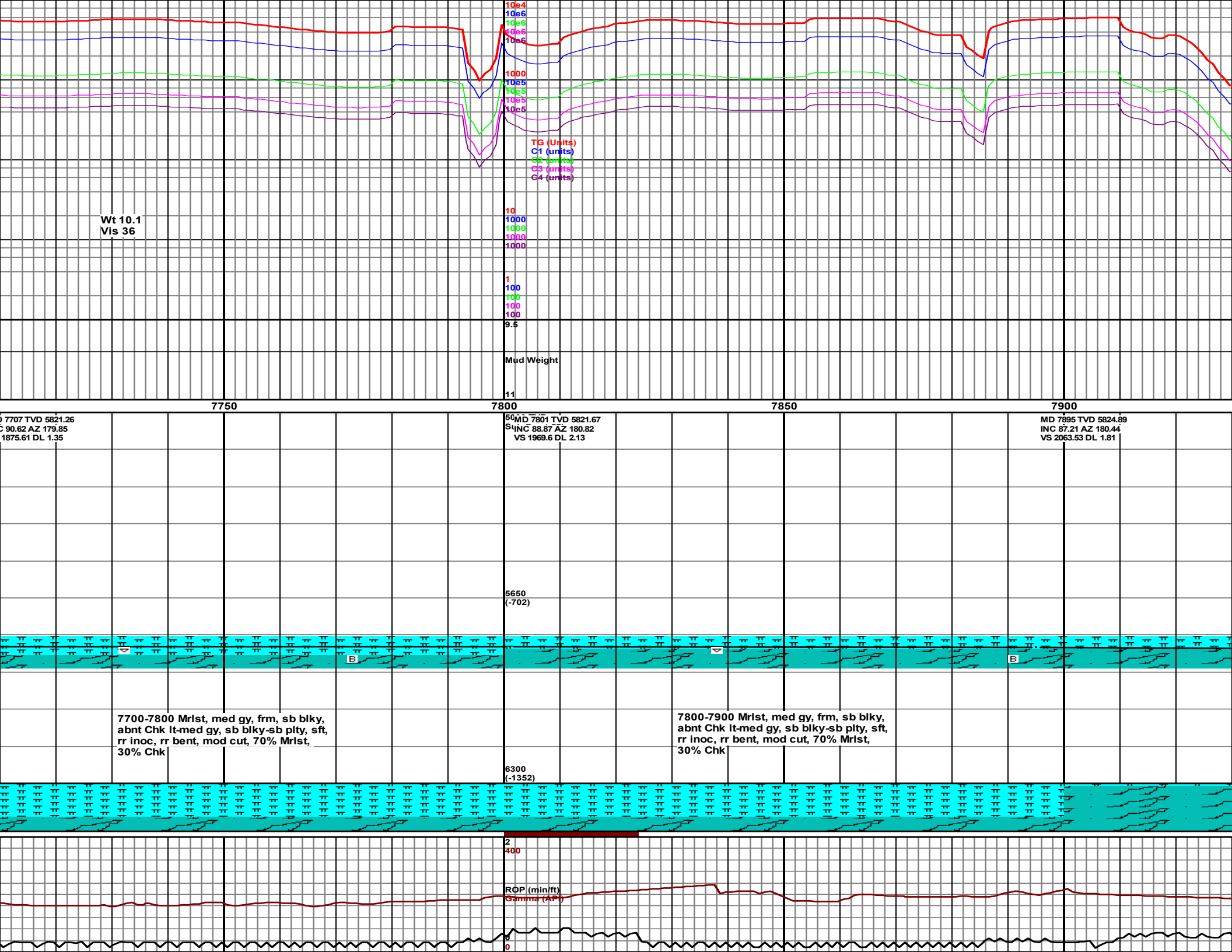




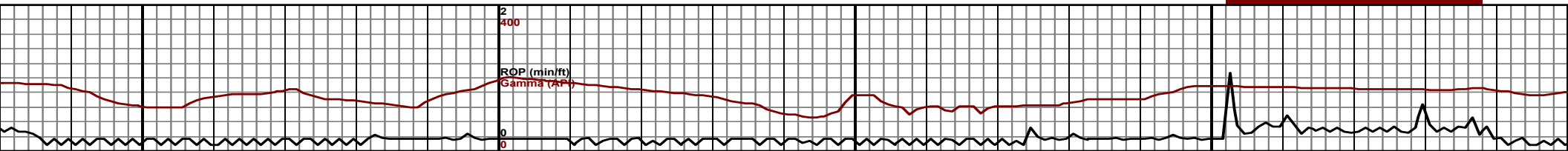
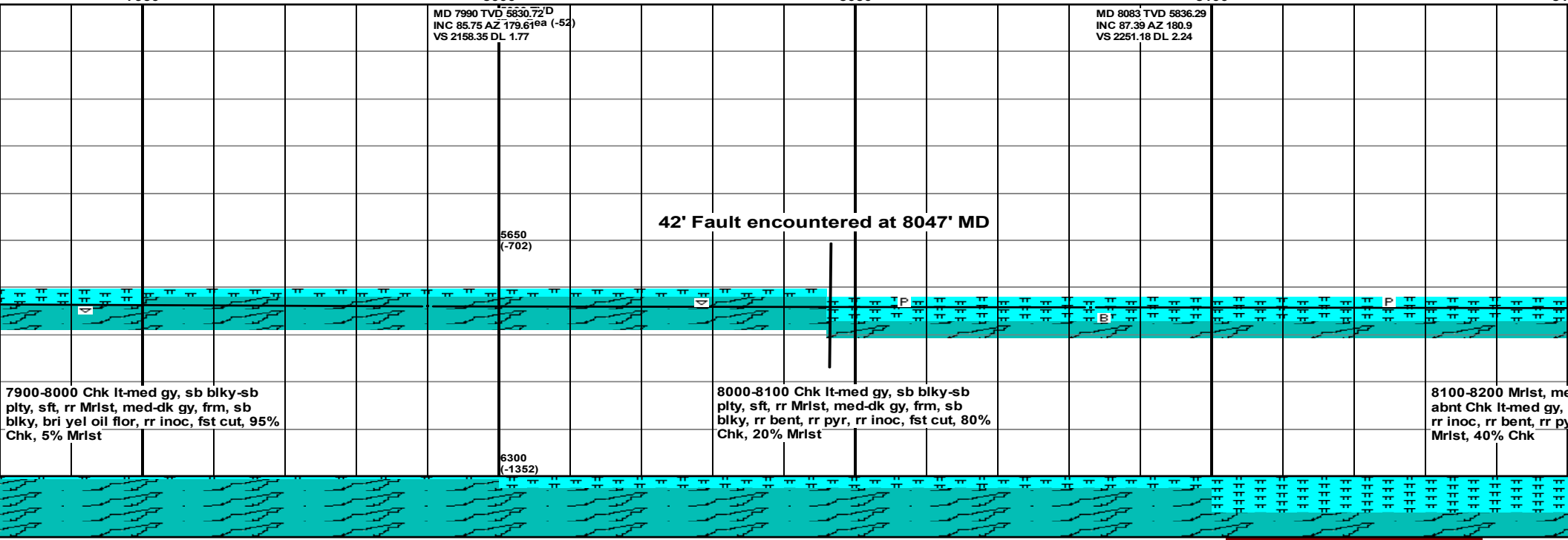
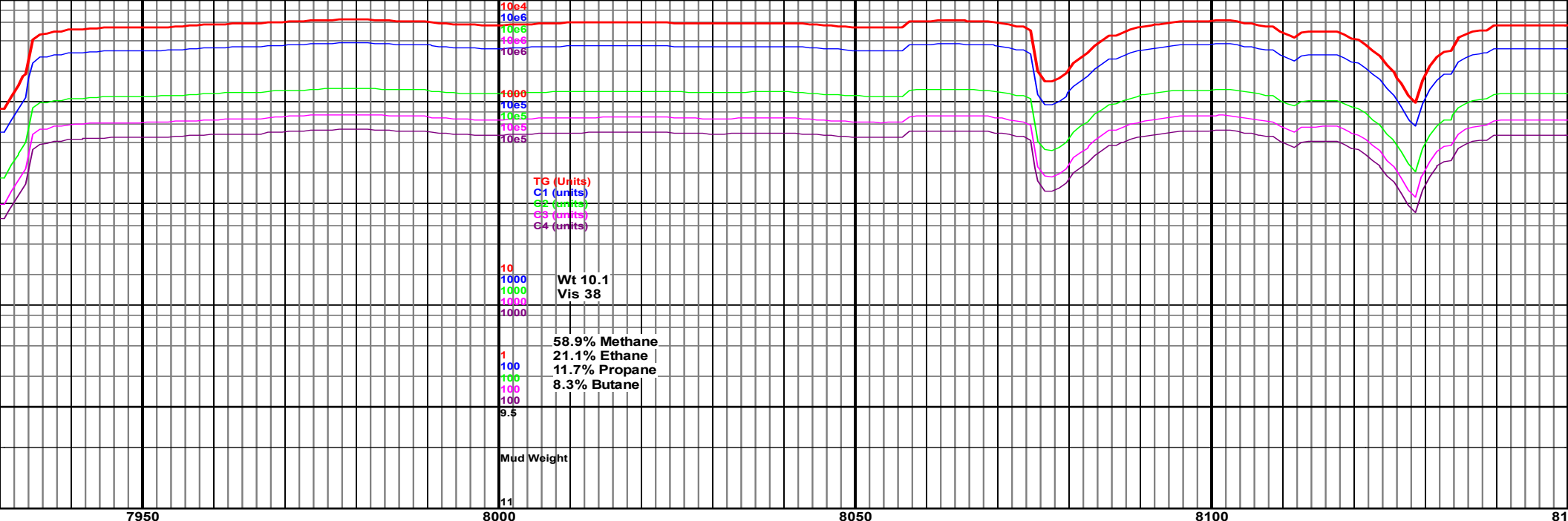


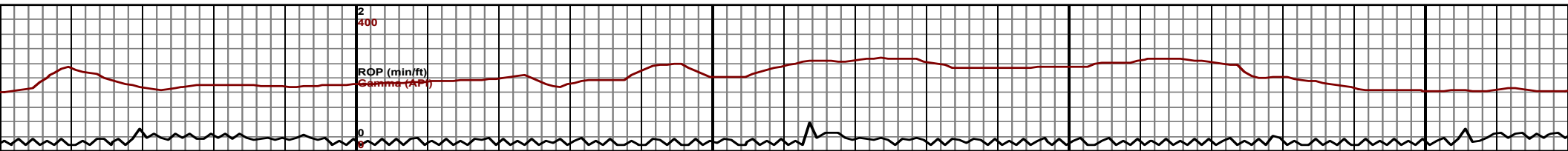
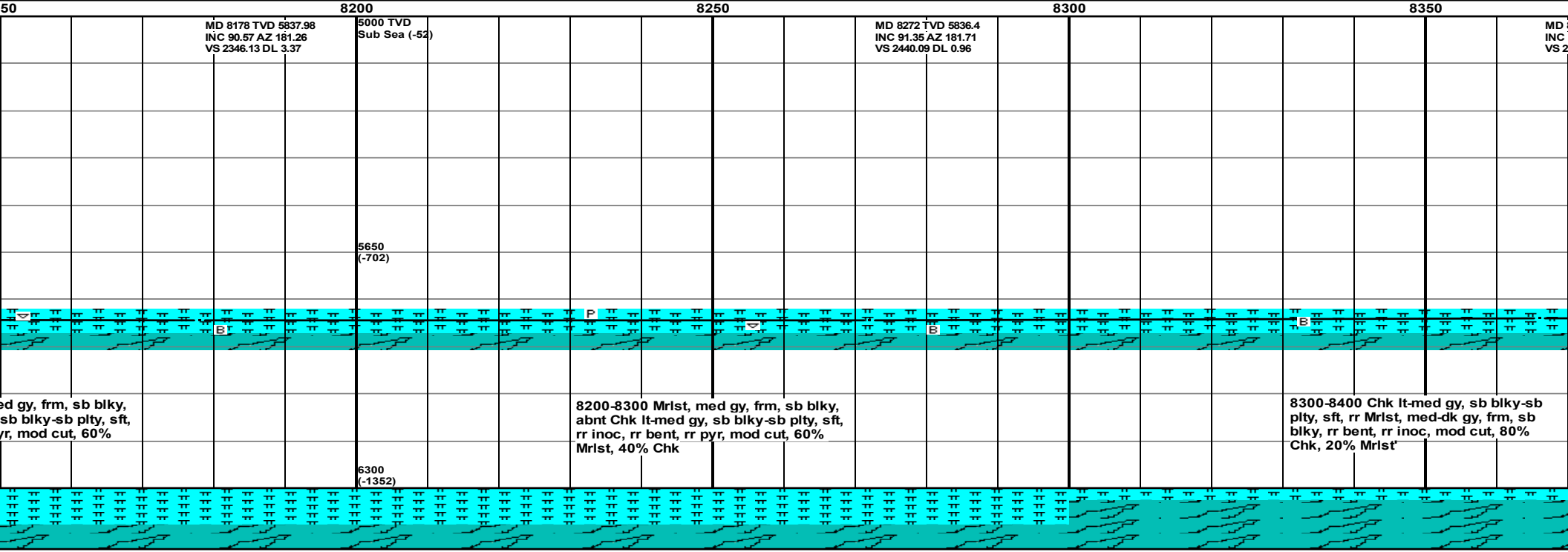
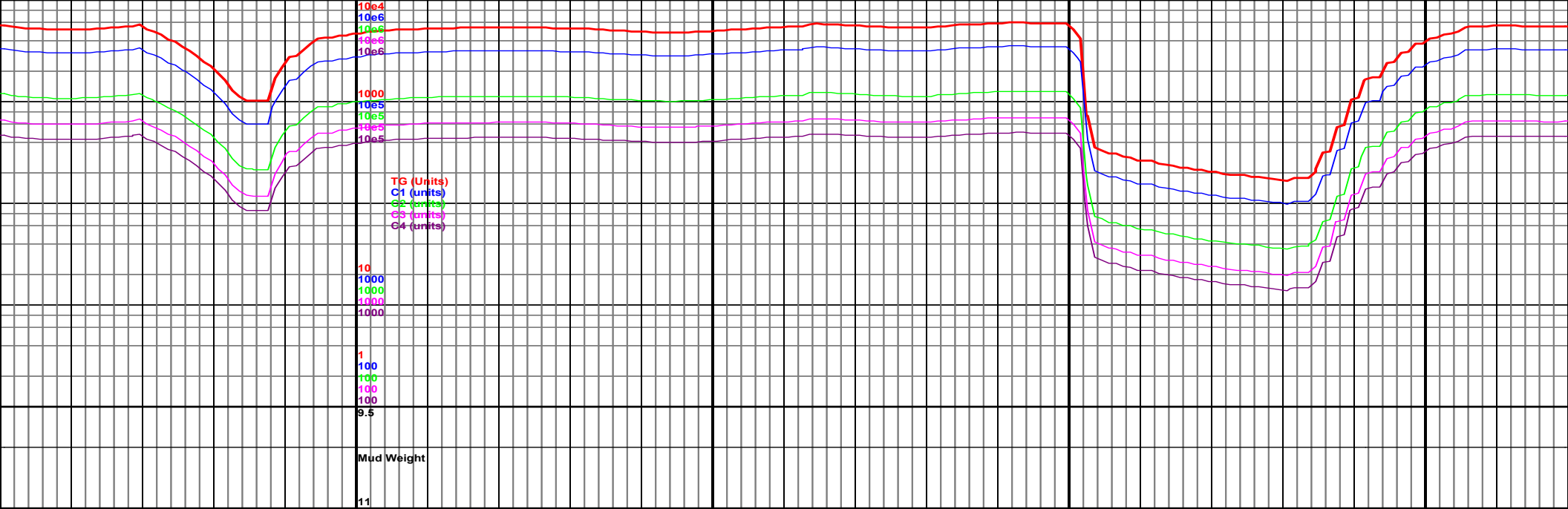


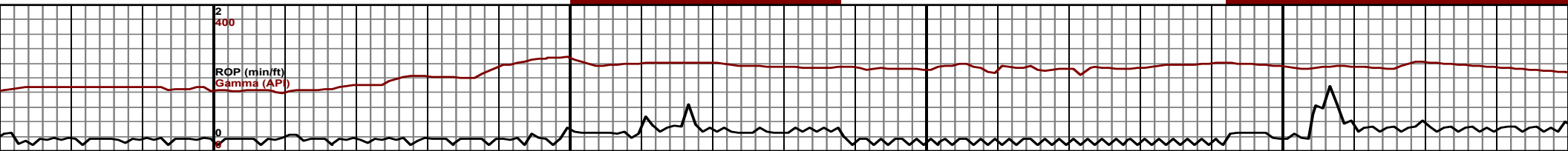
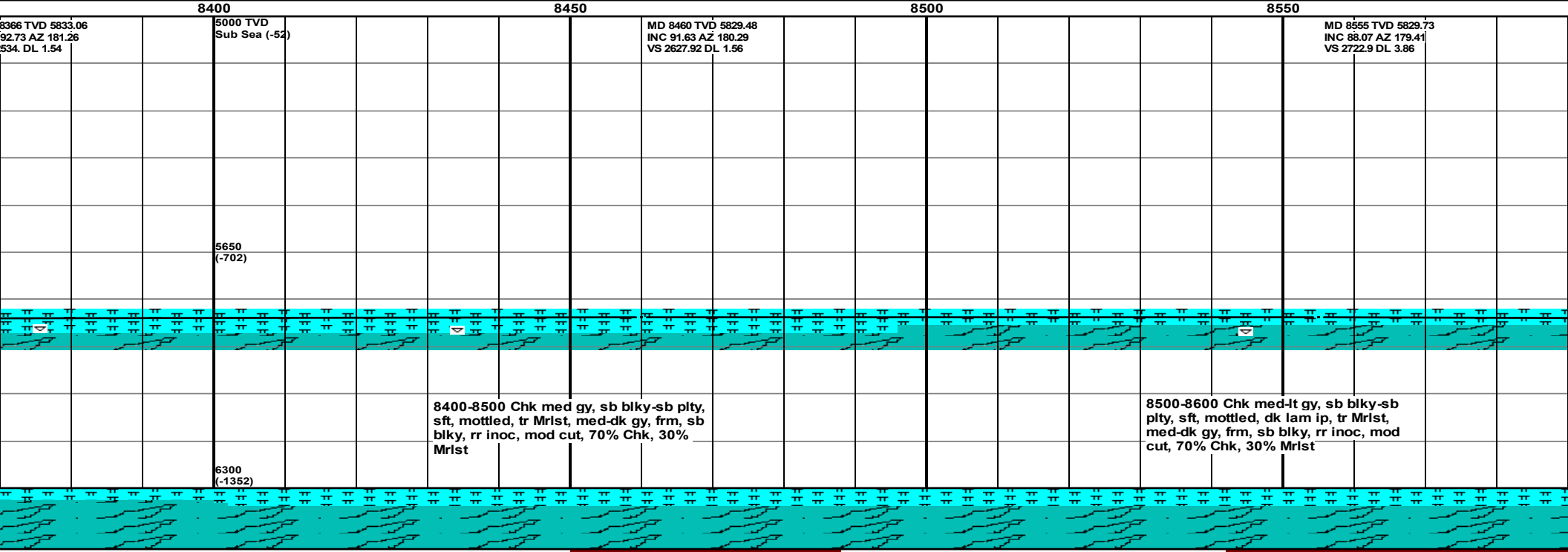
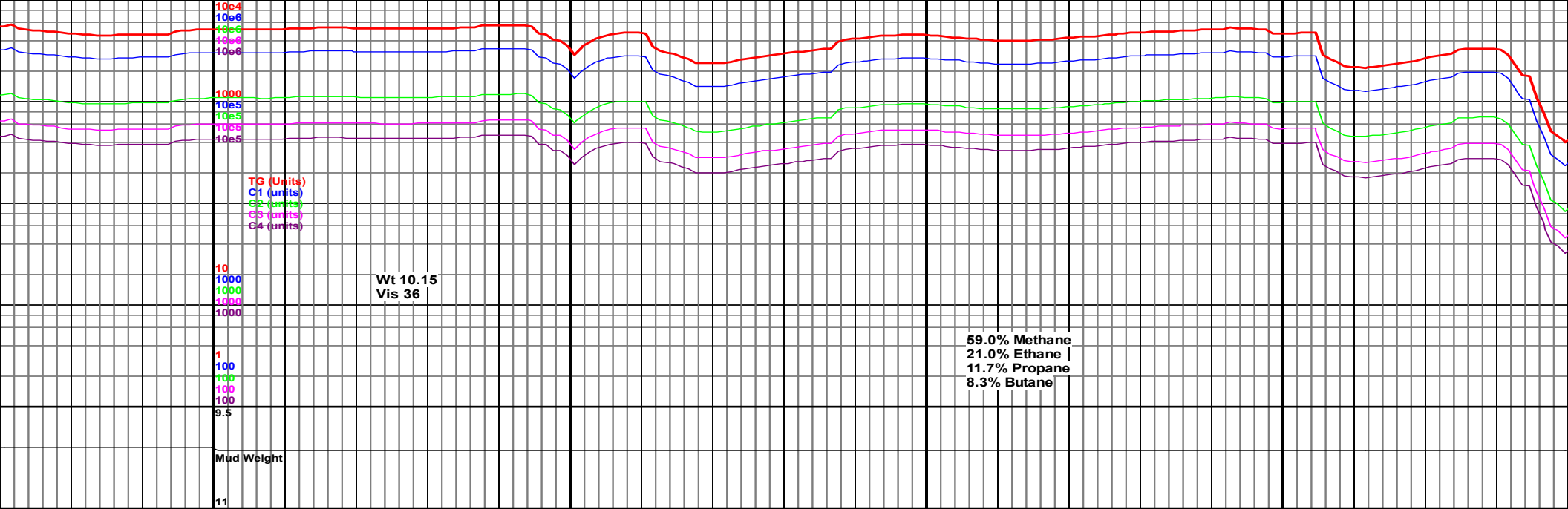


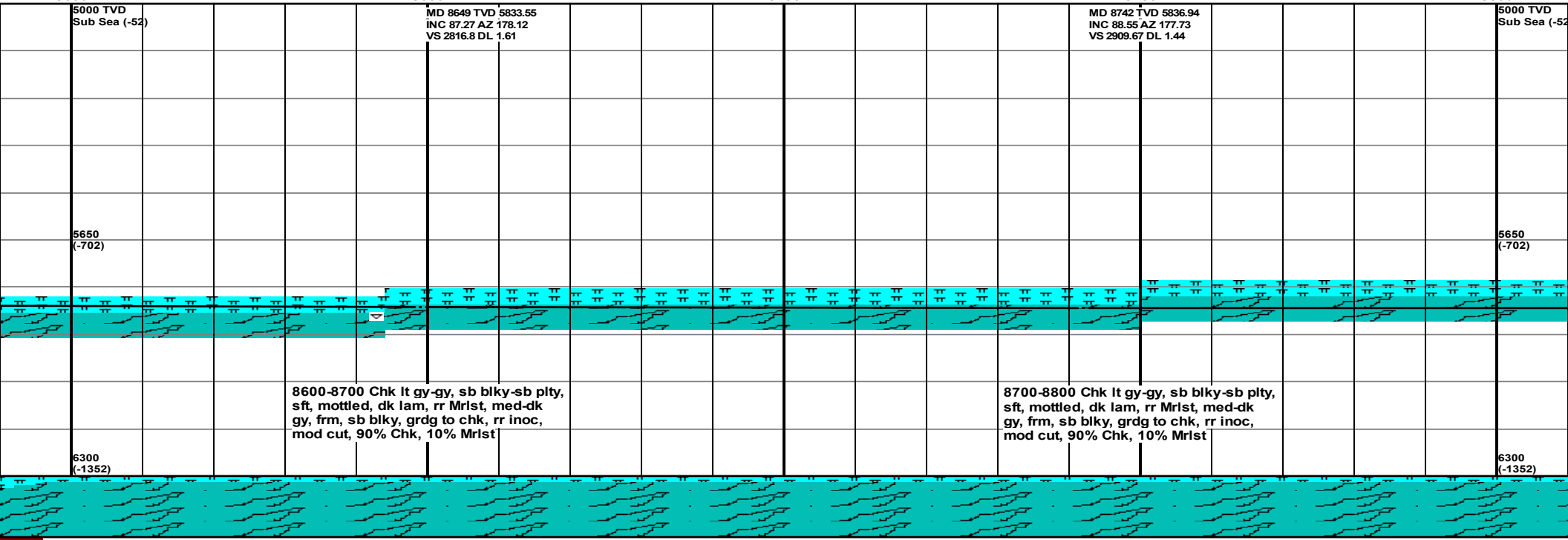


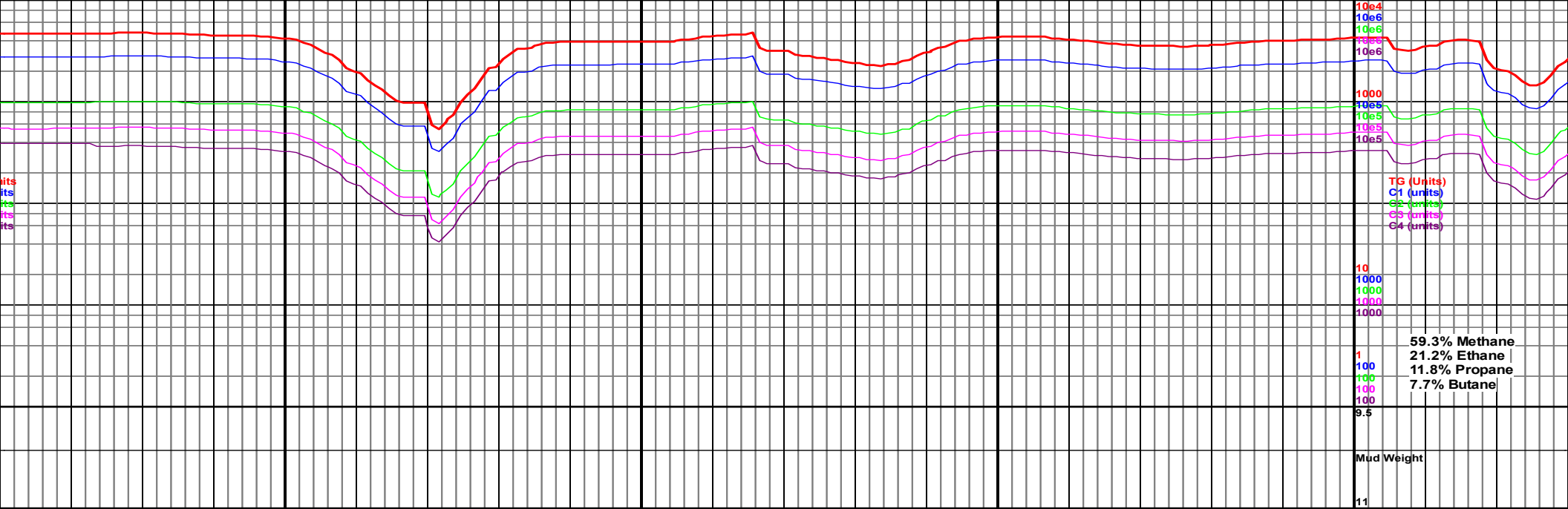












59.3% Methane  
21.2% Ethane  
11.8% Propane  
7.7% Butane

Mud Weight  
11

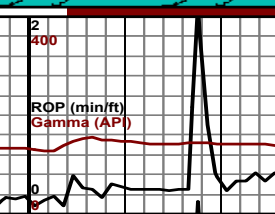
8850	8900	8950	9000
MD 8834 TVD 5838.15 INC 89.95 AZ 177.86 VS 3001.59 DL 1.53		MD 8926 TVD 5837.05 INC 91.42 AZ 177.77 VS 3093.52 DL 1.61	MD 9017 TVD 5837.05 INC 90.56 AZ 178.00 VS 3184.45 DL 1.61

5650  
(-702)

6300  
(-1352)

8800-8900 Chk lt gy-gy, blk-sb blk,  
sft, mottled, dk lam, rr Mrst, dk gy, sb  
blk, frm, rr inoc, mod cut, 90% Chk,  
10% Mrst

8900-9000 Chk lt gy-gy, blk-sb blk,  
sft, mottled, dk lam, rr Mrst, dk gy, sb  
blk, frm, rr inoc, mod cut, 90% Chk,  
10% Mrst

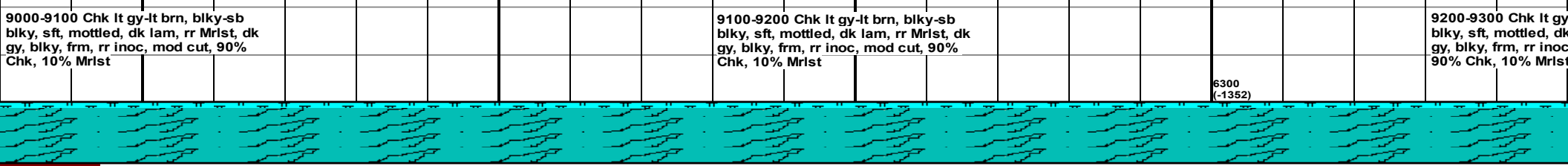
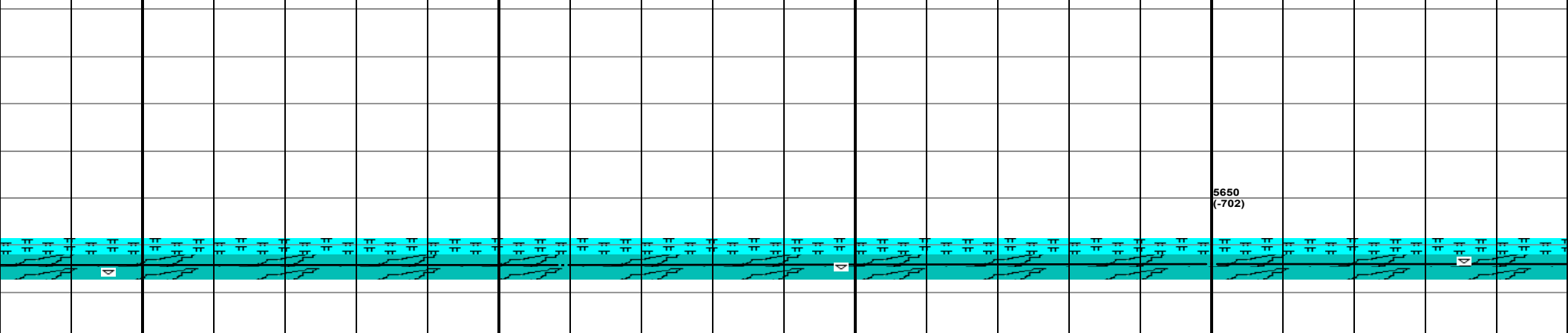


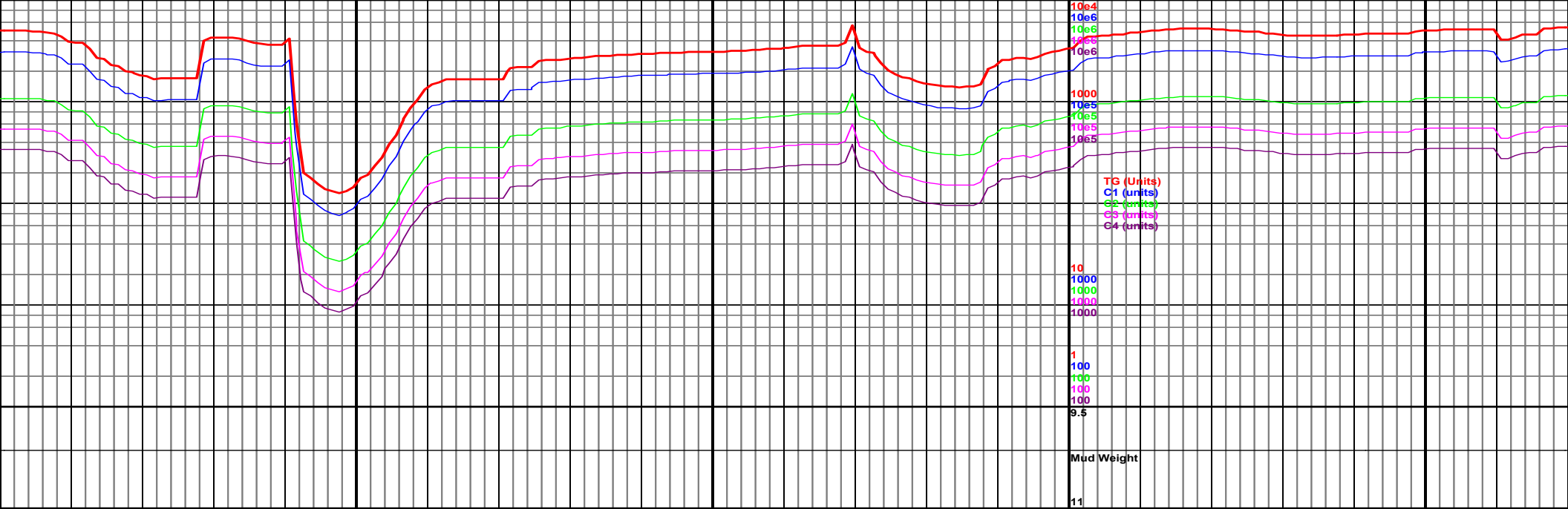


9050 9100 9150 9200 9250

MD 9109 TVD 5834.97  
INC 90.07 AZ 178.37  
VS 3276.42 DL 0.55

MD 9200 TVD 5833.48  
INC 91.8 AZ 178.85  
VS 3367.38 DL 1.97





50 9300 9350 9400 9450

MD 9292 TVD 5831.48  
INC 90.7 AZ 178.36  
VS 3459.32 DL 1.31

MD 9384 TVD 5832.11  
INC 88.51 AZ 180.02  
VS 3551.3 DL 2.99

5000 TVD  
Sub Sea (-52)

TOH at 9275' for gamma  
tool on 2/18/2016. Back to  
drilling at 08:18 on  
2/19/2016.



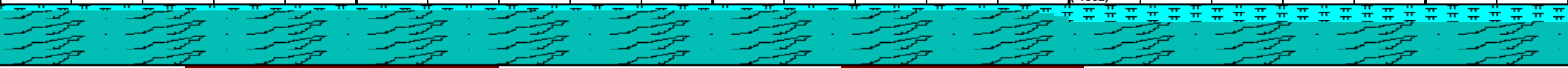
lt brn, blk-sb  
lam, rr Mrst, dk  
rr bent, mod cut,

9300-9400 Chk lt gy-lt brn, blk-sb  
blk, sft, mottled, dk lam, rr Mrst, dk  
gy, blk, frm, rr inoc, rr bent, mod cut,  
90% Chk, 10% Mrst

9400-9500 Chk lt gy-lt brn, blk-sb  
blk, sft, mottled, dk lam, rr Mrst, dk  
gy, blk, frm, rr inoc, rr bent, mod cut,  
70% Chk, 30% Mrst

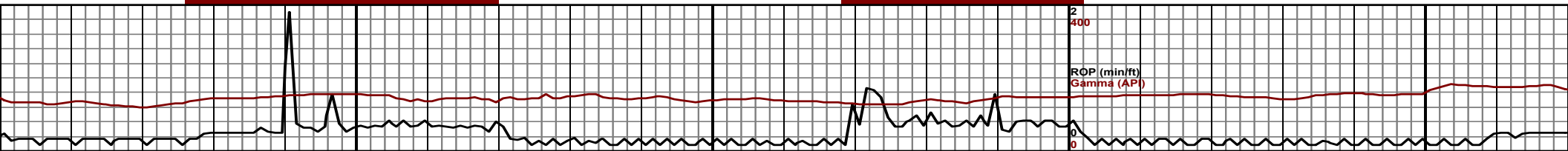
5650  
(-702)

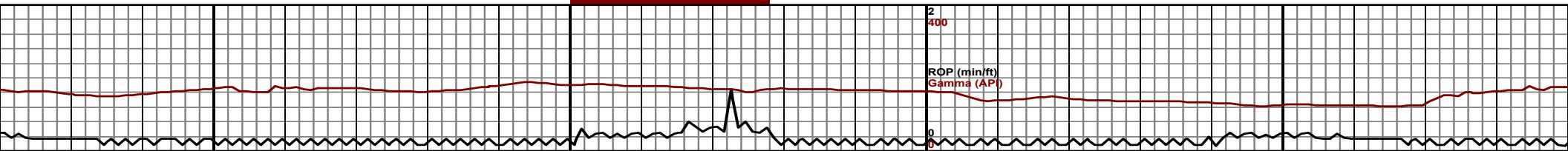
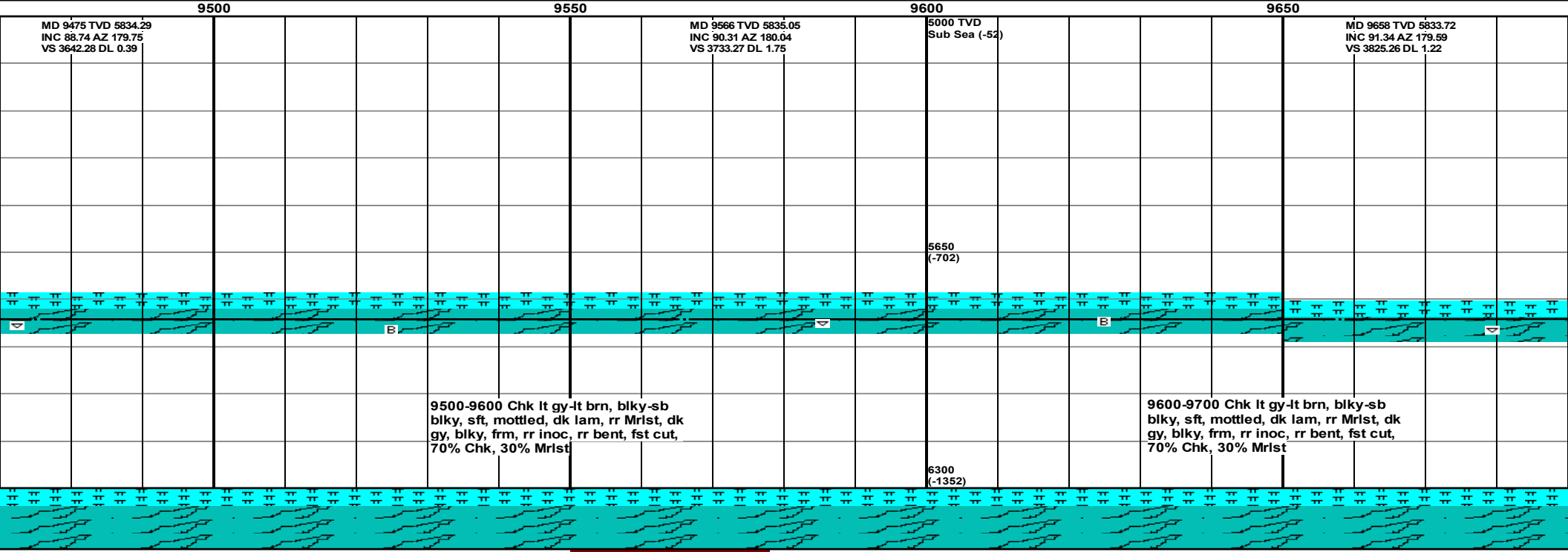
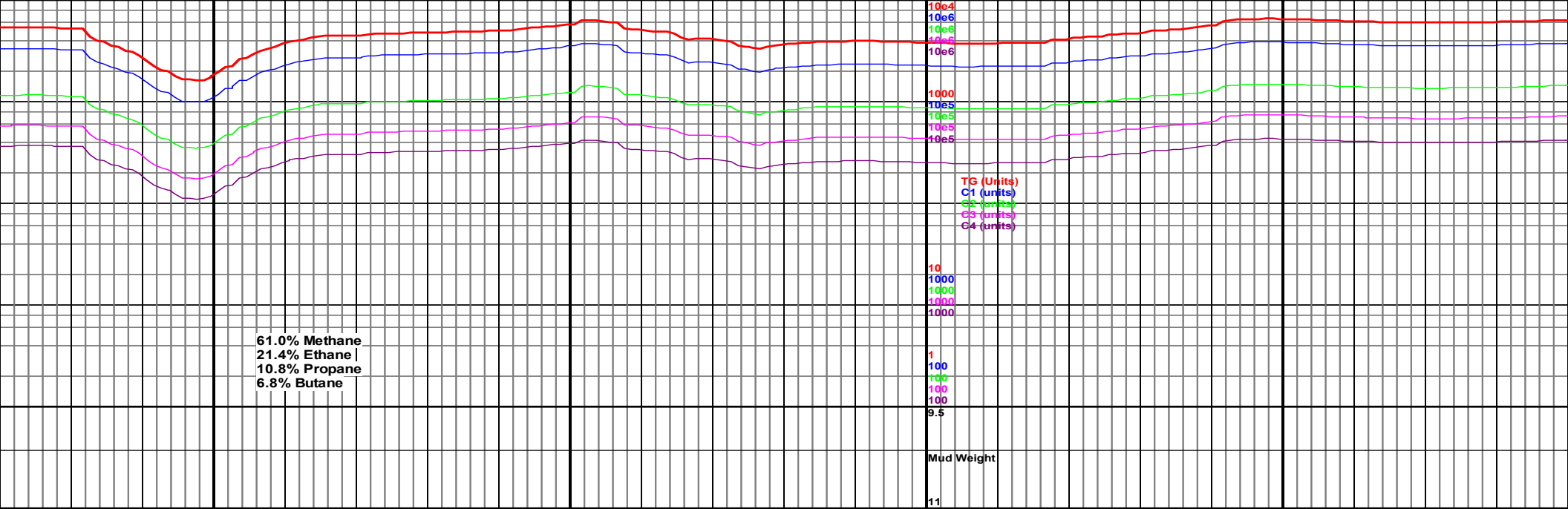
6300  
(-1352)



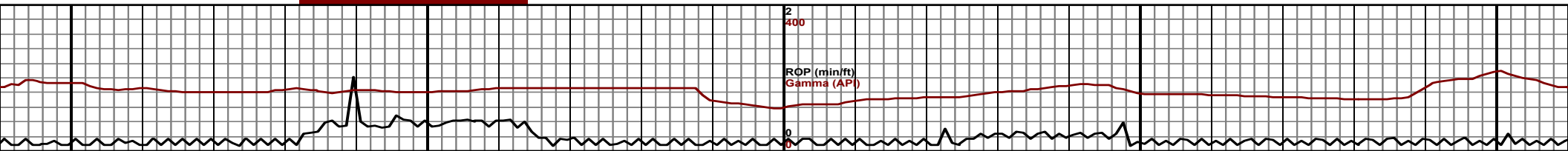
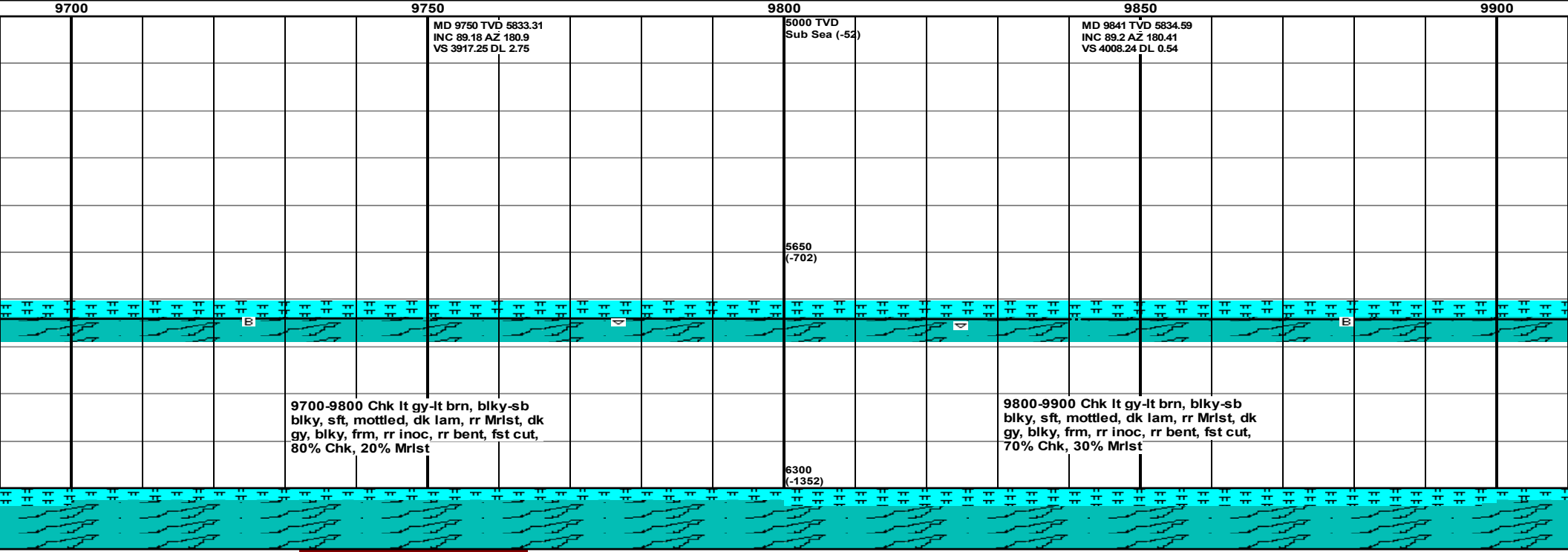
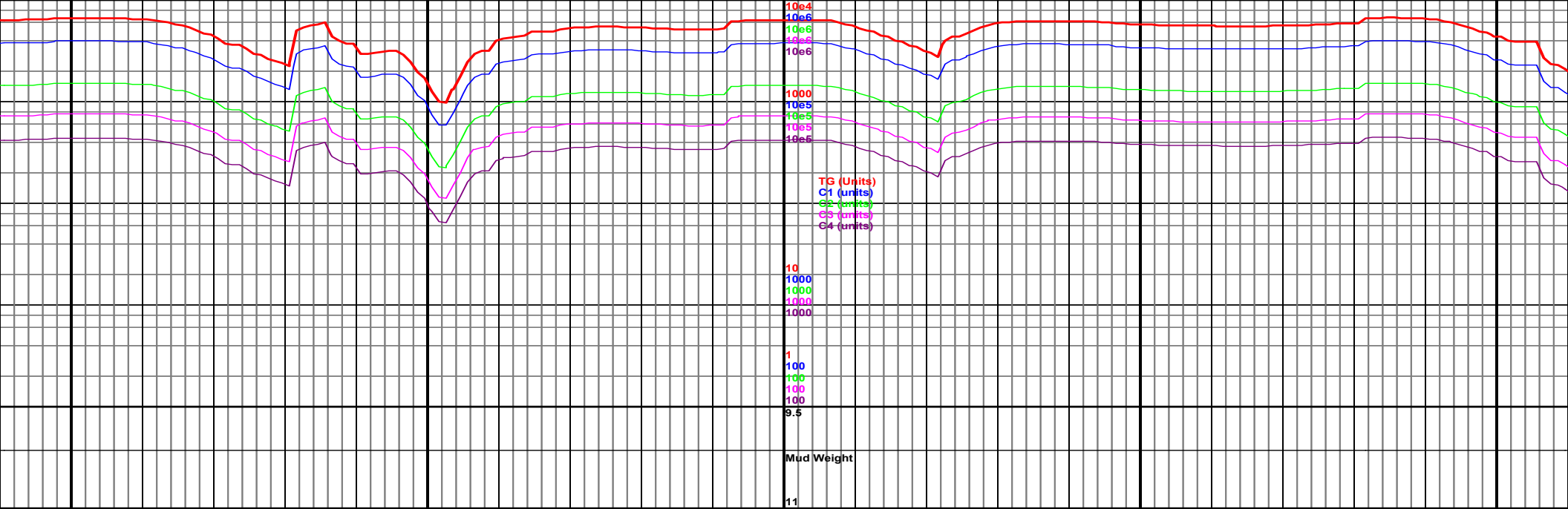
2  
400

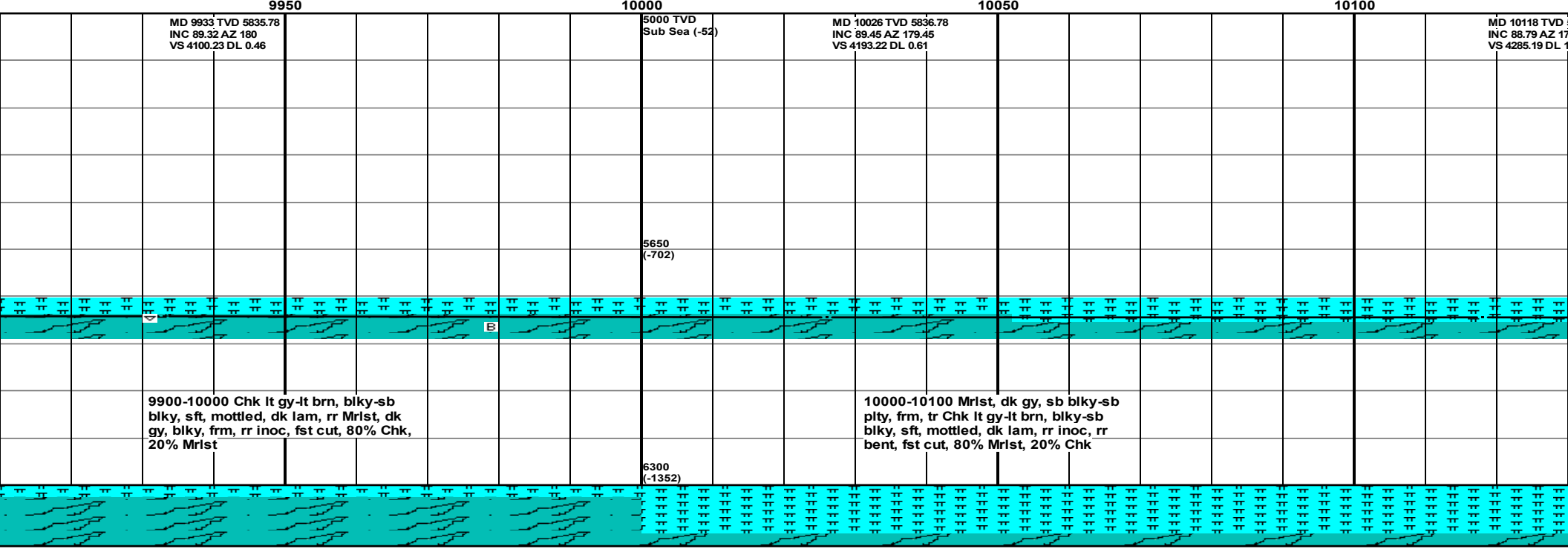
ROP (min/ft)  
Gamma (API)

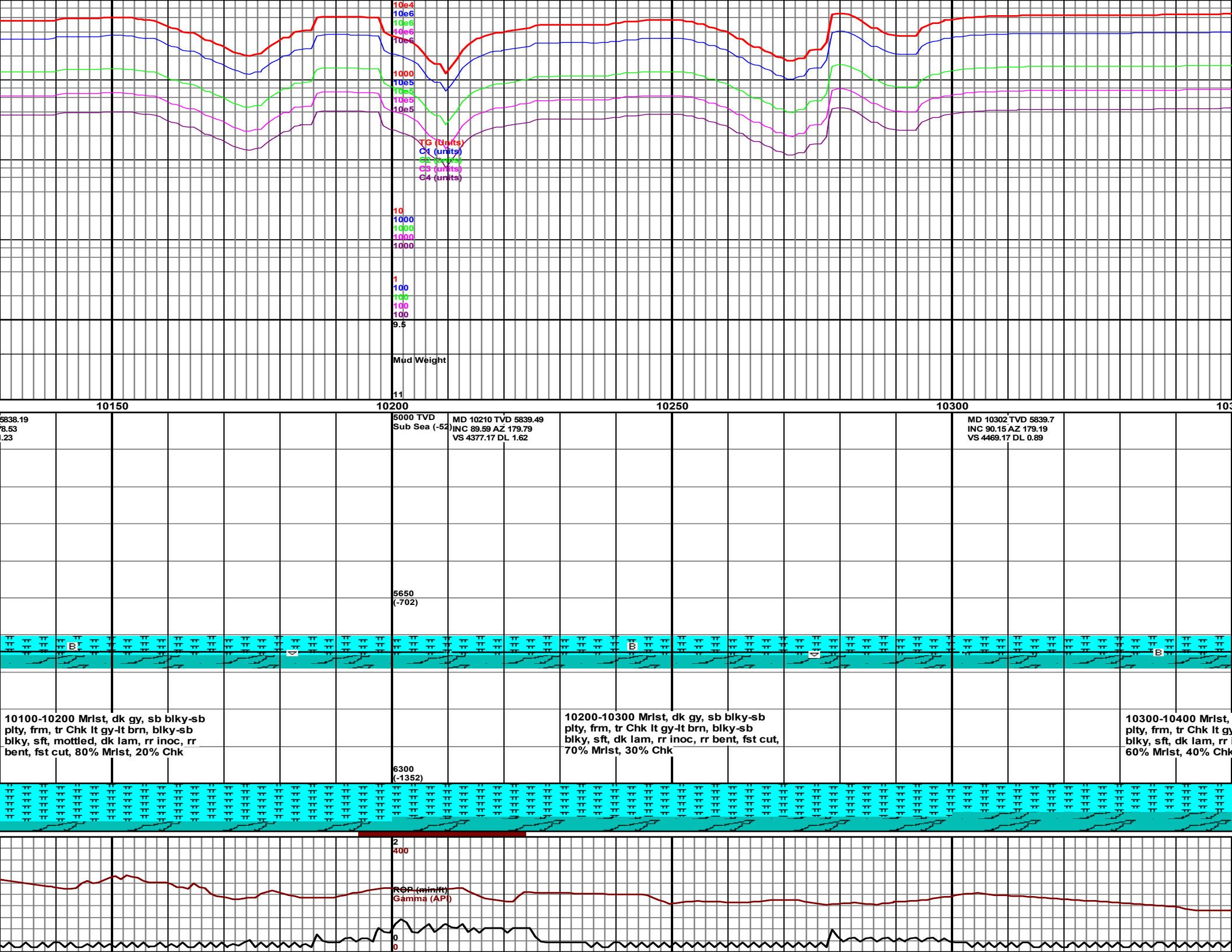


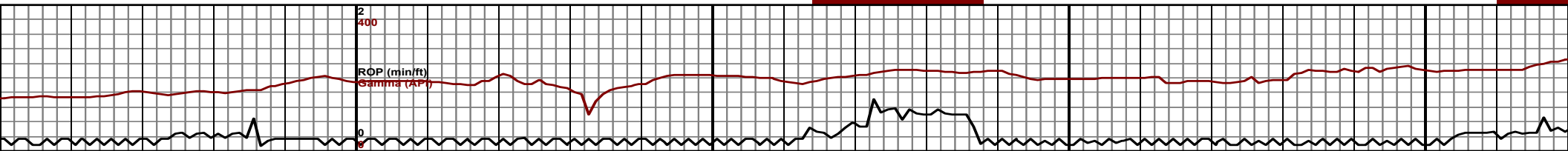
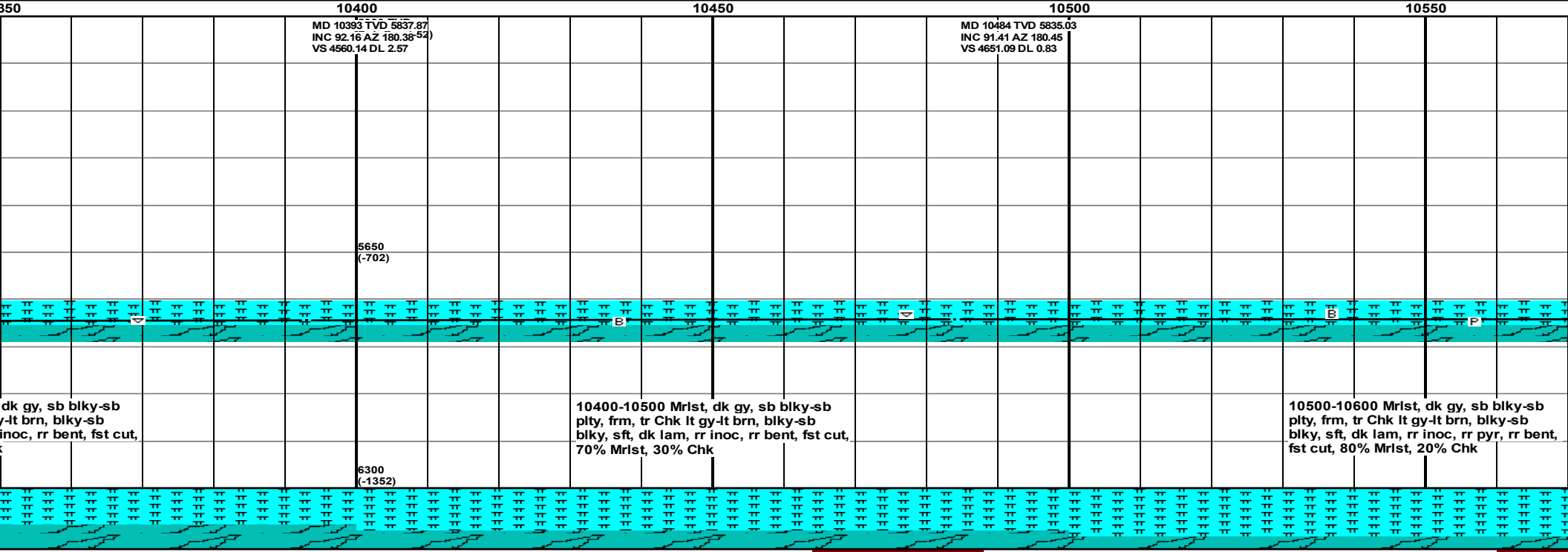
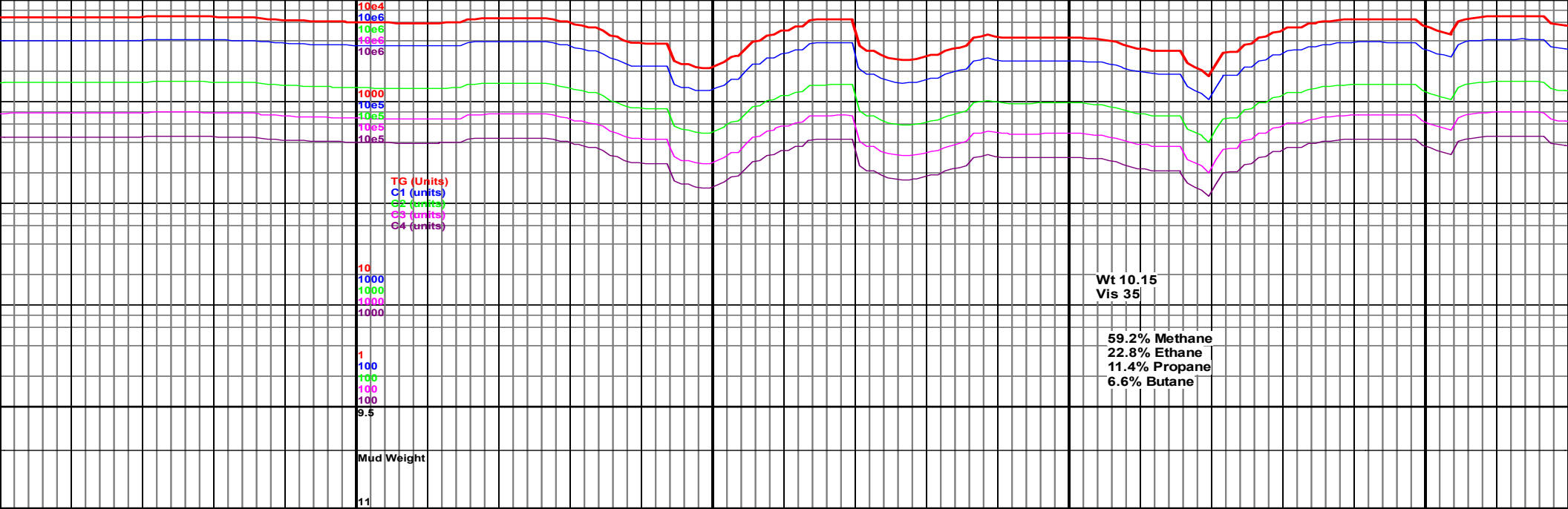


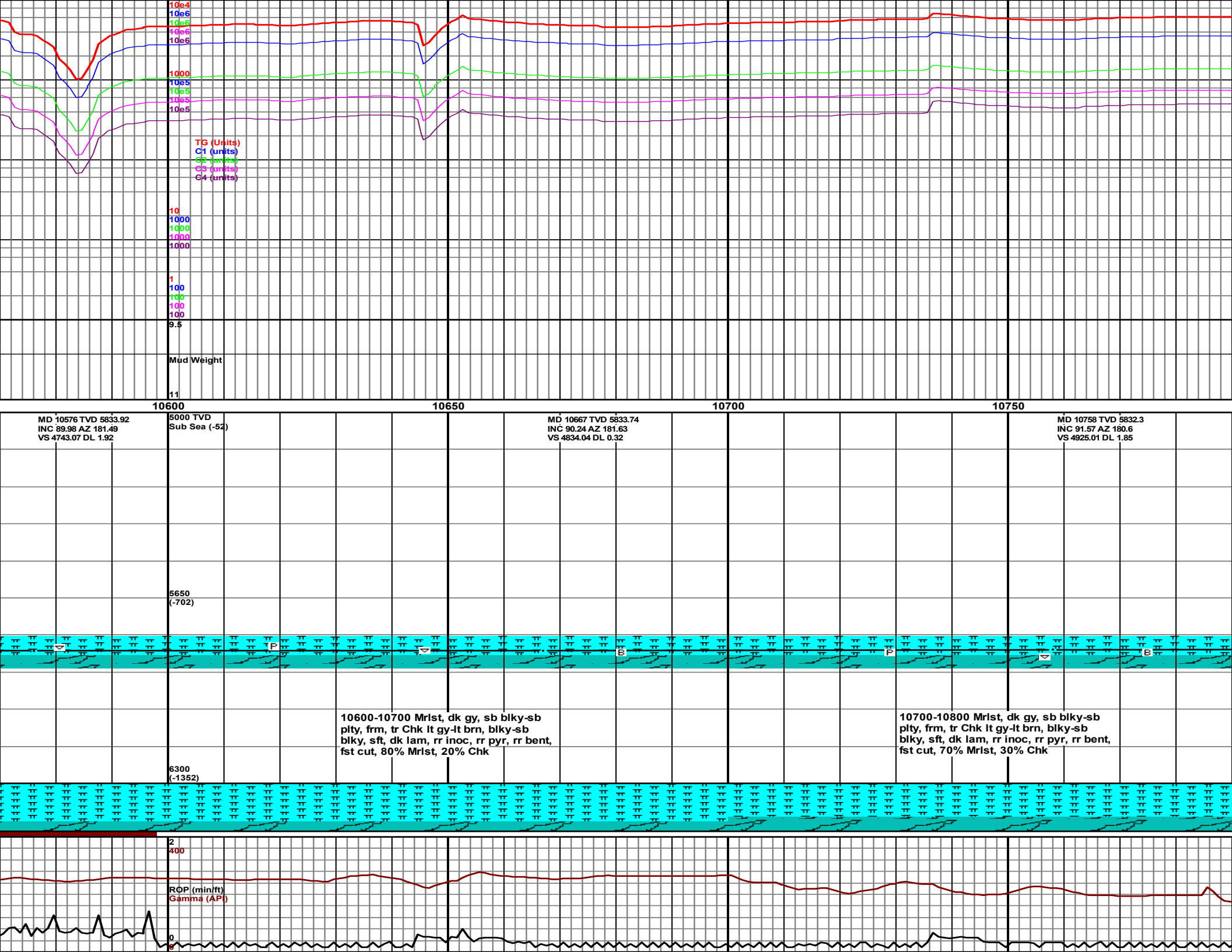


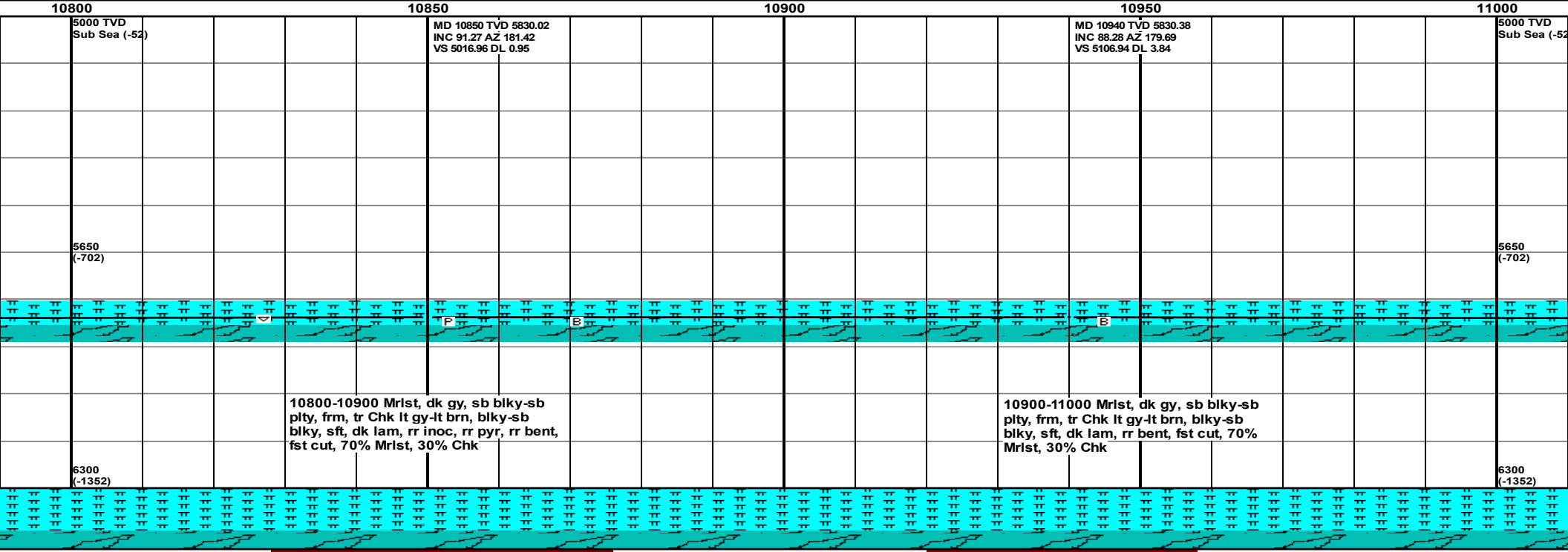
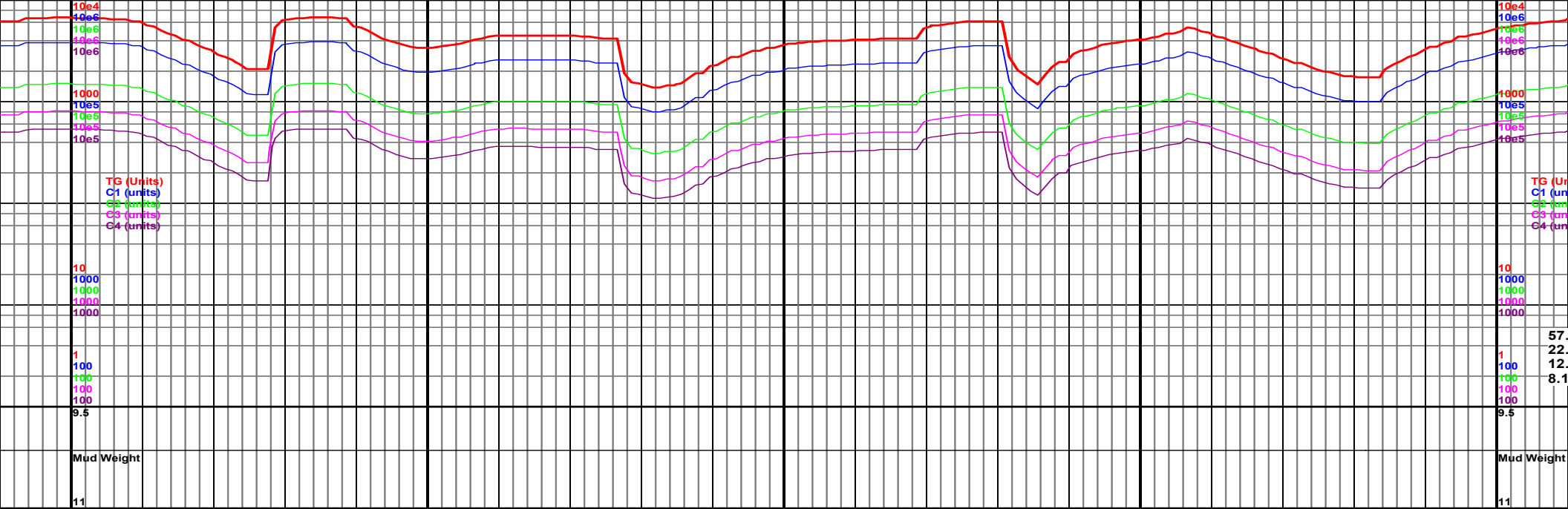


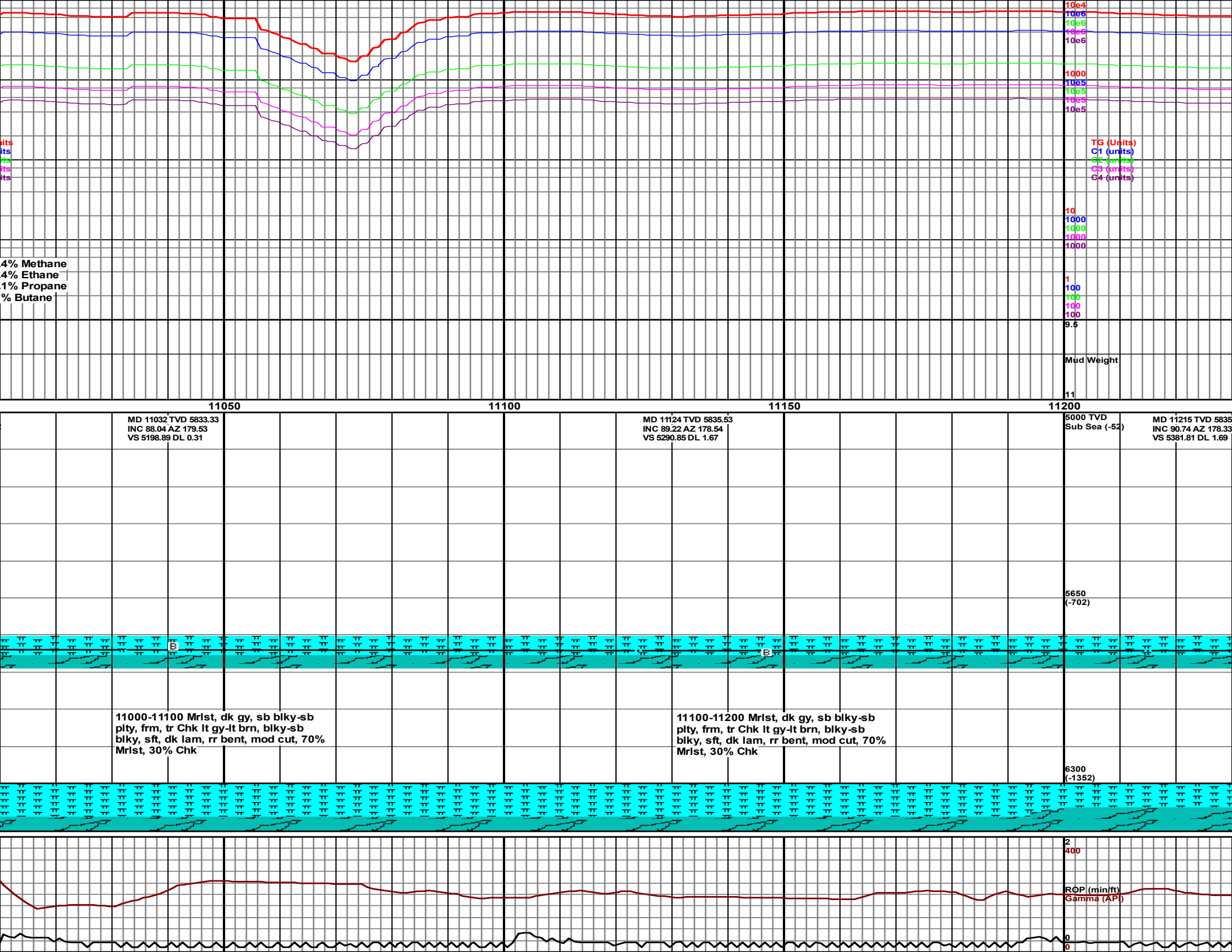


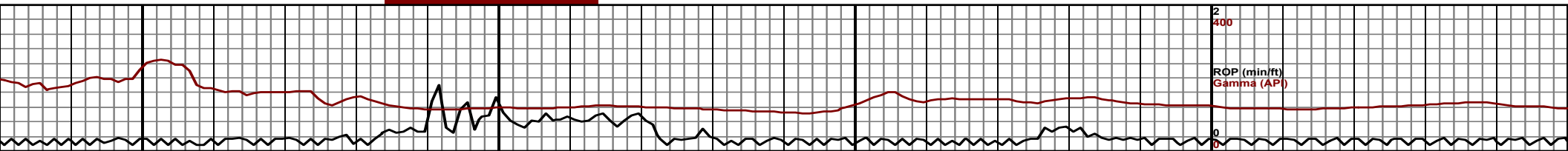
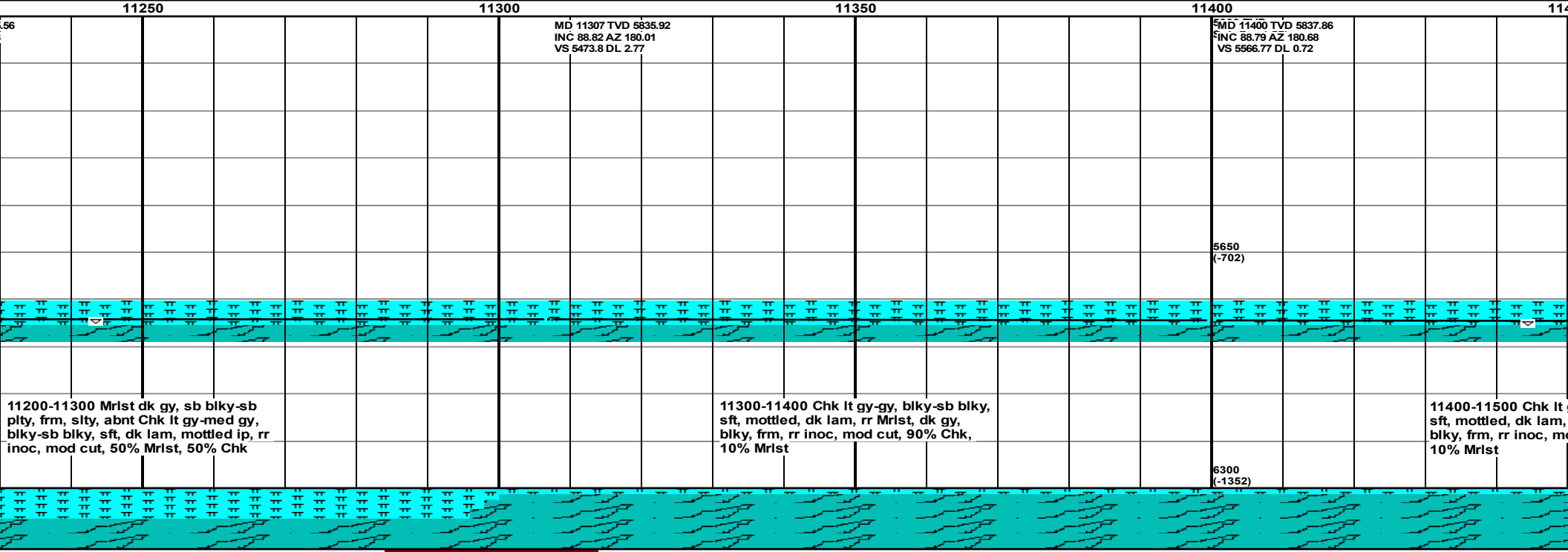
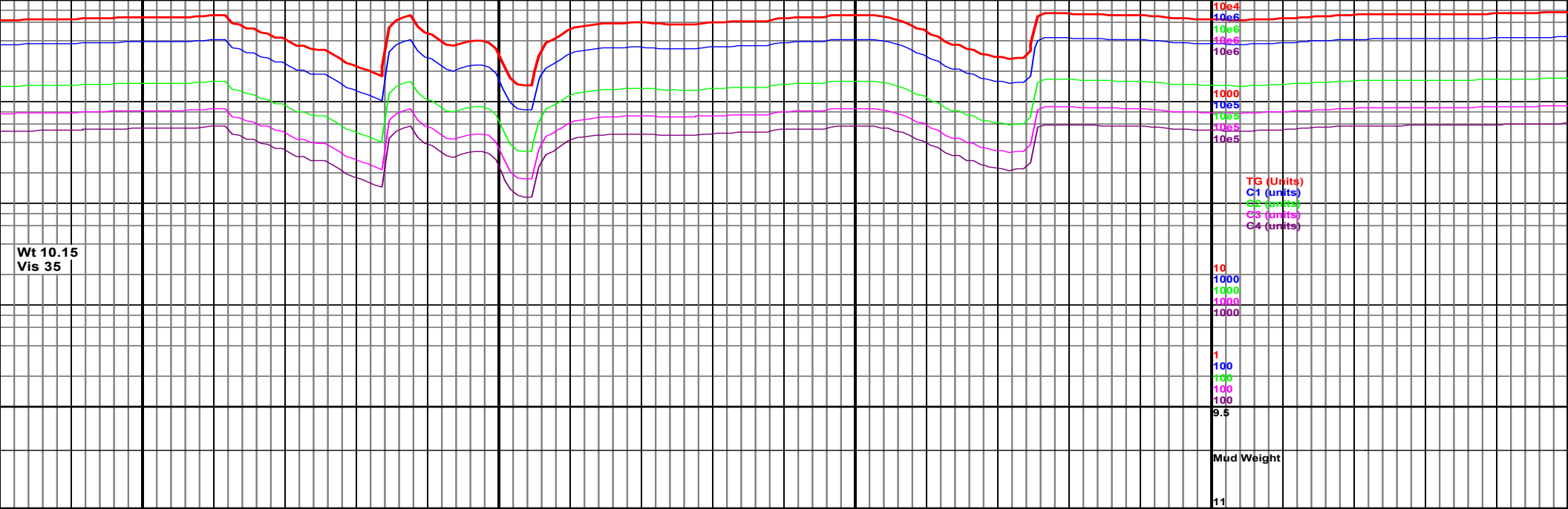




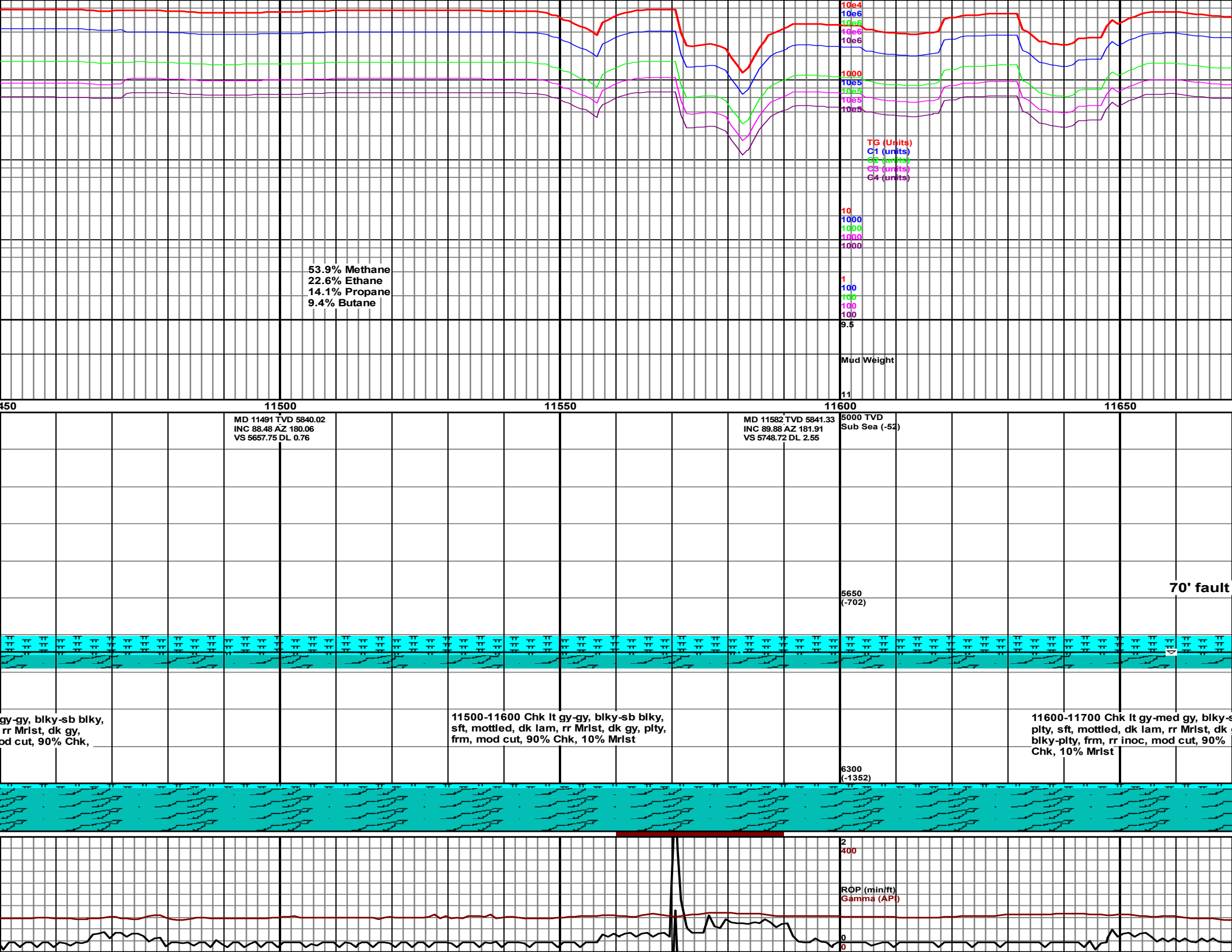












53.9% Methane  
22.6% Ethane  
14.1% Propane  
9.4% Butane

TG (Units)  
C1 (Units)  
C2 (Units)  
C3 (Units)  
C4 (Units)

10  
1000  
10000  
100000  
1000000  
10000000

Mud Weight

11

MD 11491 TVD 5840.02  
INC 88.48 AZ 180.06  
VS 5657.75 DL 0.76

MD 11582 TVD 5841.33  
INC 89.88 AZ 181.91  
VS 5748.72 DL 2.55

5000 TVD  
Sub Sea (-52)

70' fault

gy-gy, blkly-sb blkly,  
rr Mrlst, dk gy,  
mod cut, 90% Chk,

11500-11600 Chk It gy-gy, blkly-sb blkly,  
sft, mottled, dk lam, rr Mrlst, dk gy, plty,  
frm, mod cut, 90% Chk, 10% Mrlst

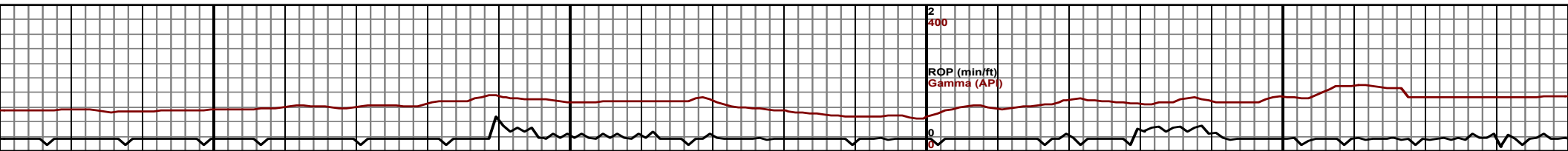
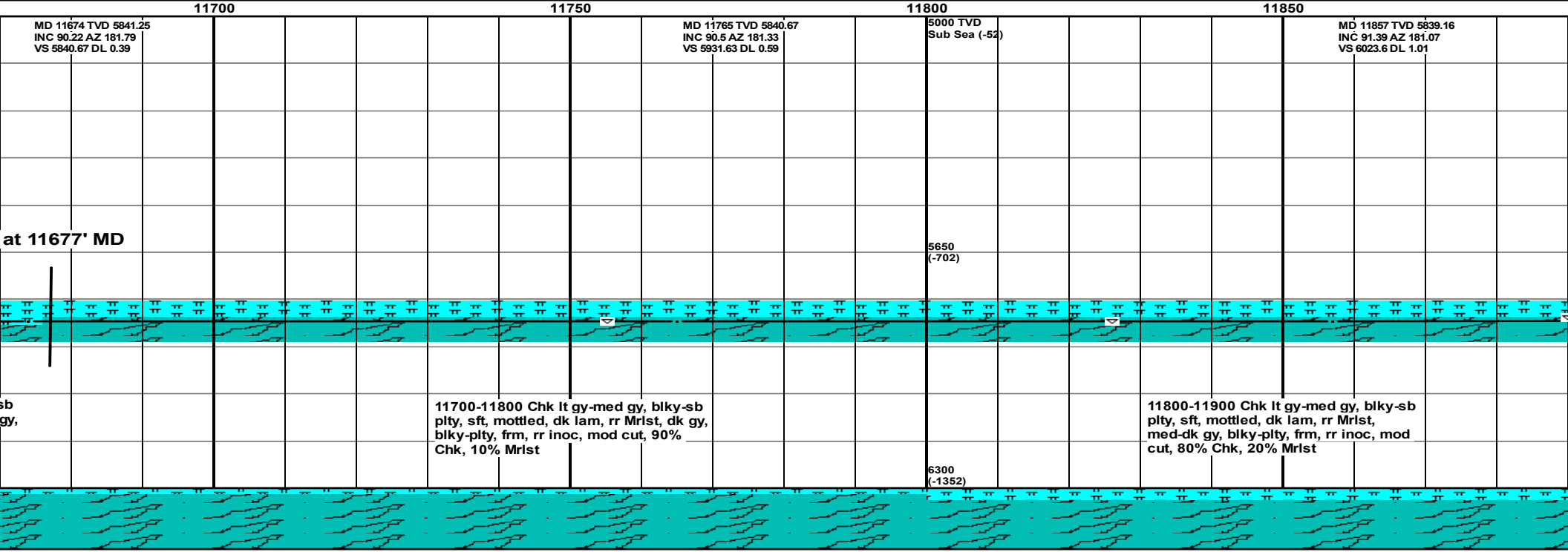
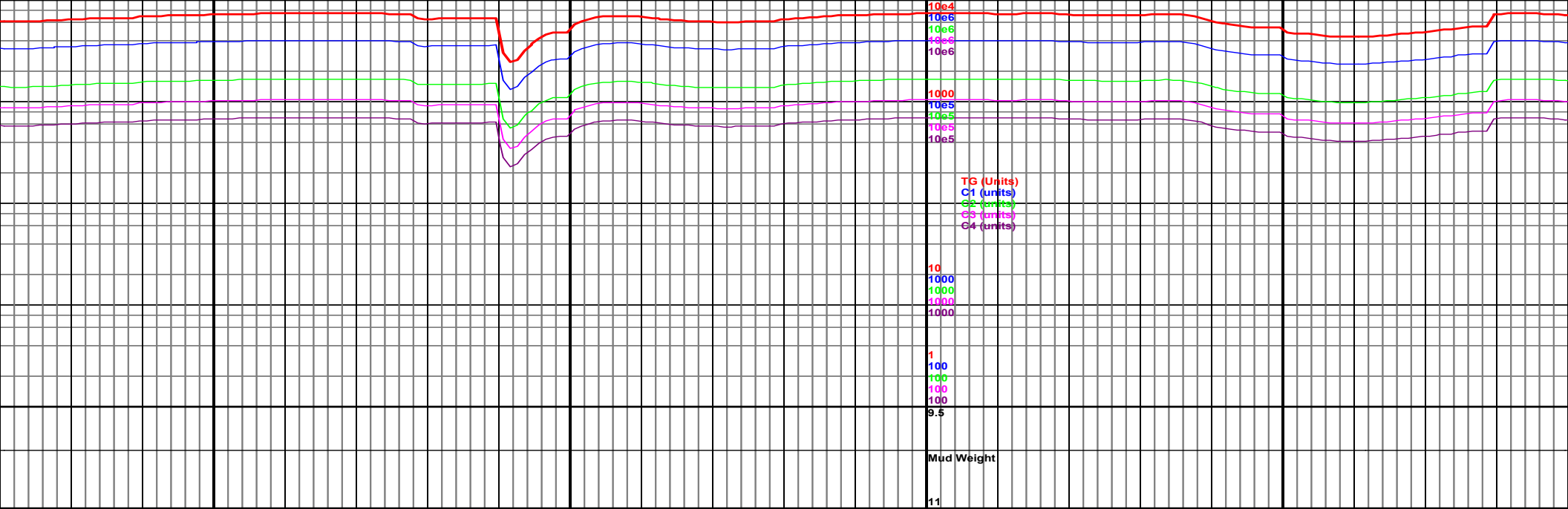
11600-11700 Chk It gy-med gy, blkly-s  
plty, sft, mottled, dk lam, rr Mrlst, dk  
blkly-plty, frm, rr inoc, mod cut, 90%  
Chk, 10% Mrlst

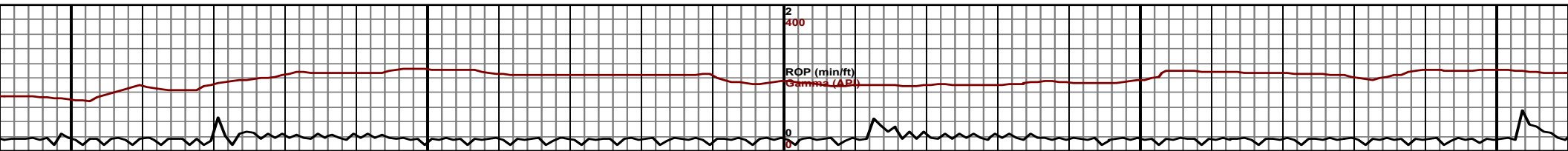
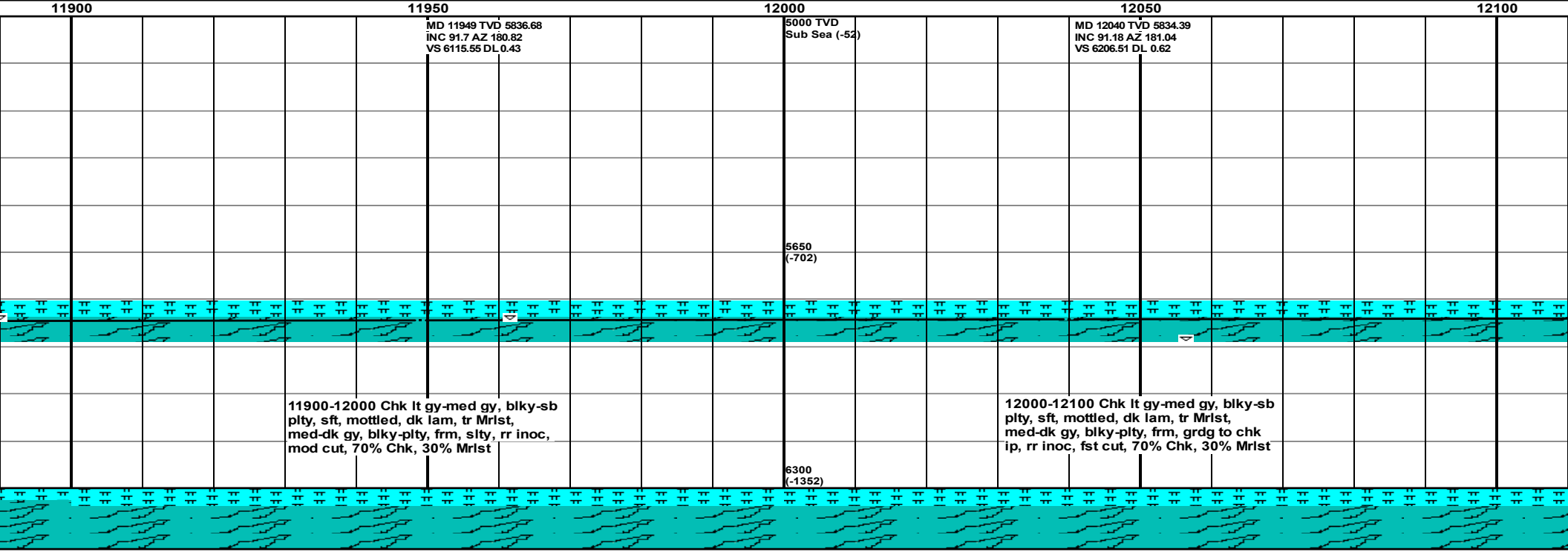
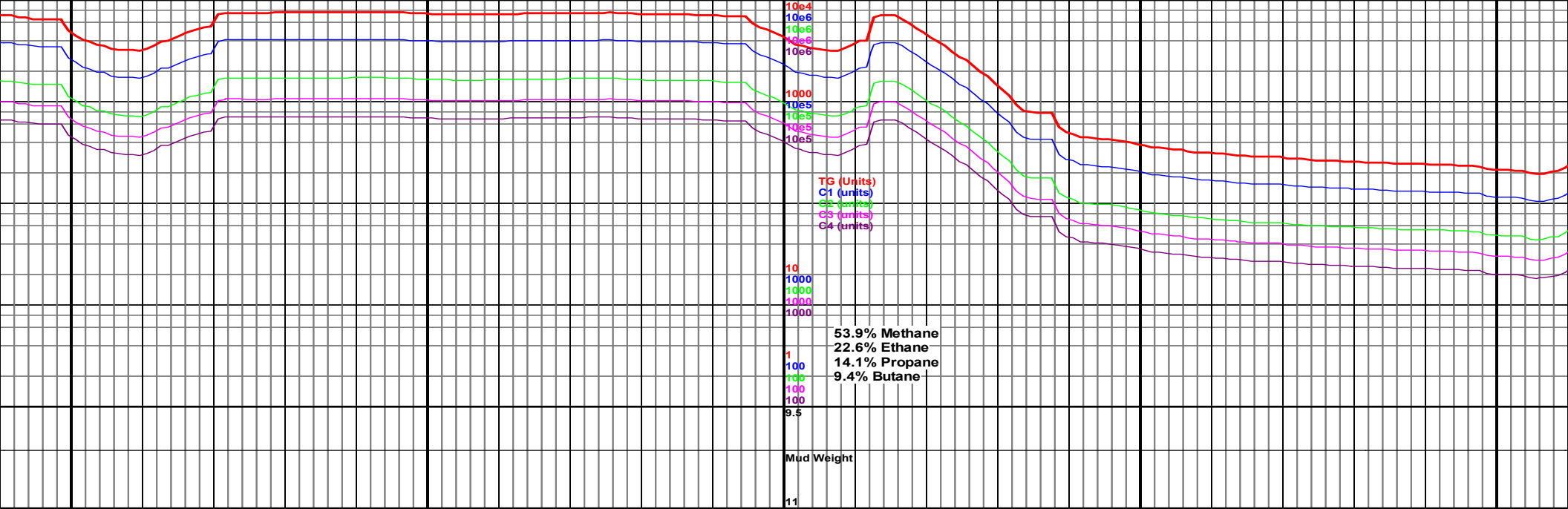
6300  
(-1352)

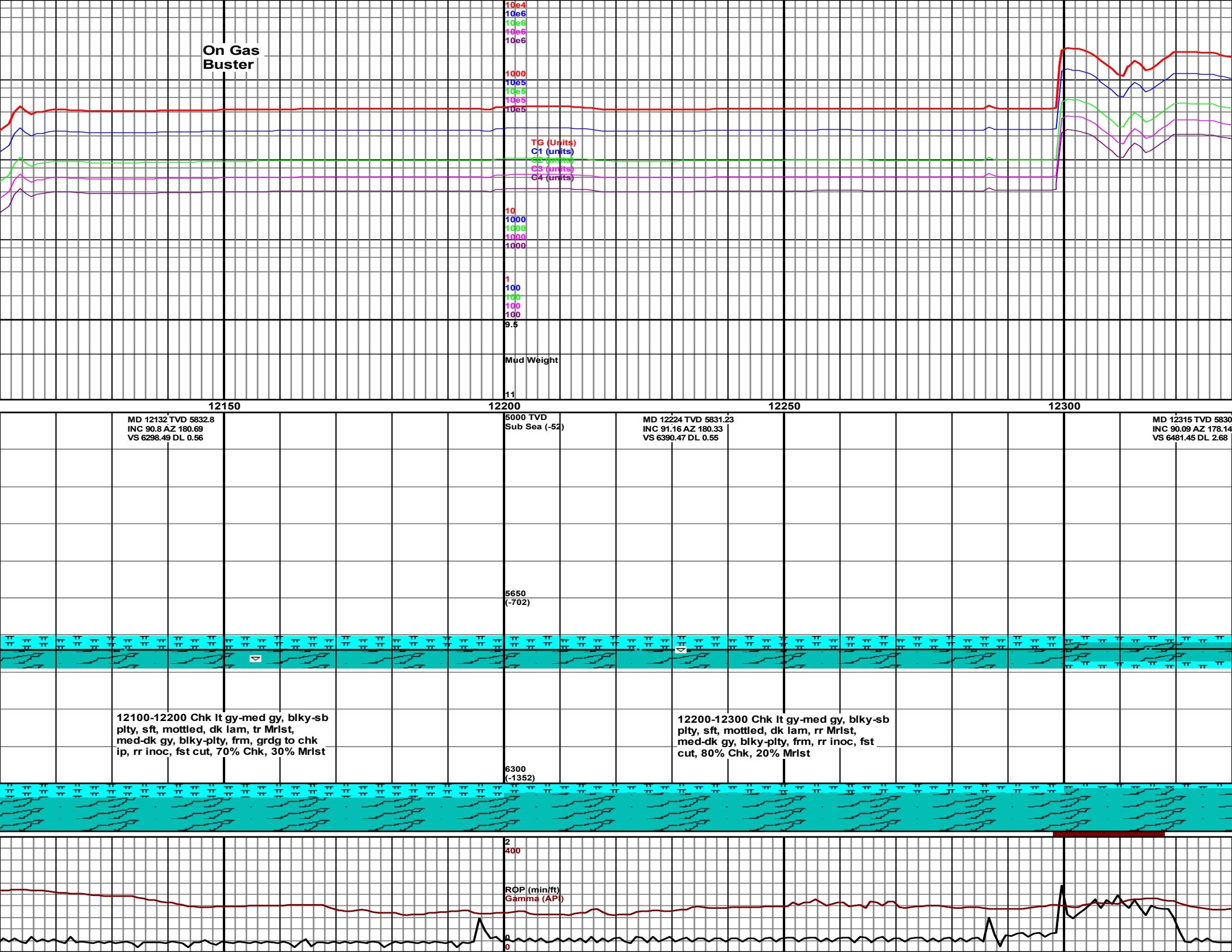
2  
400

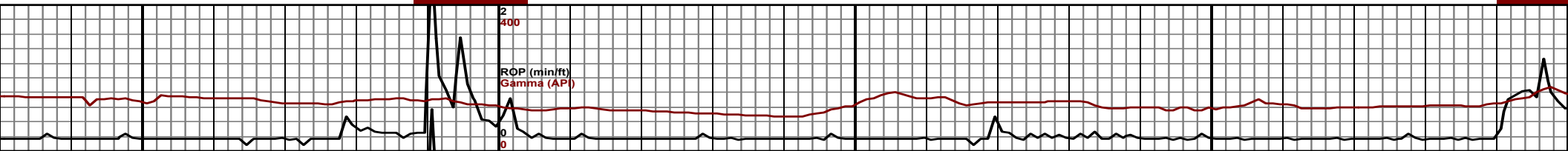
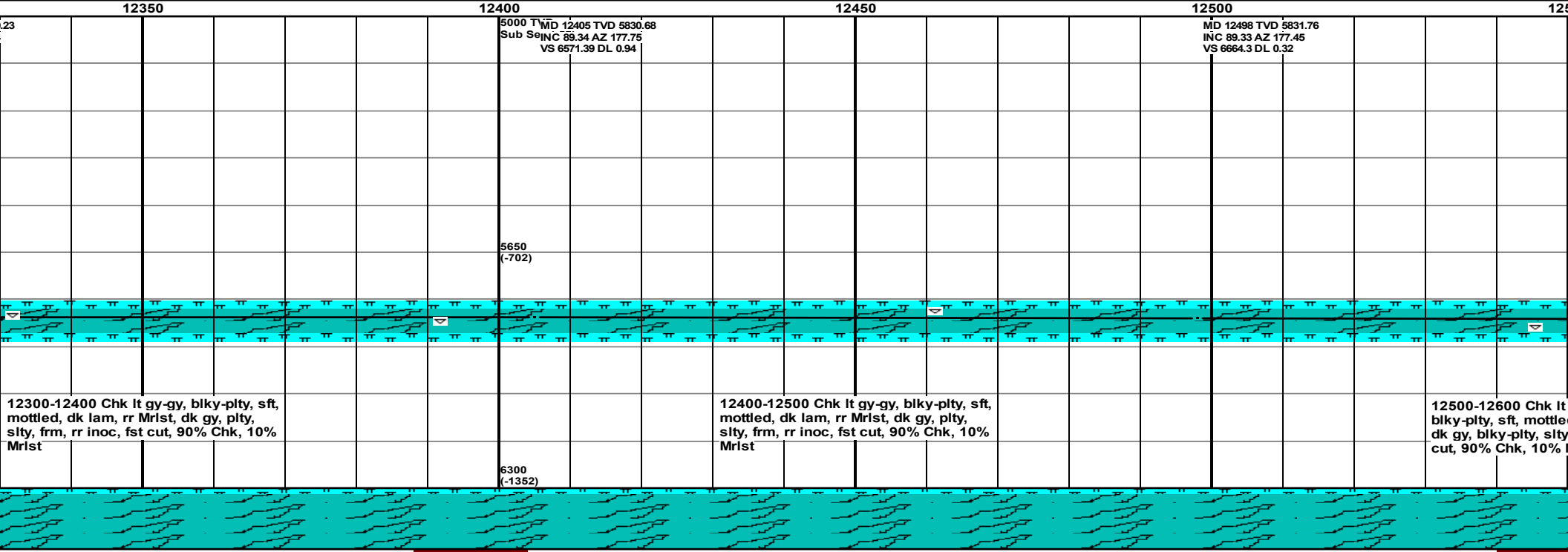
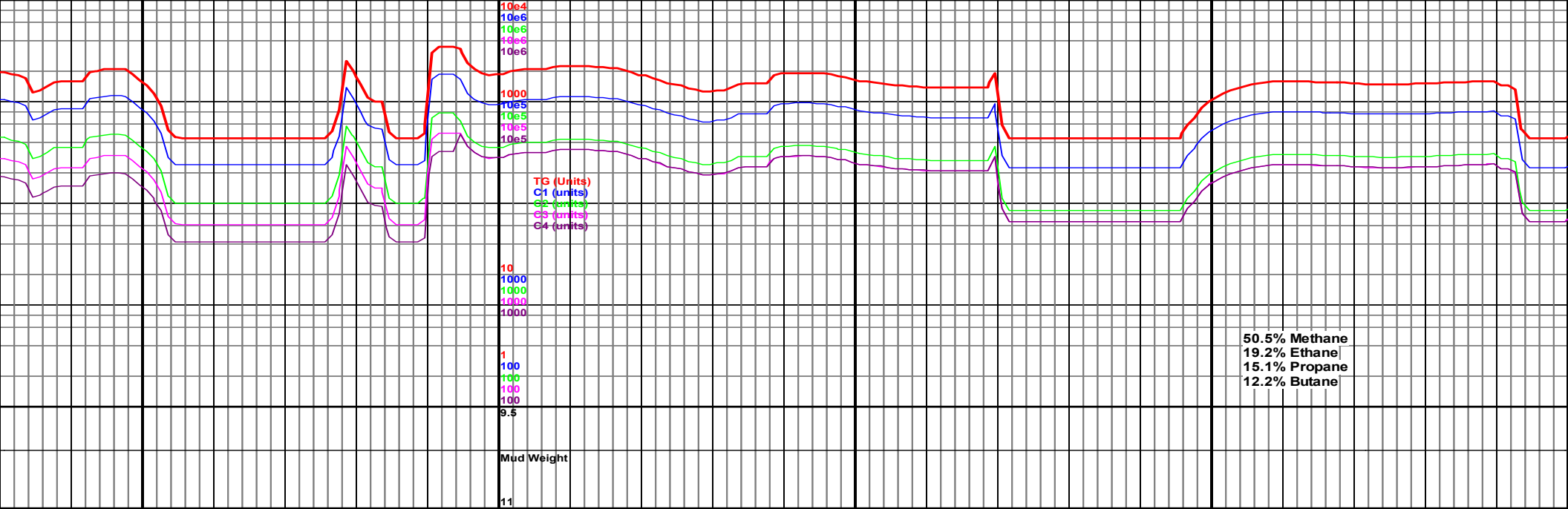
ROP (min/ft)  
Gamma (API)

0  
0

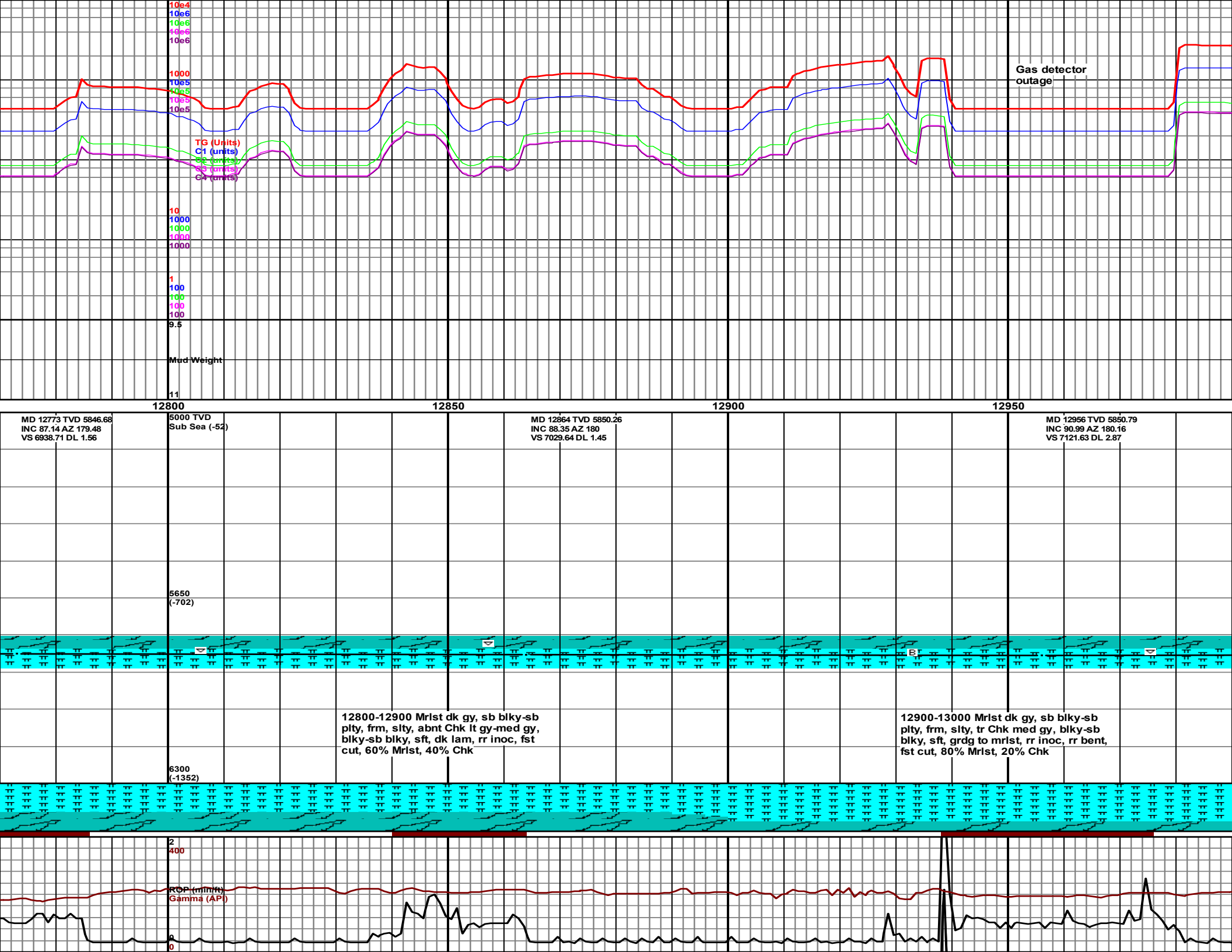


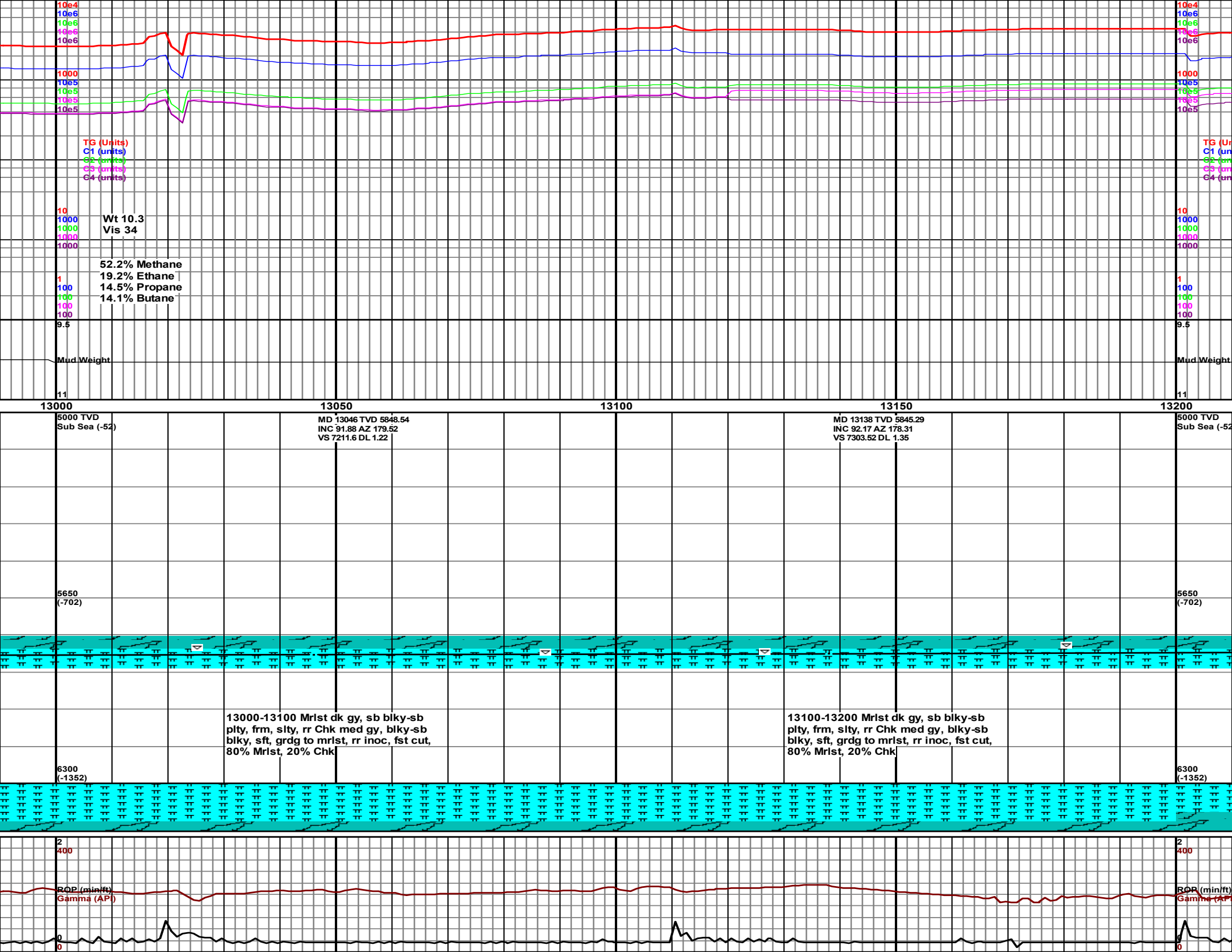




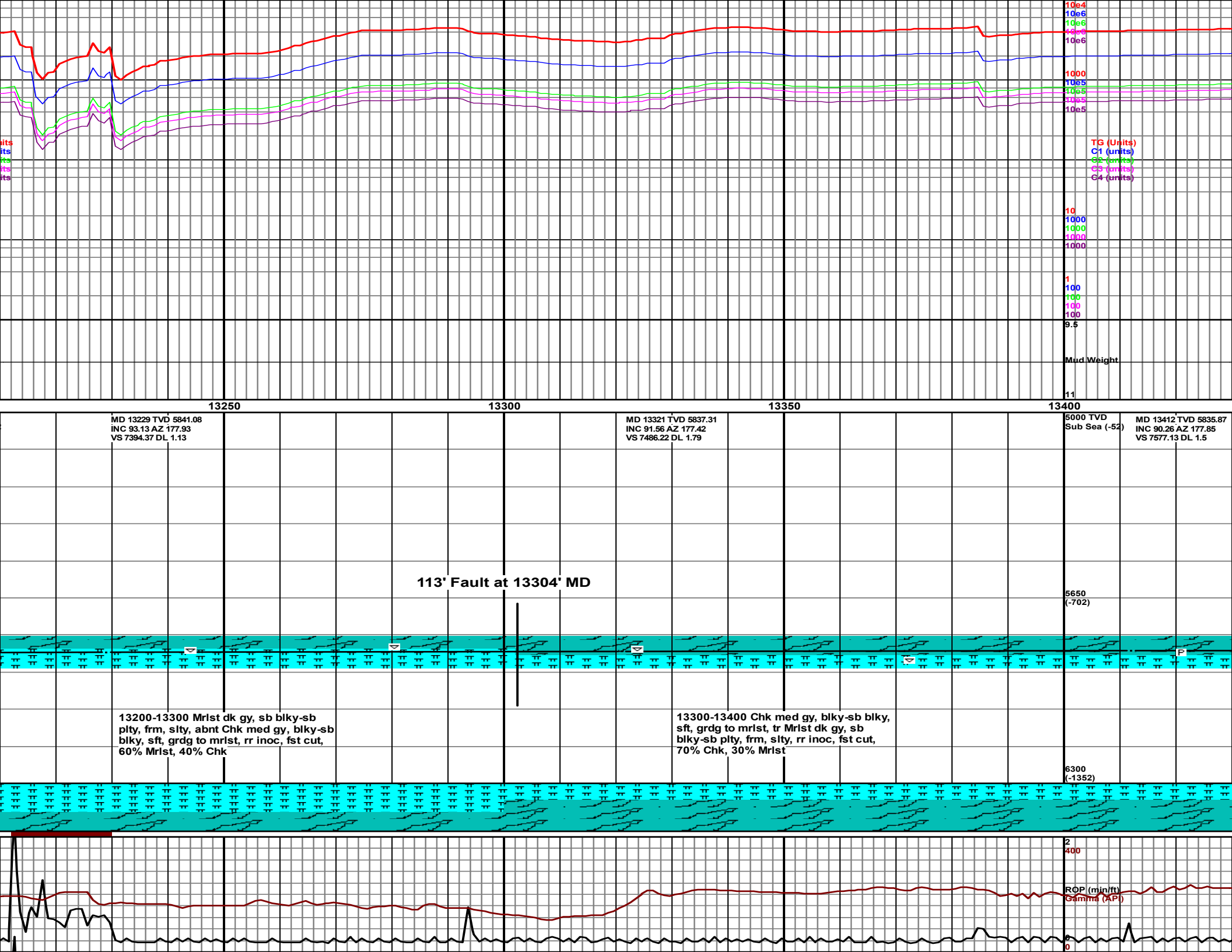


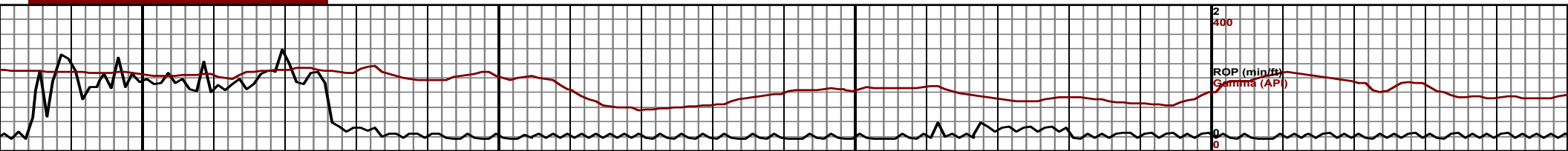
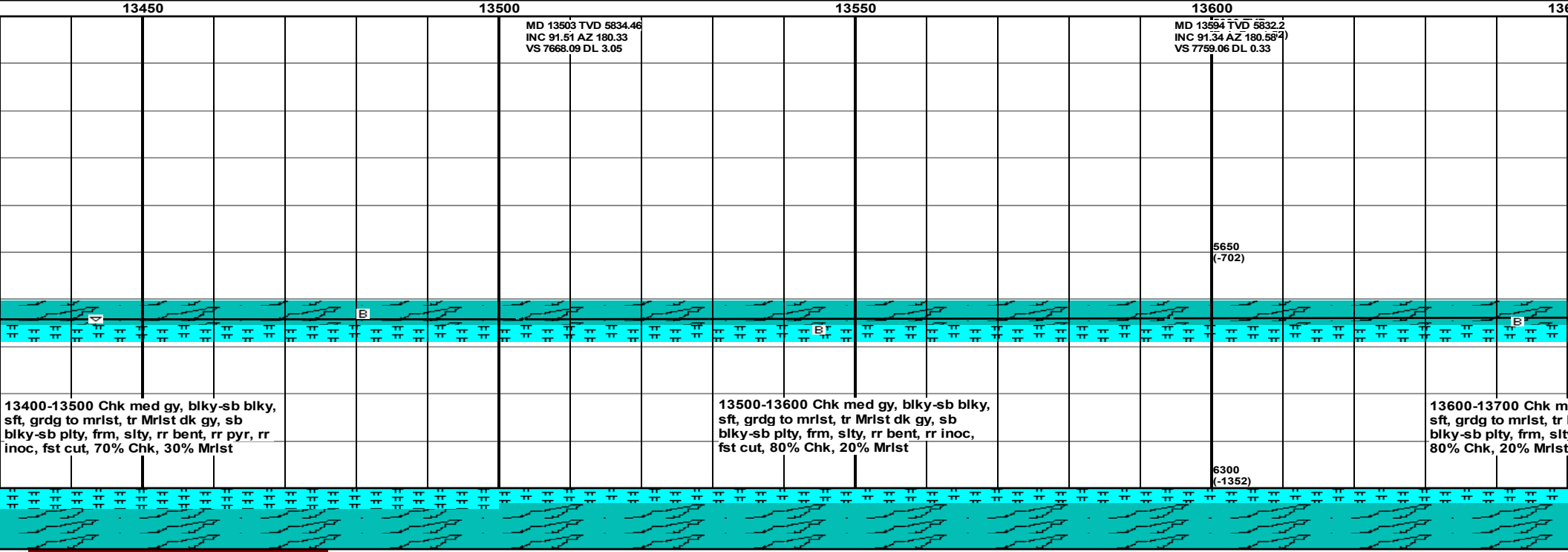
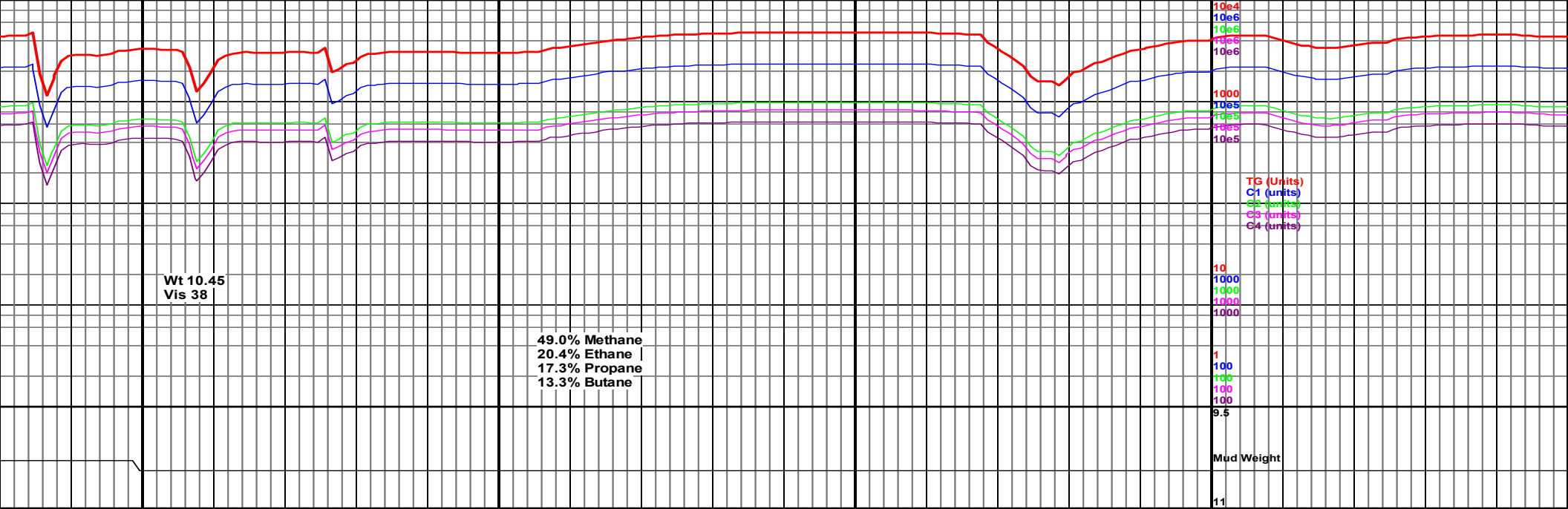


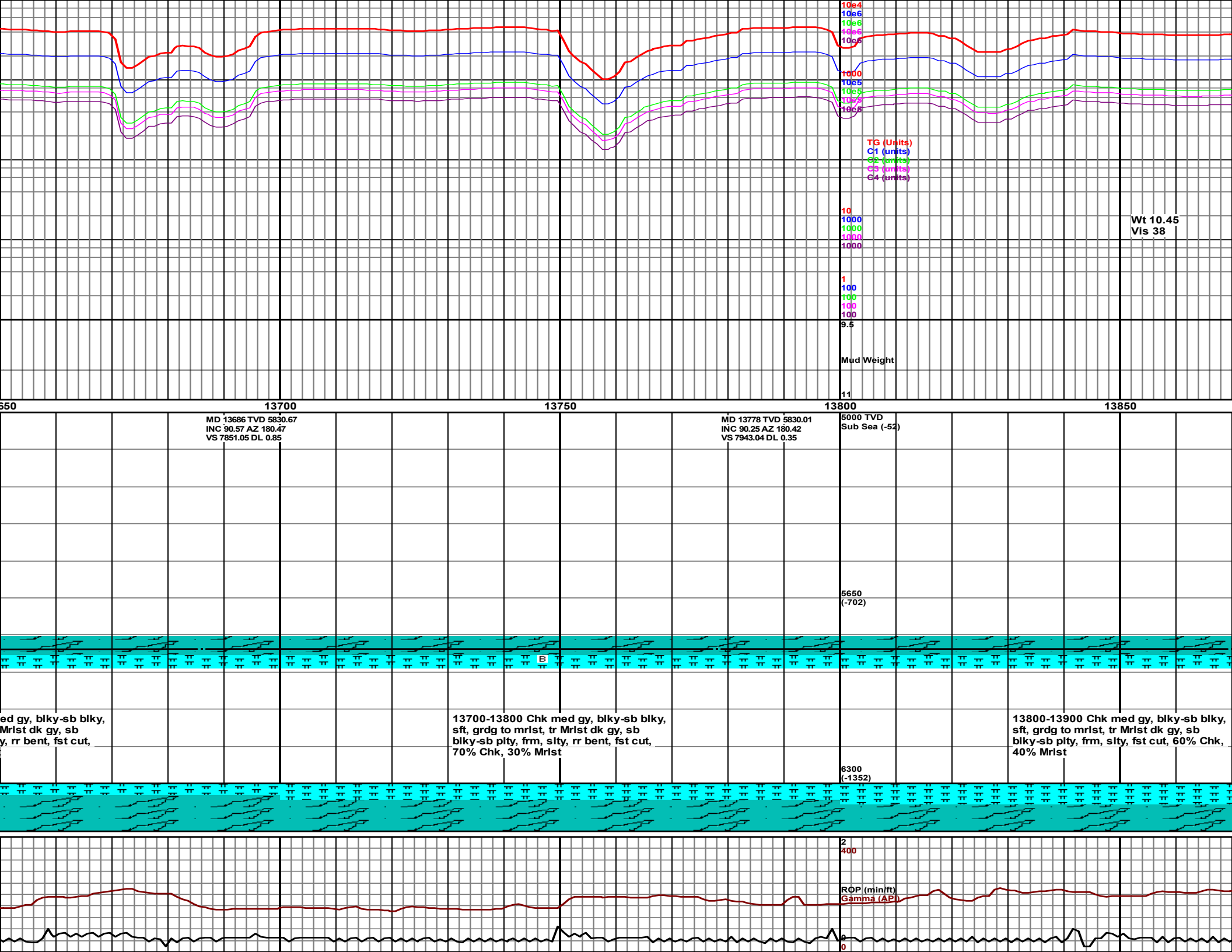


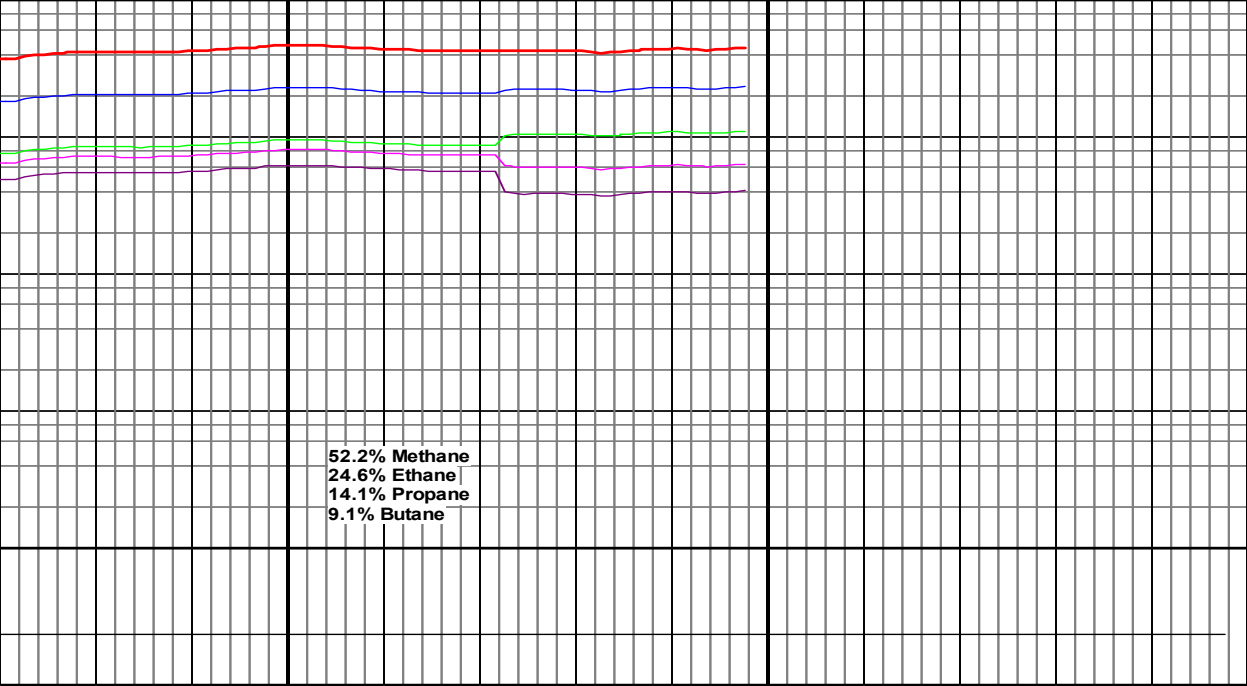












13900

13950

14000

MD 13870 TVD 5825 MD 13884 TVD 5829.51  
INC 89.92 AZ 180.71 INC 89.79 AZ 180.77  
VS 8035.04 DL 0.48 VS 8049.03 DL 1.02

TD of 13948' reached at  
09:25 on 2/20/2016.

13900-13948 Chk med gy, blk-y-sb blk-y,  
sft, grdg to mrlst, tr Mrlst dk gy, sb  
blk-y-sb plty, frm, slty, rr bent, fst cut,  
60% Chk, 40% Mrlst

