



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

Well Name: Horsetail 30G-3144  
API: 0512343028  
Location: SWNE SEC 30-T10N-R57W  
License Number:  
Spud Date: 12/12/2016  
Surface Coordinates: Lat.: 40.810528 Long.: -103.791475

Region: Redtail Field  
Drilling Completed: 12/16/2016

Bottom Hole  
Coordinates:  
Ground Elevation (ft): 4740  
Logged Interval (ft): 5019 To: 13790  
Formation: Niobrara  
Type of Drilling Fluid: Water Based Mud

K.B. Elevation (ft): 4761  
Total Depth (ft): 13790

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: Craig Dreiling and Todd Nakata  
Company: Acme Geologic Consulting  
Address: 108 Berry Street  
Little Rock, AR 72205

## Drilling Company

Unit Drilling Company  
Rig 406

## 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**

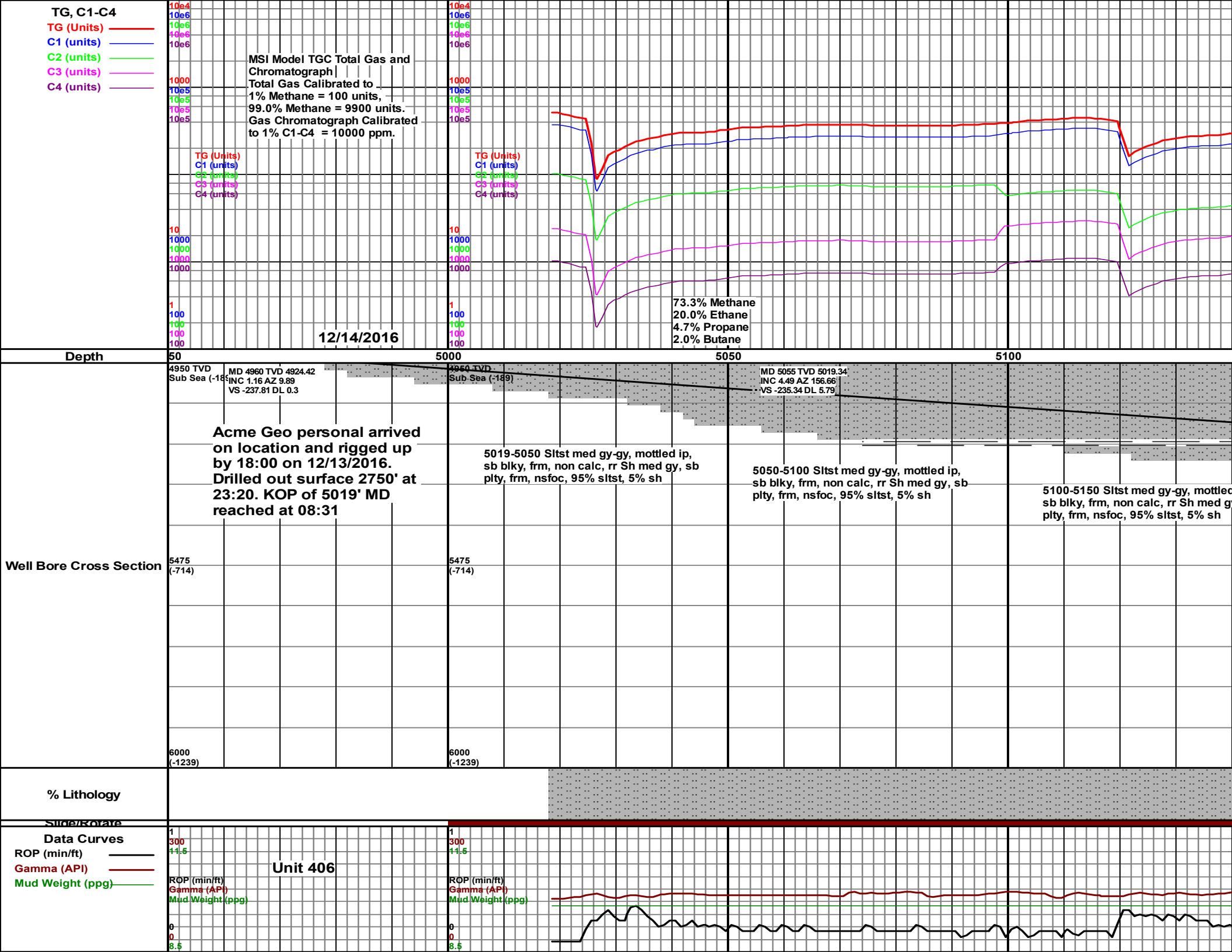
-  Ques
-  Dead

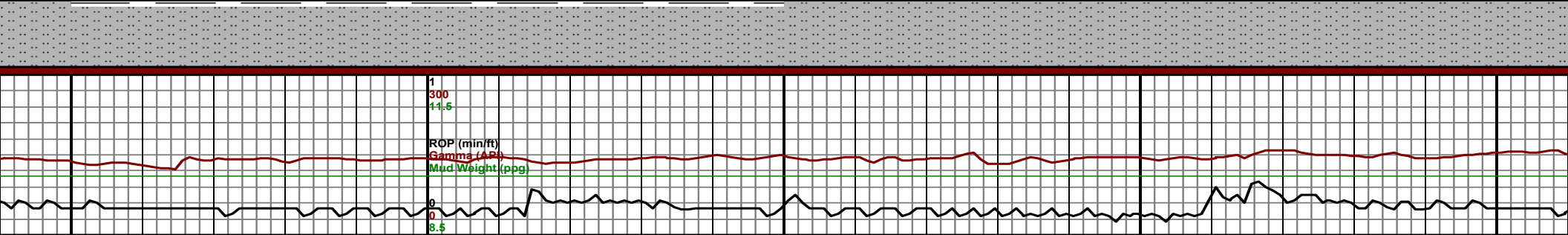
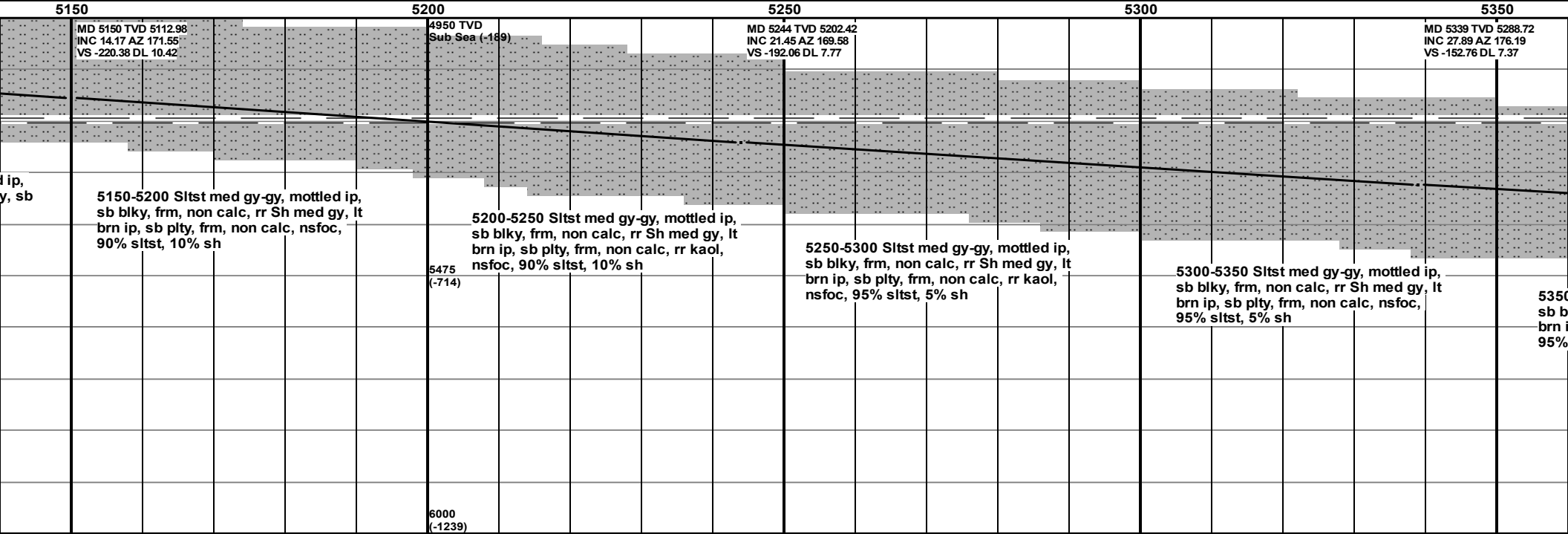
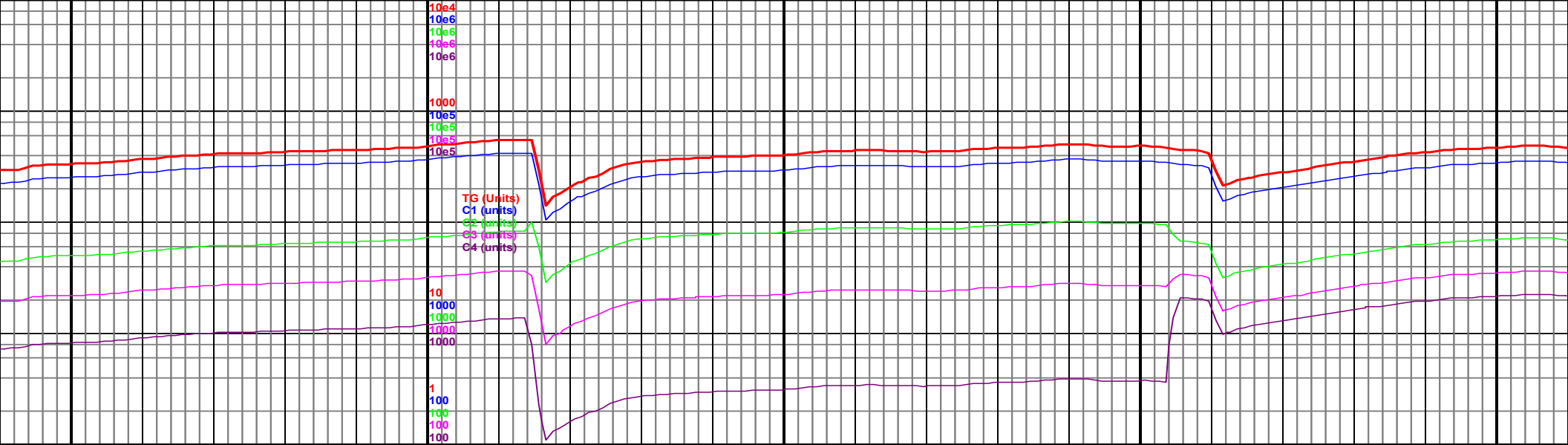
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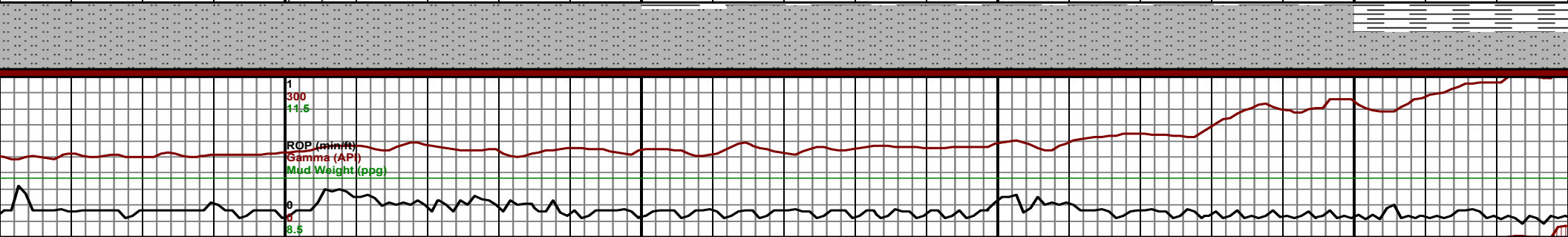
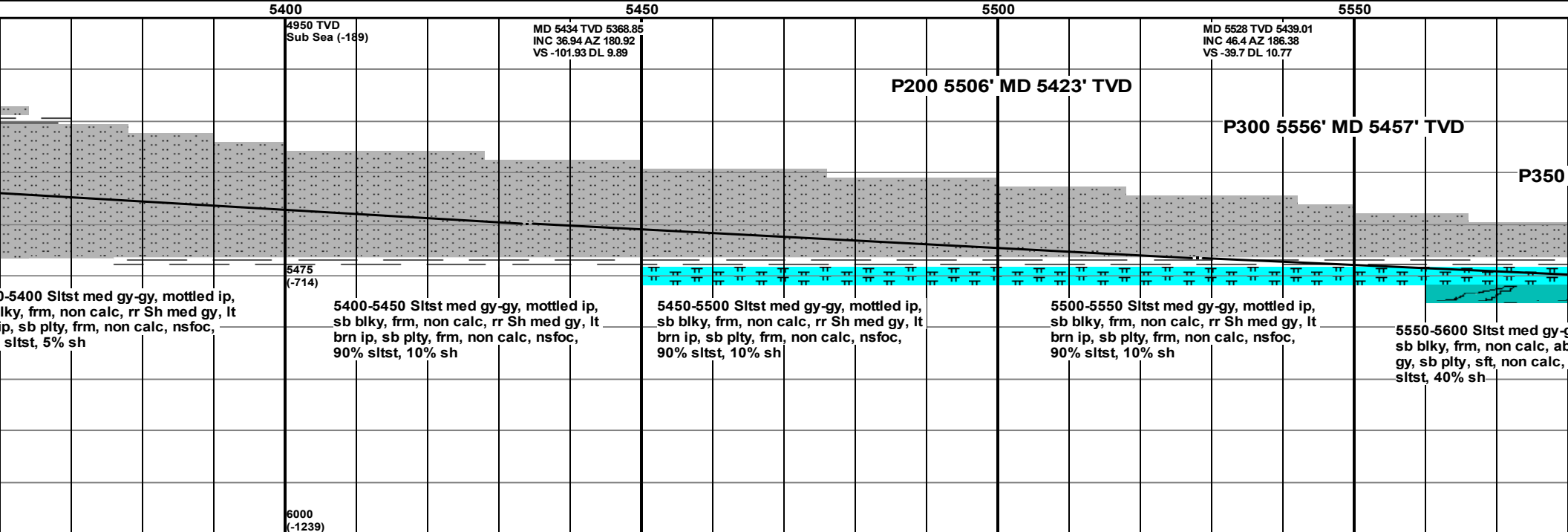
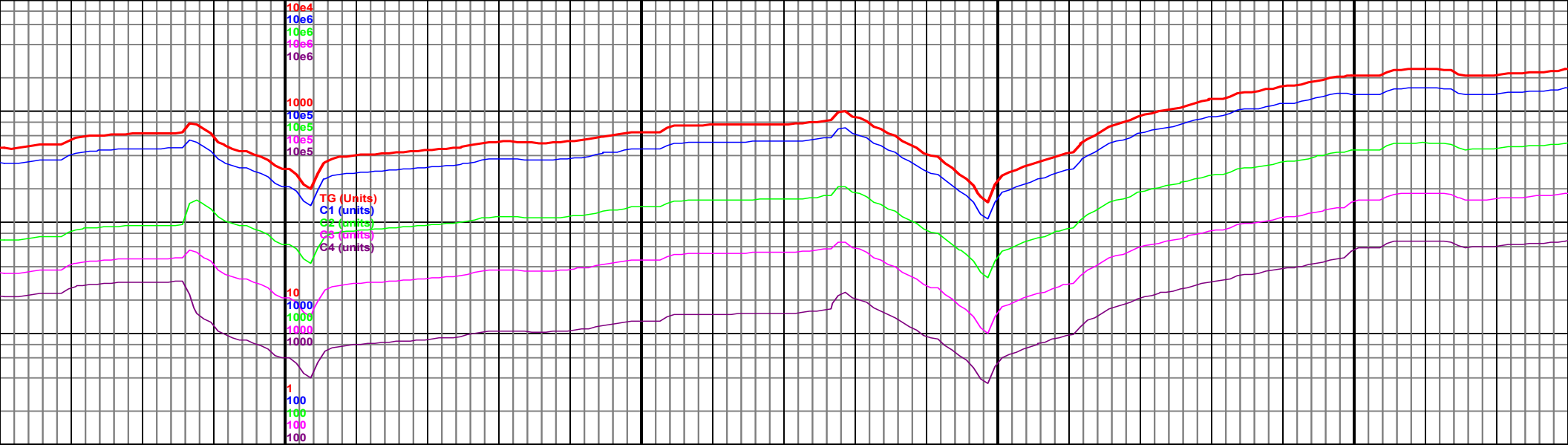
-  Core
-  Dst

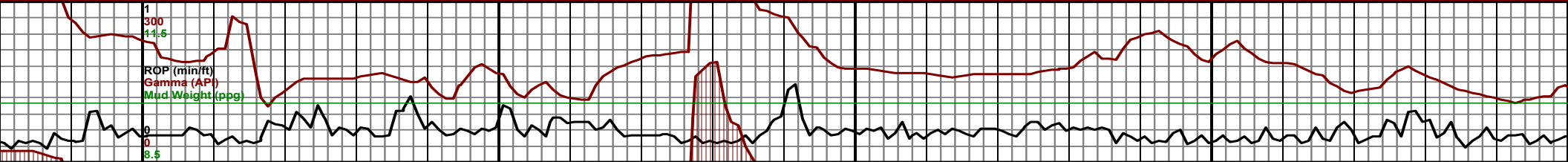
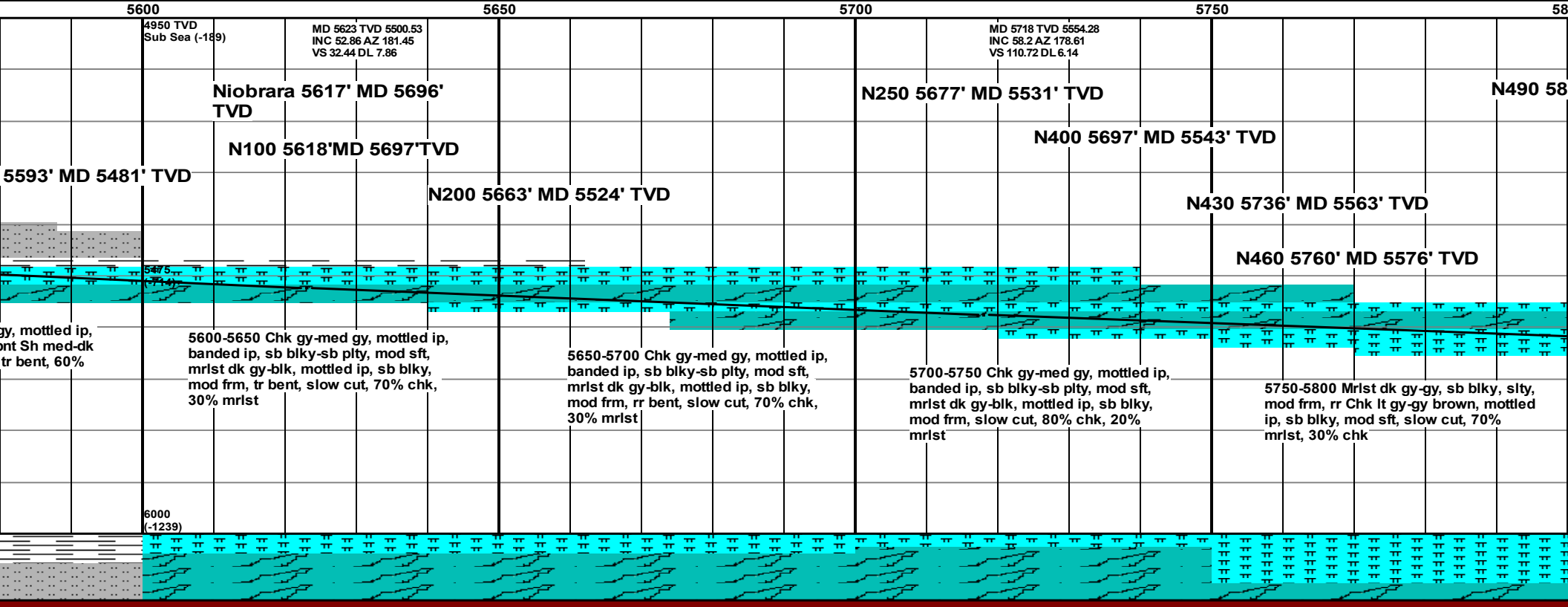
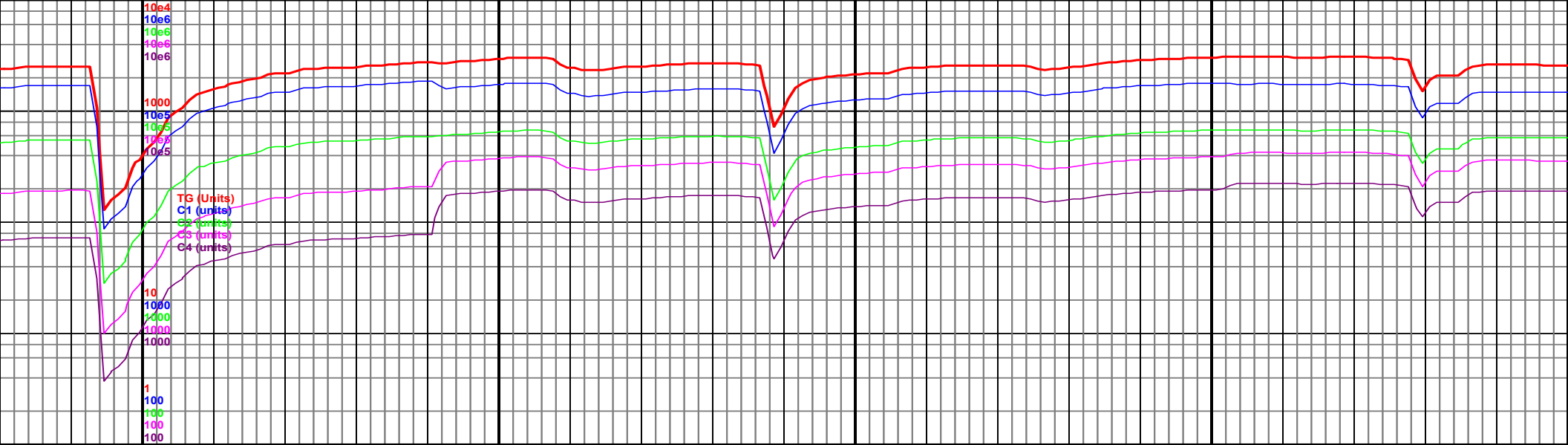
**EVENT**

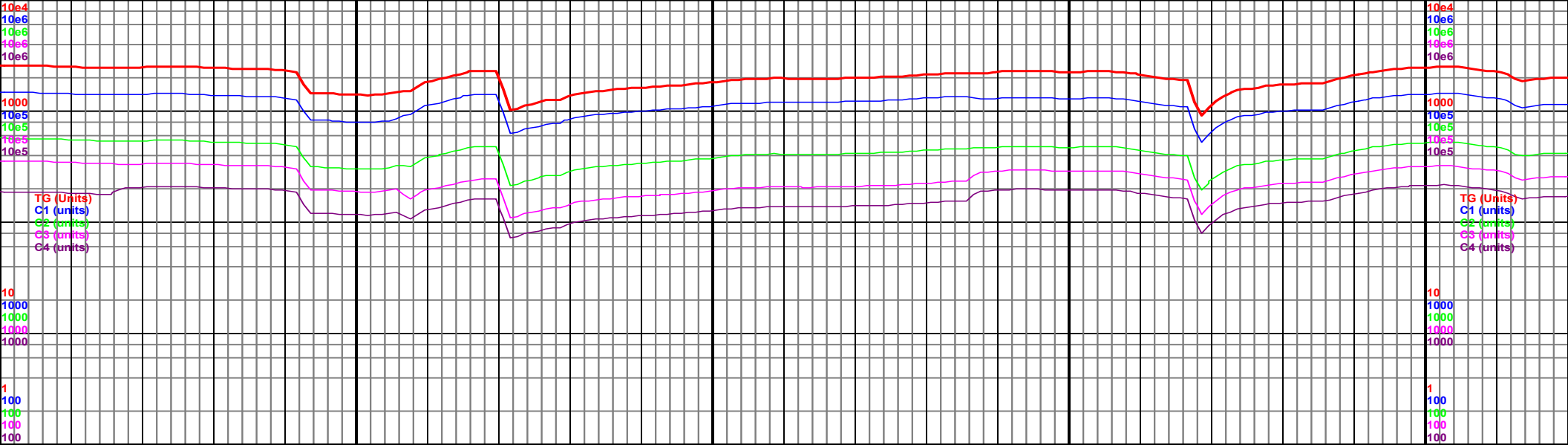
-  Rft
-  Sidewall











4950 TVD MD 5812 TVD 5604.65  
Sub Sea (-189) INC 57.01 AZ 176.88  
VS 190.02 DL 2.

MD 5907 TVD 5651.21  
INC 64.26 AZ 180.77  
VS 272.72 DL 8.42

MD 6001 TVD 5686.91  
Sub Sea (-189) INC 71.08 AZ 183.35  
VS 359.55 DL 7.69

06' MD 5602' TVD

N500 5827' MD 5612' TVD

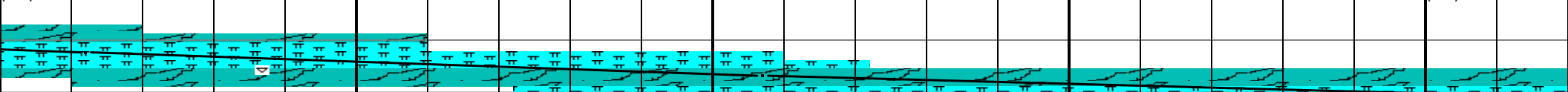
N700 5933' MD 5662' TVD

N710 5952' MD 5669' TVD

N720 5992' MD 5684' TVD

5475  
(-714)

5475  
(-714)



5800-5850 Chk gy-med gy brown, mottled ip, banded ip, sb blkgy-sb plty, mod sft, mrlst dk gy-blk, mottled ip, sb blkgy, mod frm, rr bent, rr inoc, rr pyr, slow cut, 70% chk, 30% mrlst

5850-5900 Mrlst dk gy-gy, sb blkgy, slty, mod frm, rr Chk lt gy-gy bro, mottled ip, sb blkgy, mod sft, tr bent, slow cut, 80% mrlst, 20% chk

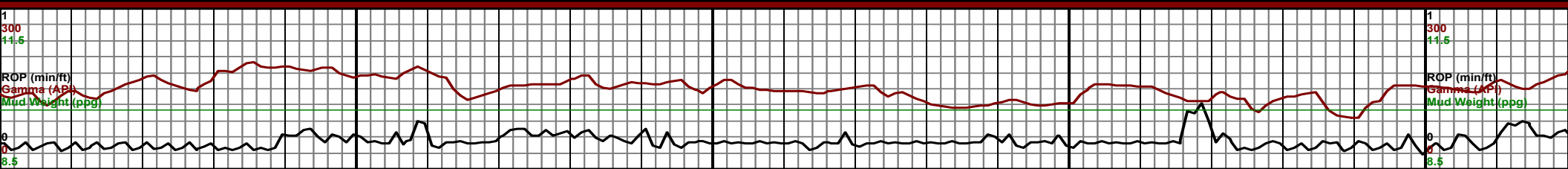
5900-5950 Mrlst dk gy-gy, sb blkgy, slty, mod frm, rr Chk lt gy-gy, mottled ip, sb blkgy, mod sft, rr bent, slow cut, 80% mrlst, 20% chk

5950-6000 Chk gy-med gy, mottled ip, banded ip, sb blkgy, mod sft, mrlst dk gy-blk, mottled ip, sb blkgy, mod frm, slow cut, 60% chk, 40% mrlst

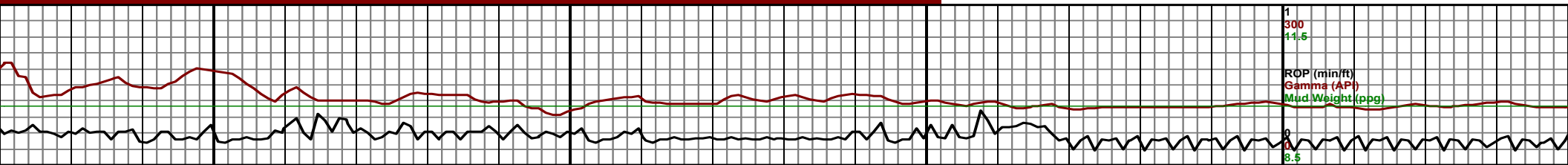
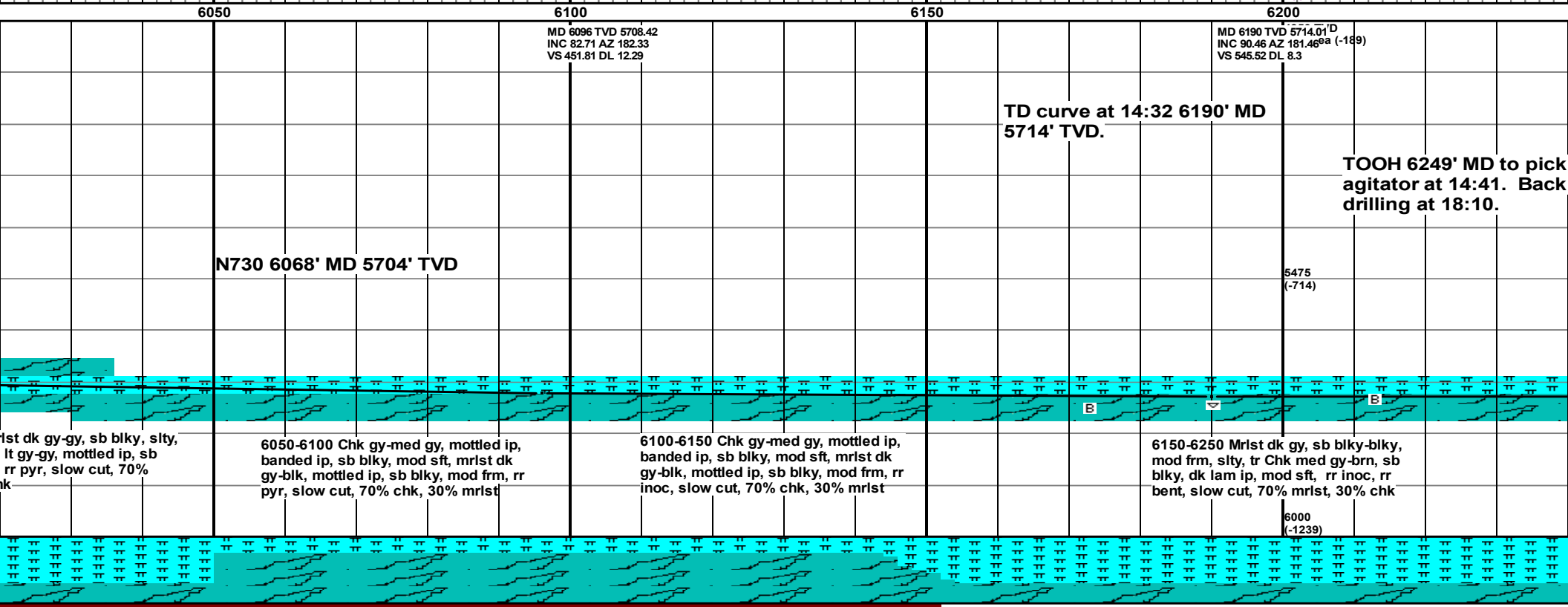
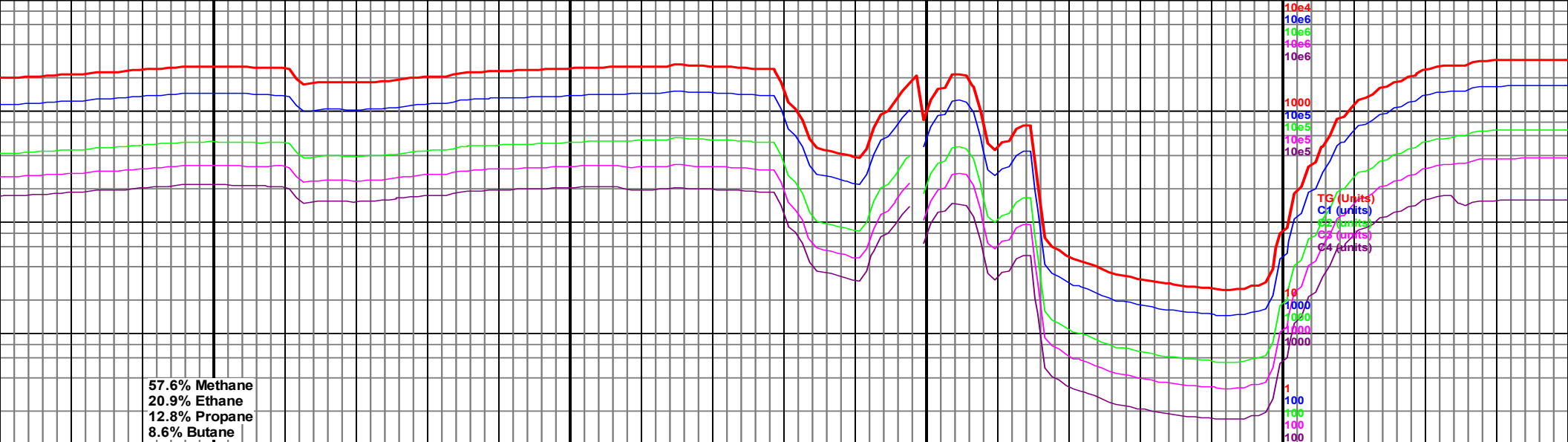
6000-6050 Mrlst dk gy-gy, mod frm, Chk blkgy, mod sft, mrlst, 30% chk

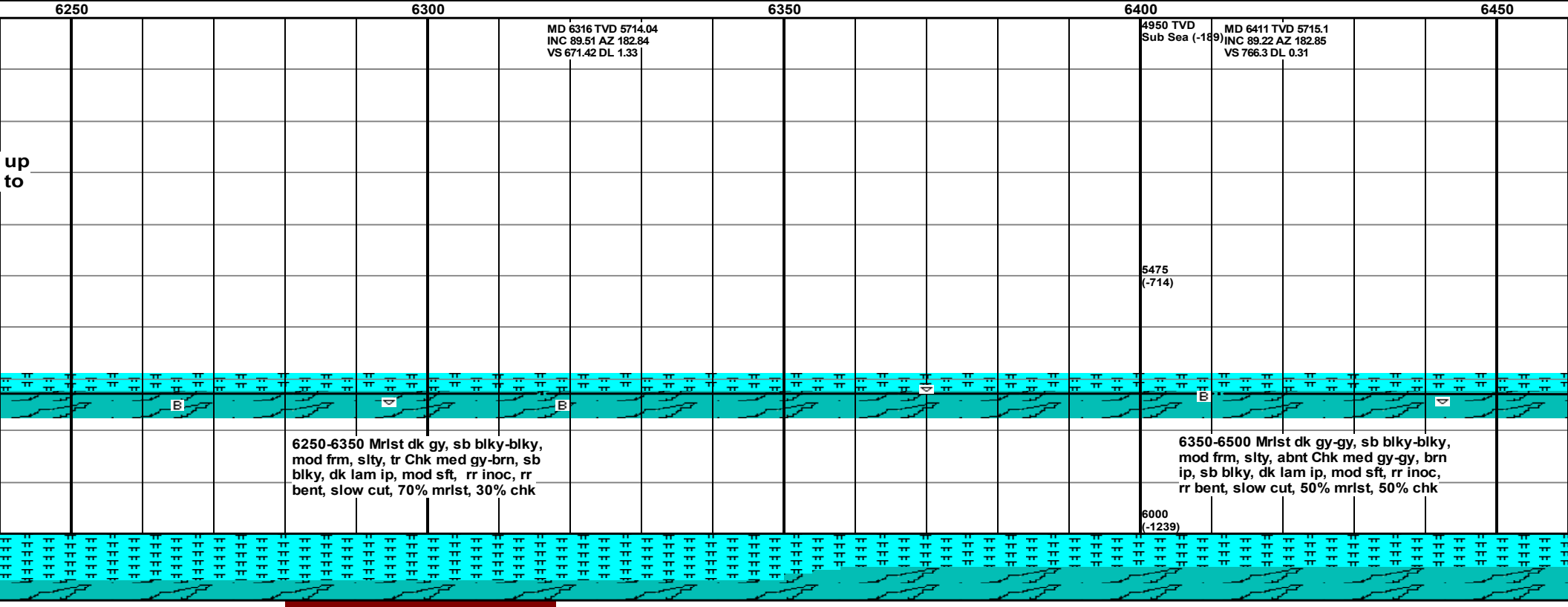
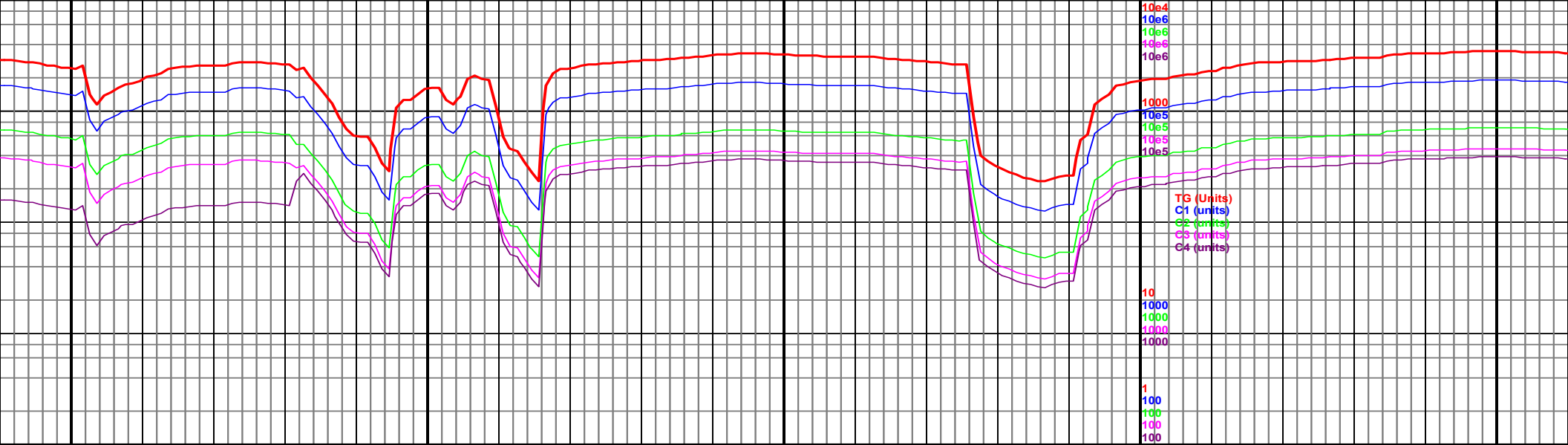
6000  
(-1239)

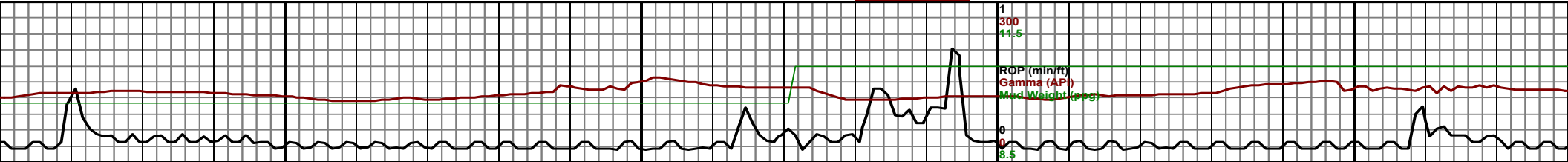
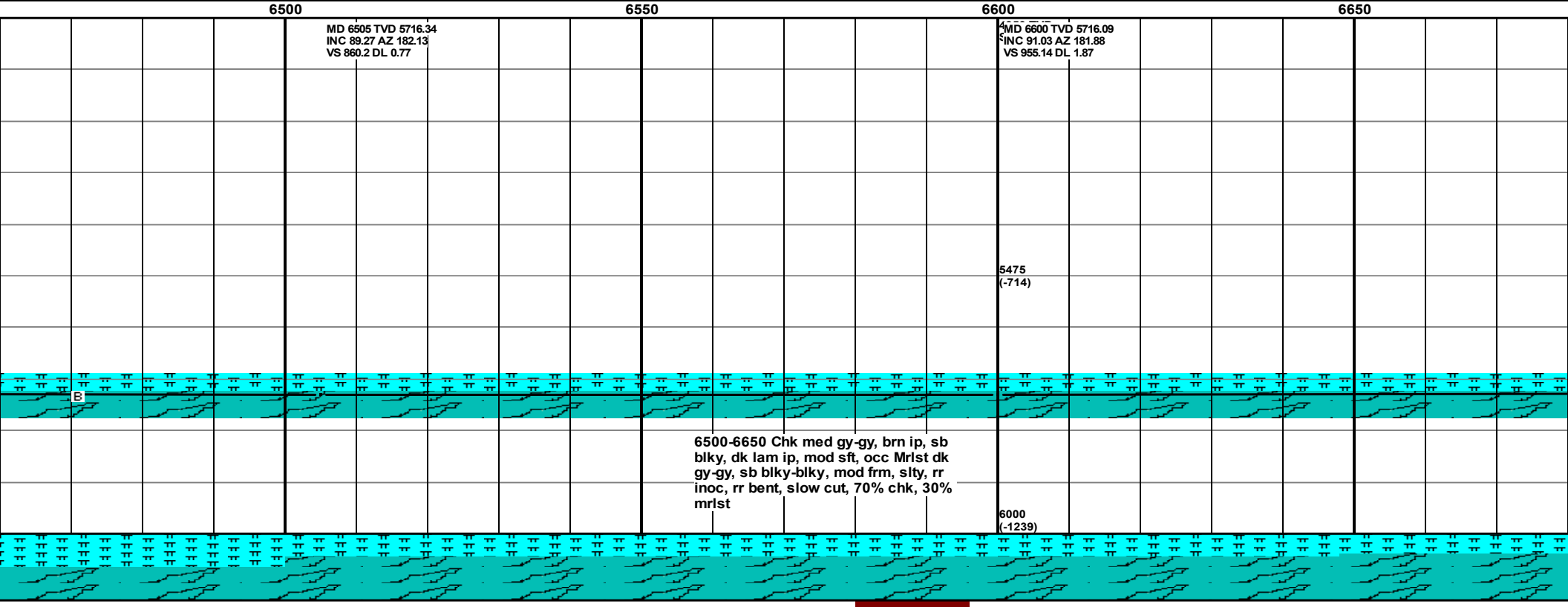
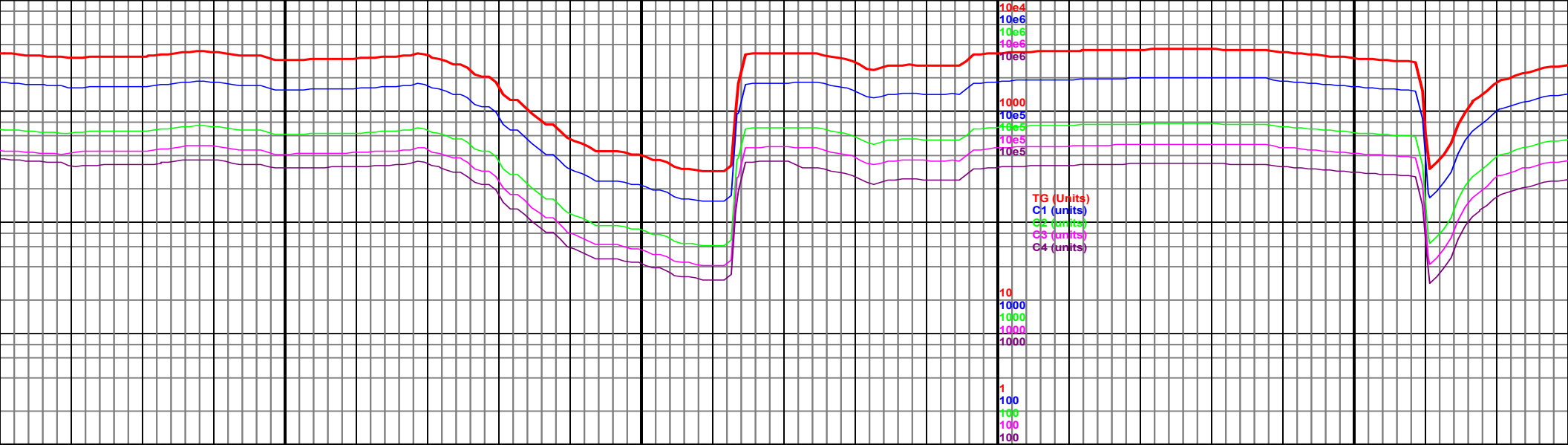
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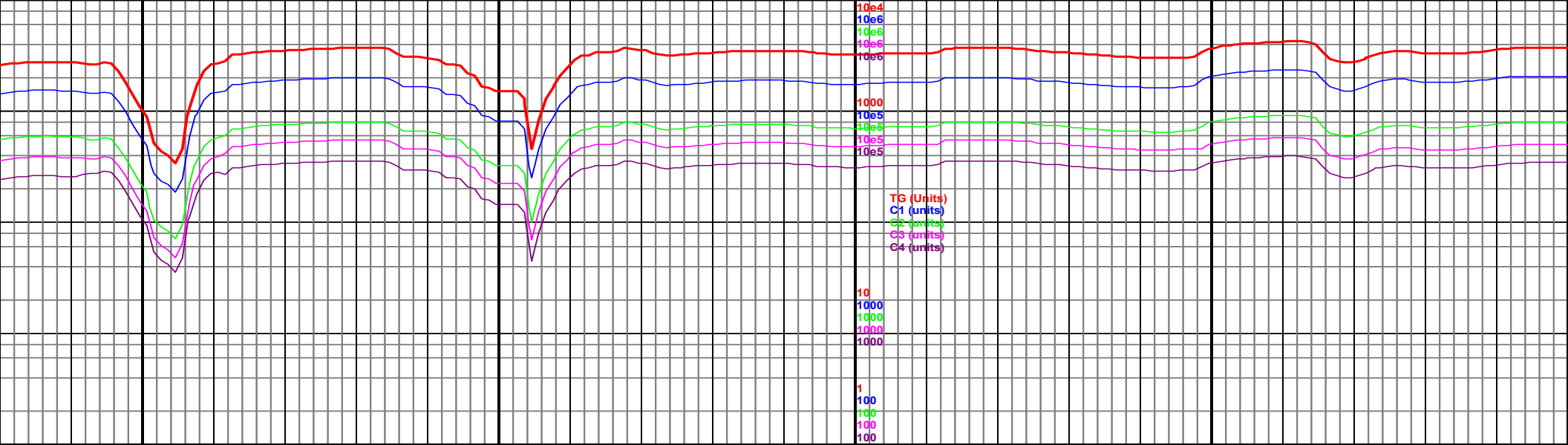












6700  
MD 6694 TVD 5715.1  
INC 90.17 AZ 179.95  
VS 1049.12 DL 2.25

6750

6800  
MD 6789 TVD 5715.66  
INC 89.16 AZ 177.89 Sea (-189)  
VS 1144.09 DL 2.41

6850

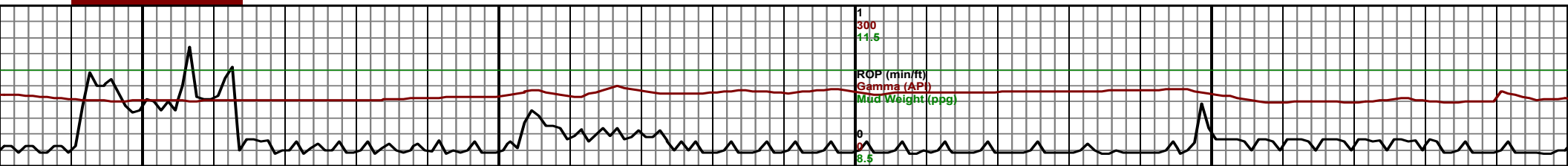
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MD 6883 TVD 5717.46  
INC 88.64 AZ 177.03  
VS 1237.98 DL 1.07

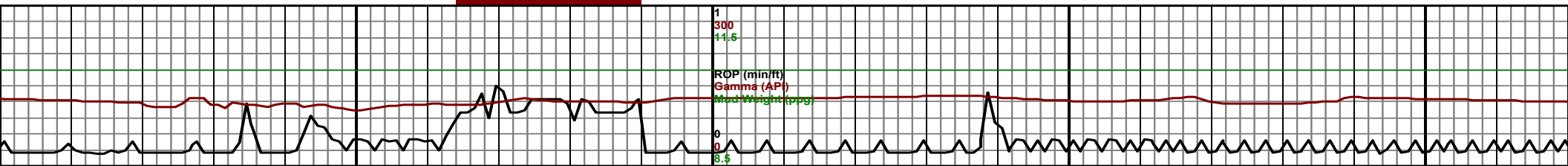
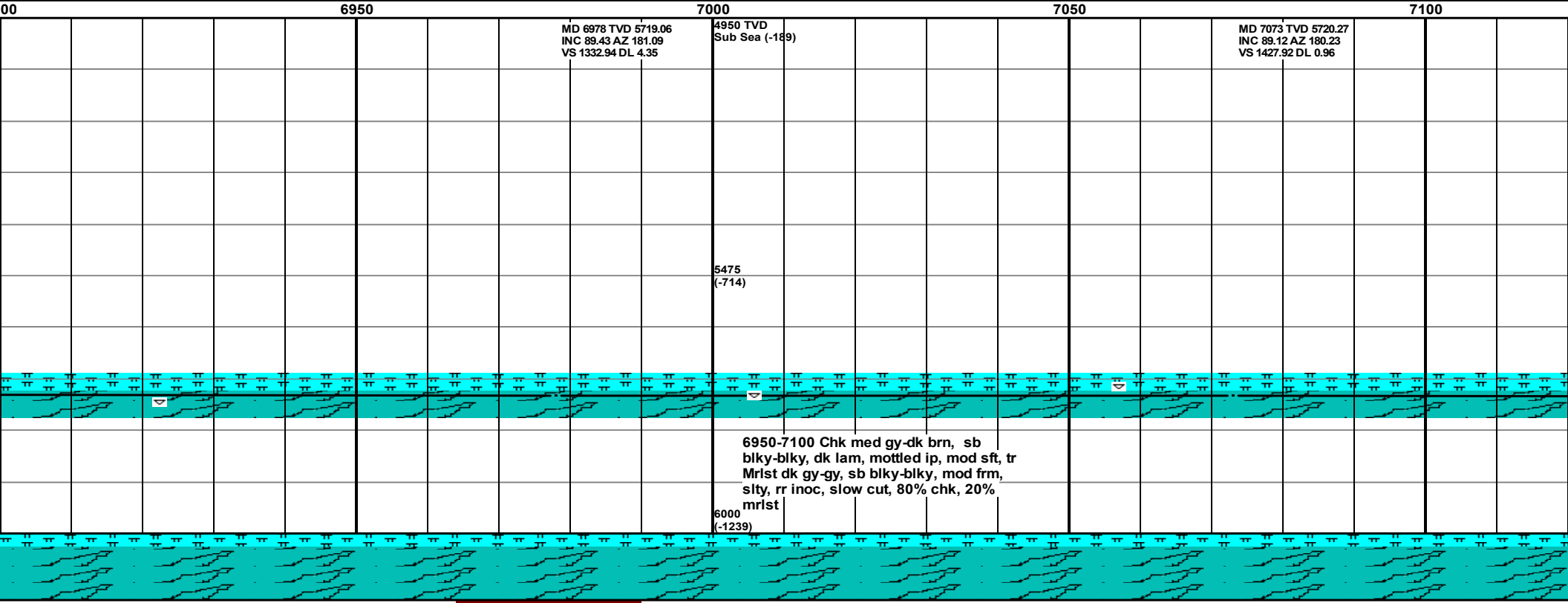
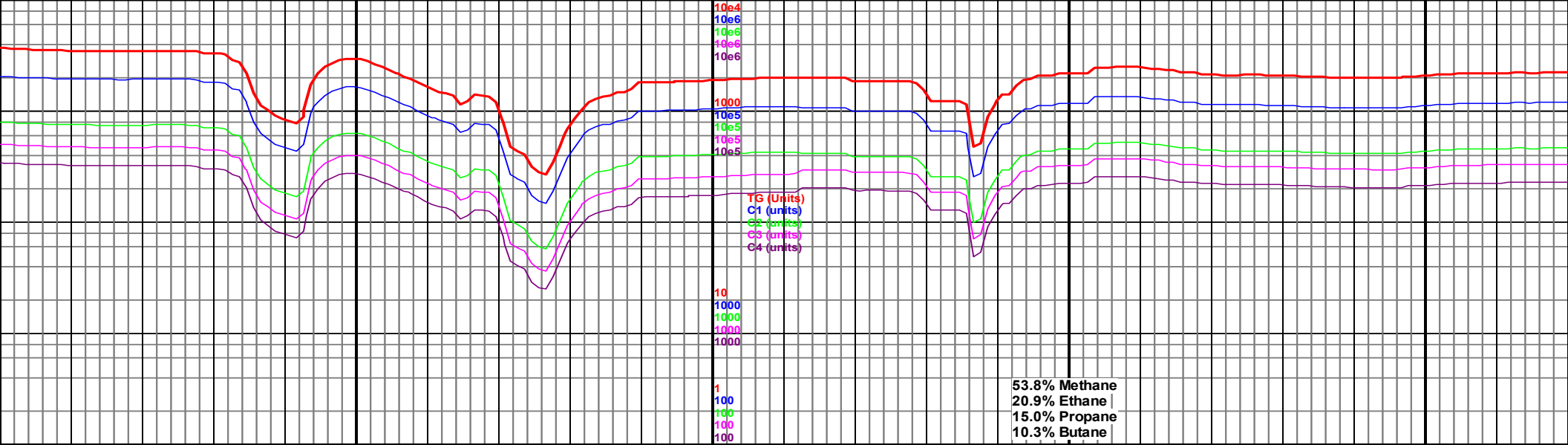
6650-6800 Chk med gy-gy, brn ip, sb  
blky, dk lam ip, mod sft, occ Mrlst dk  
gy-gy, sb blky-blky, mod frm, slty, rr  
inoc, rr bent, slow cut, 70% chk, 30%  
mrlst

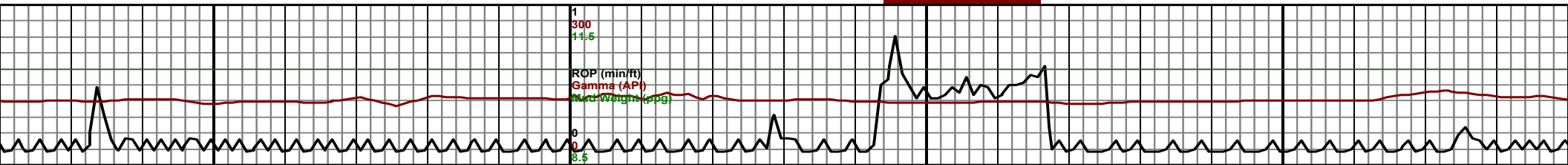
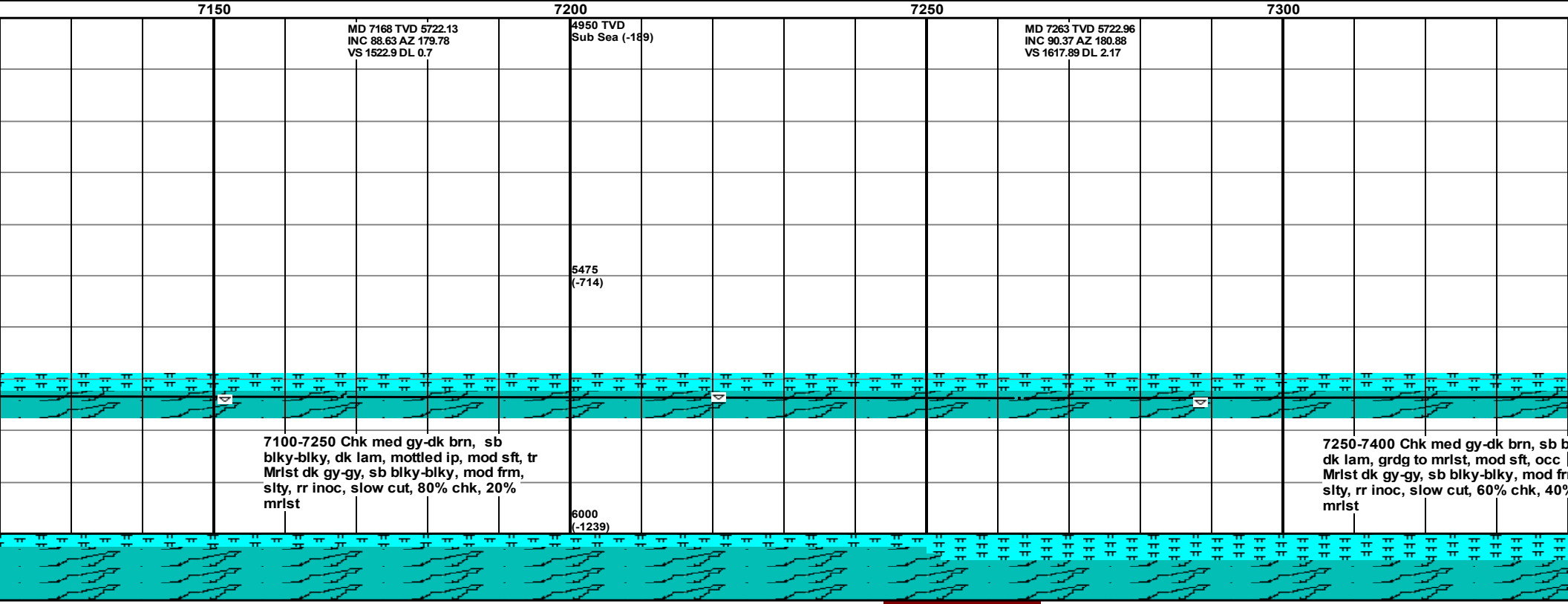
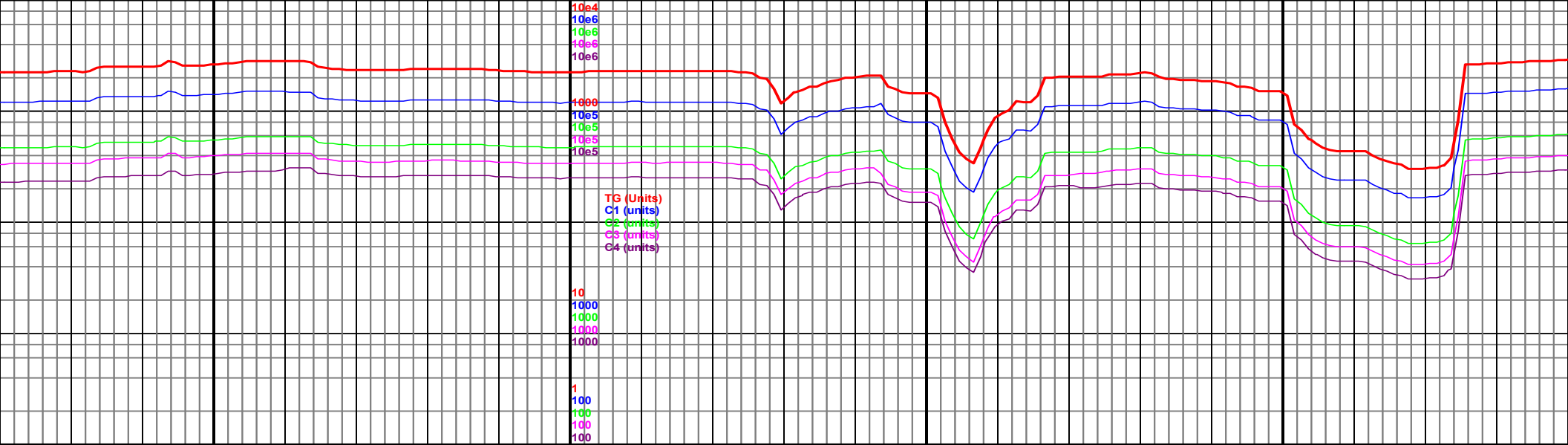
6800-6950 Chk med gy-dk brn, sb  
blky, dk lam, mod sft, tr Mrlst dk gy-gy,  
sb blky-blky, mod frm, slty, rr inoc,  
slow cut, 80% chk, 20% mrlst

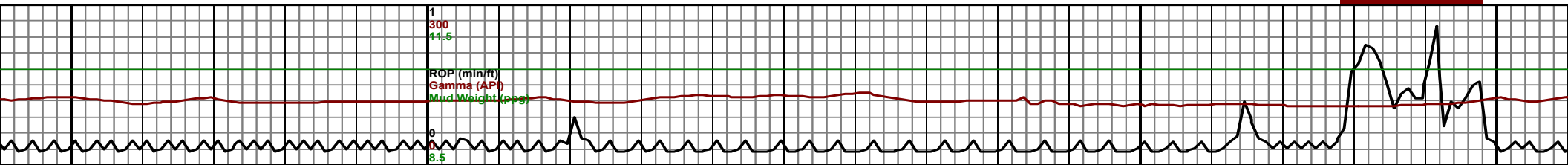
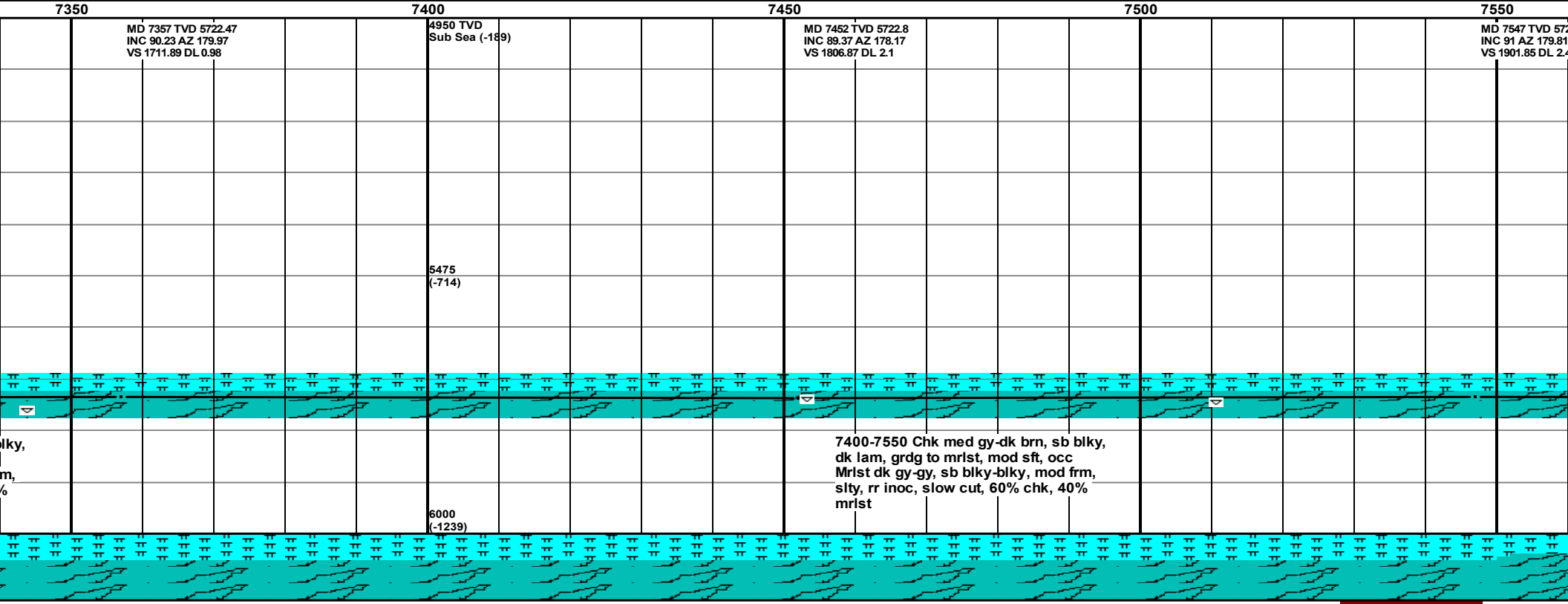
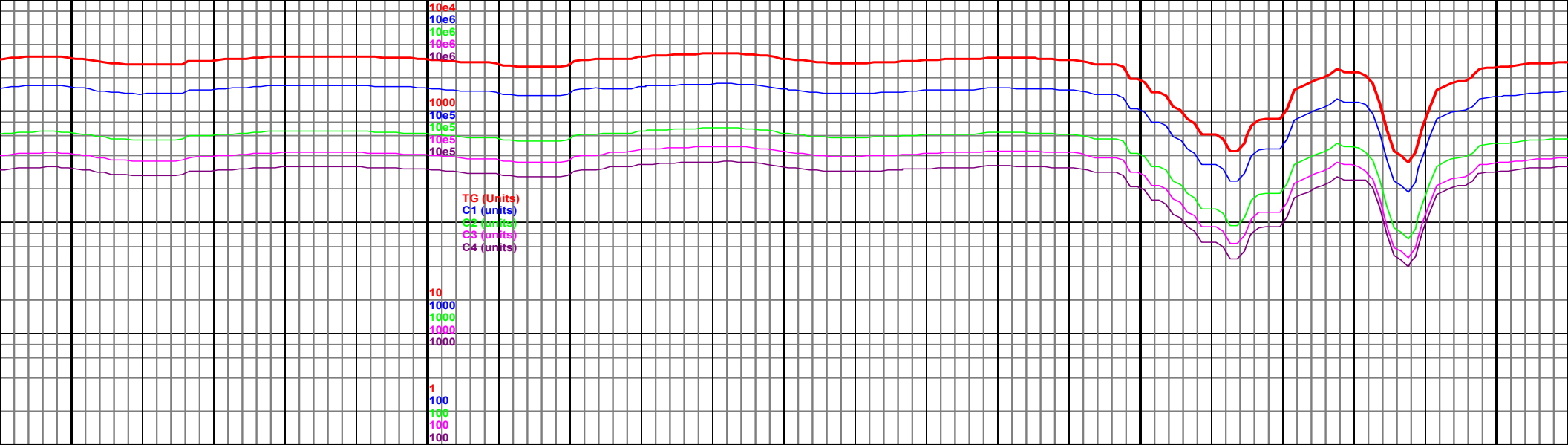
5475  
(-714)

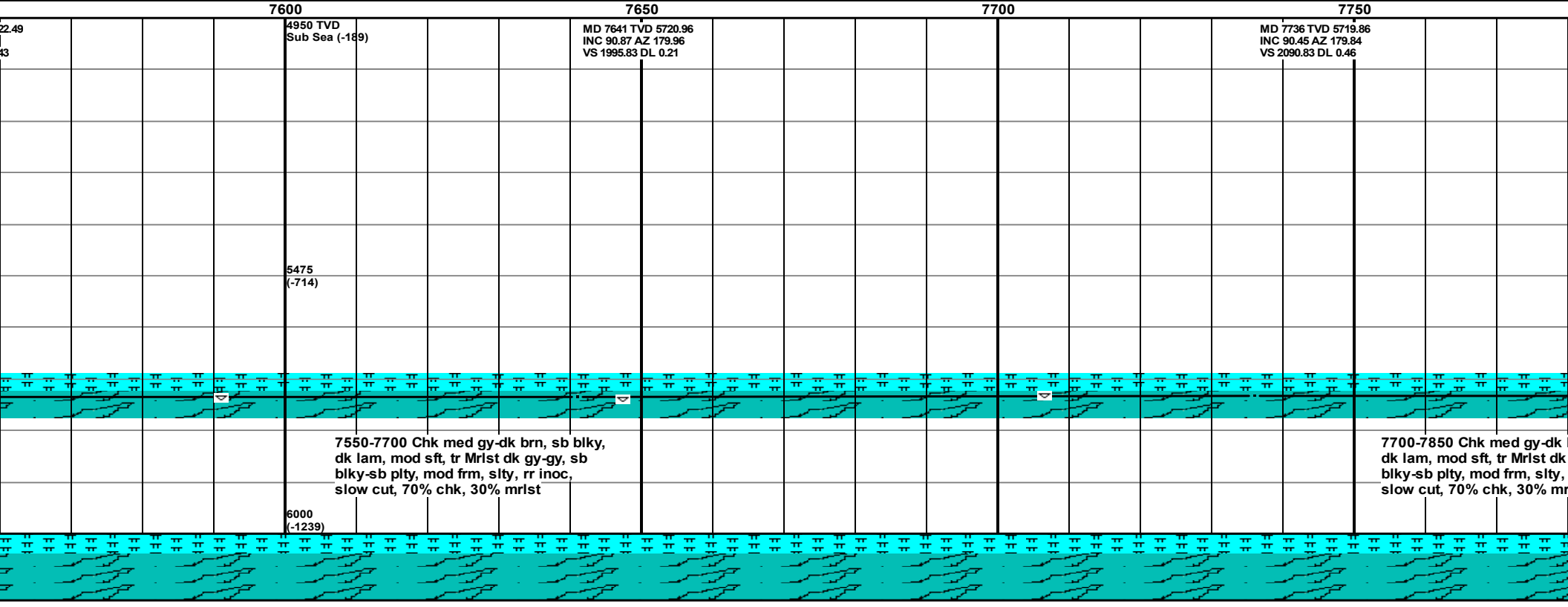
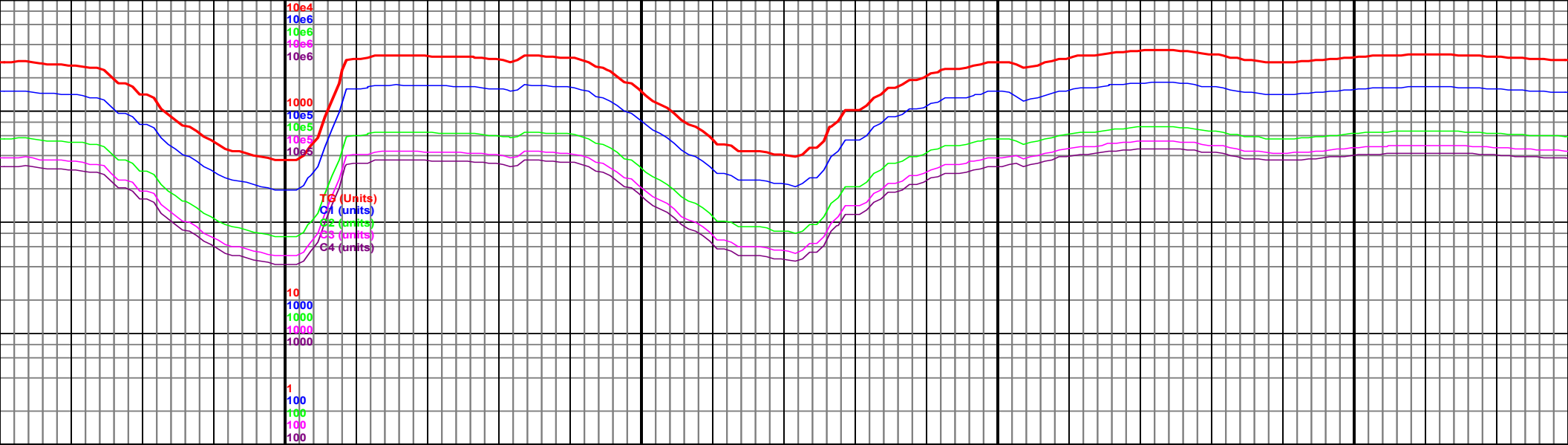
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(-1239)



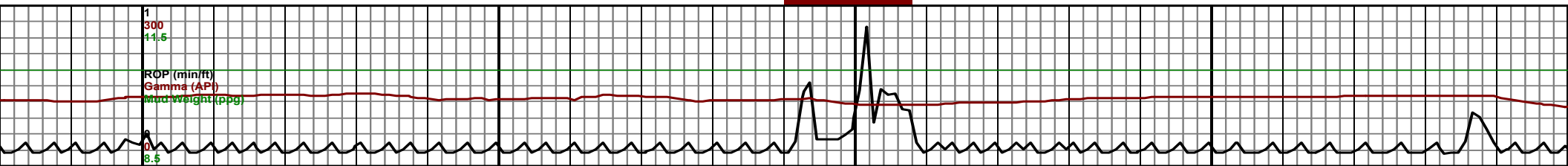
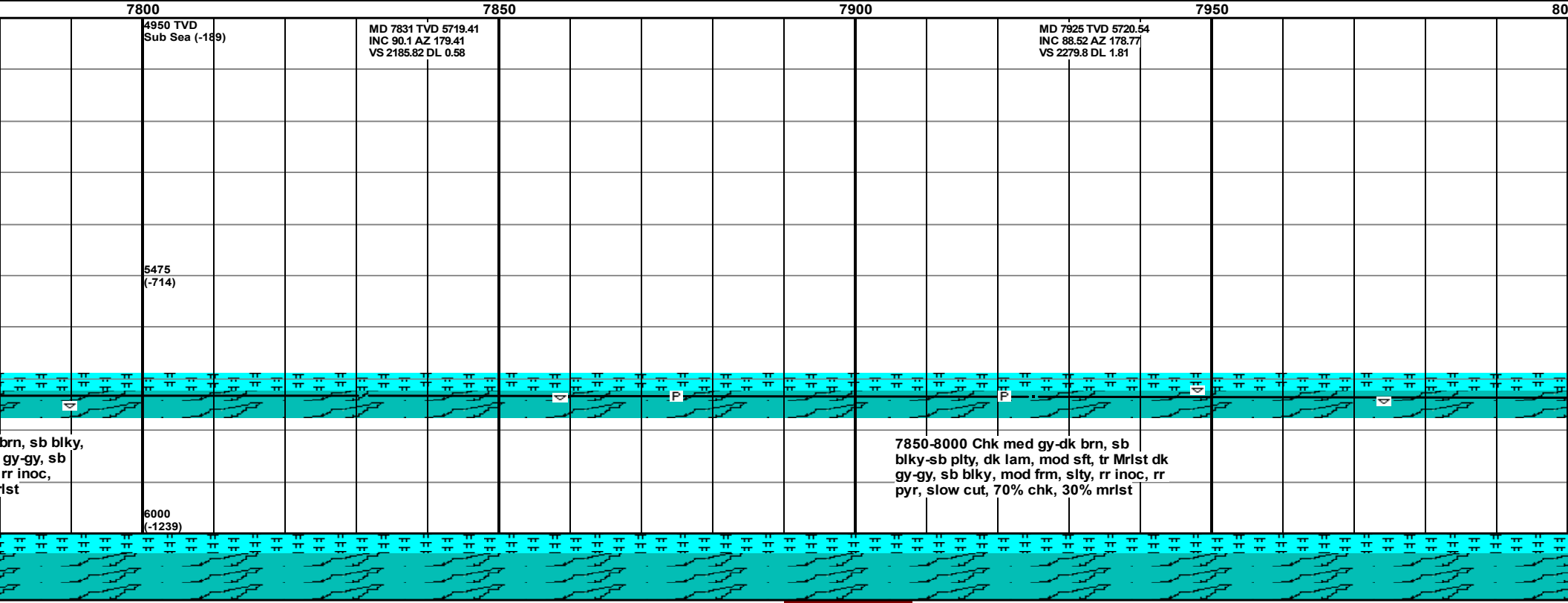
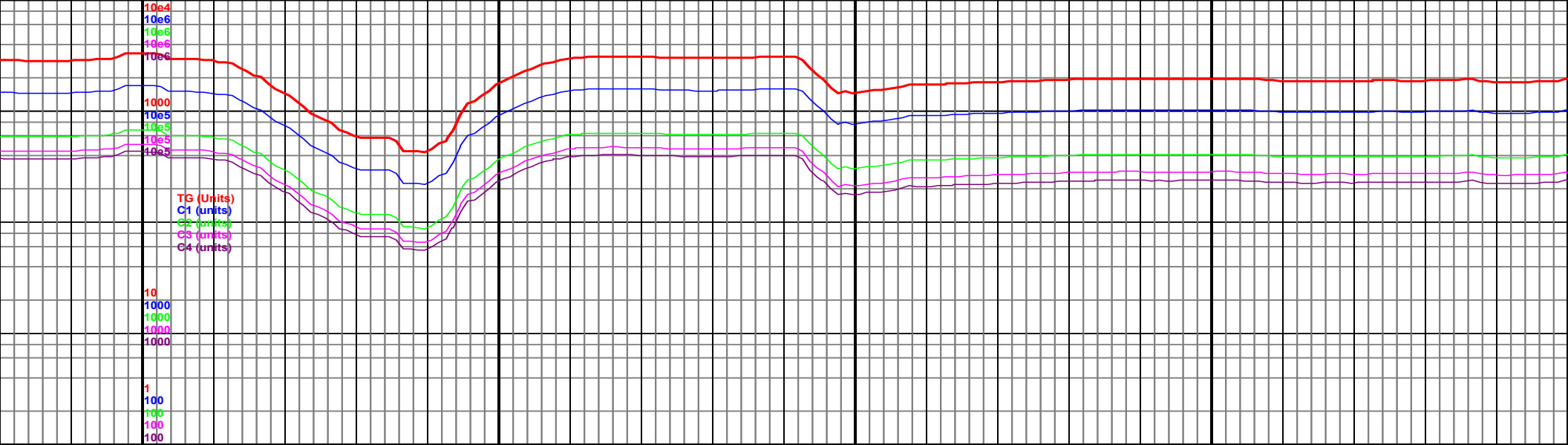


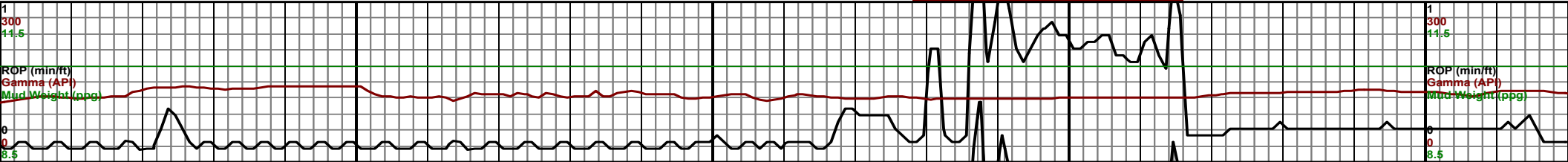
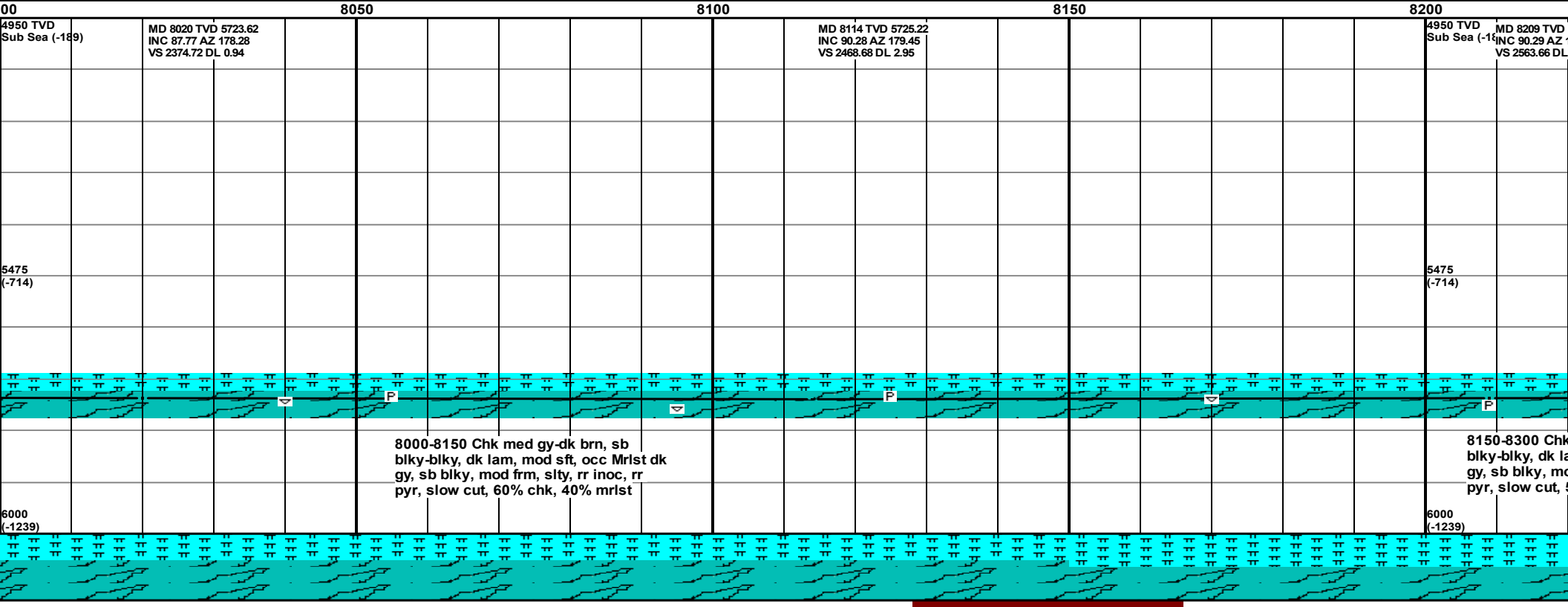
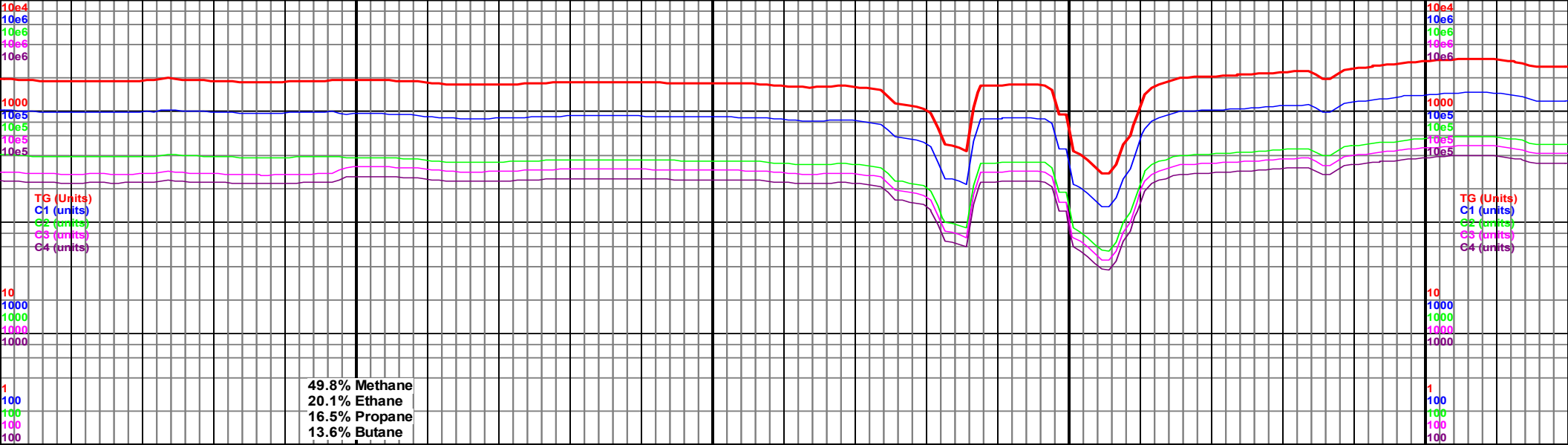


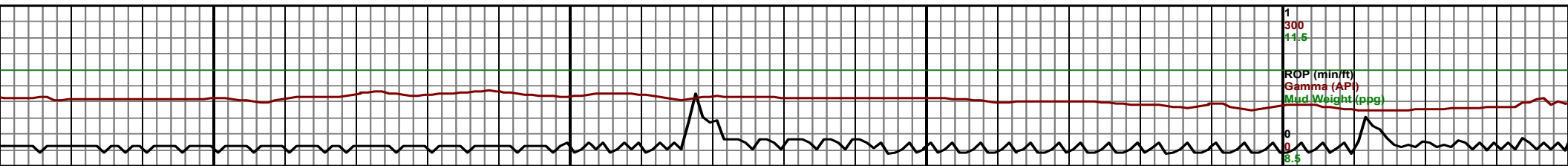
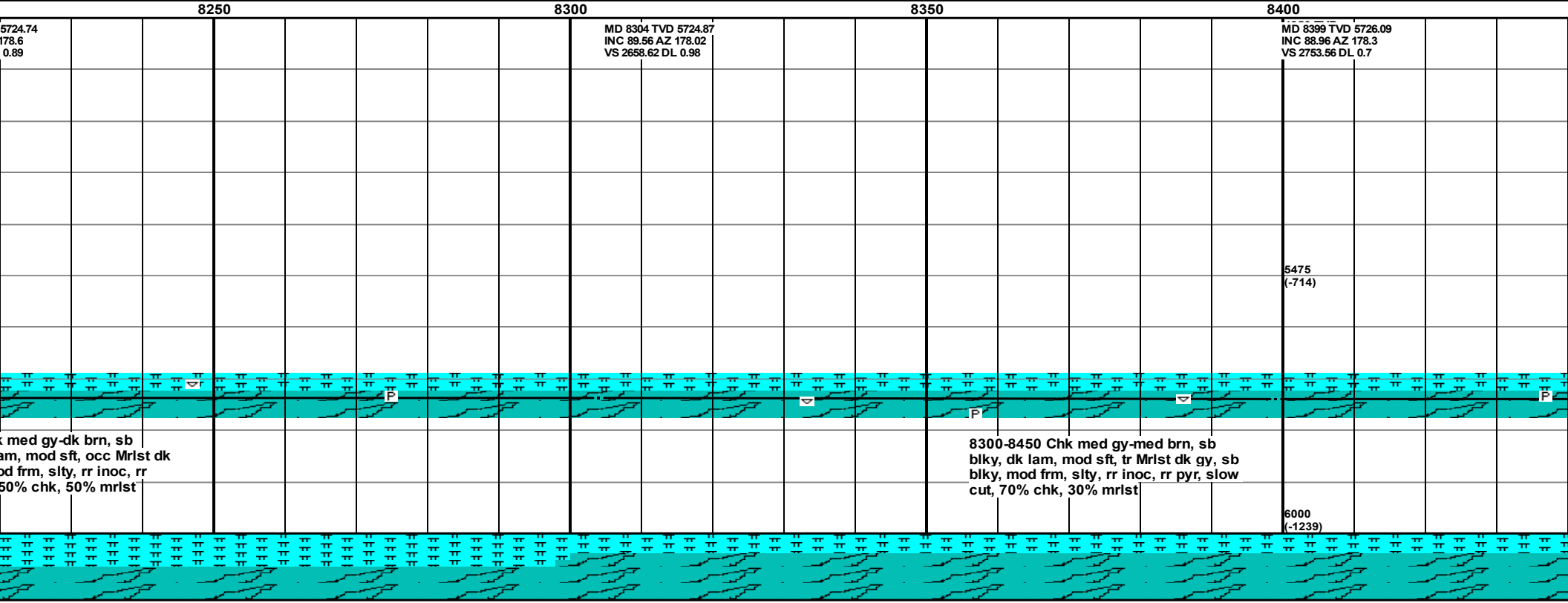
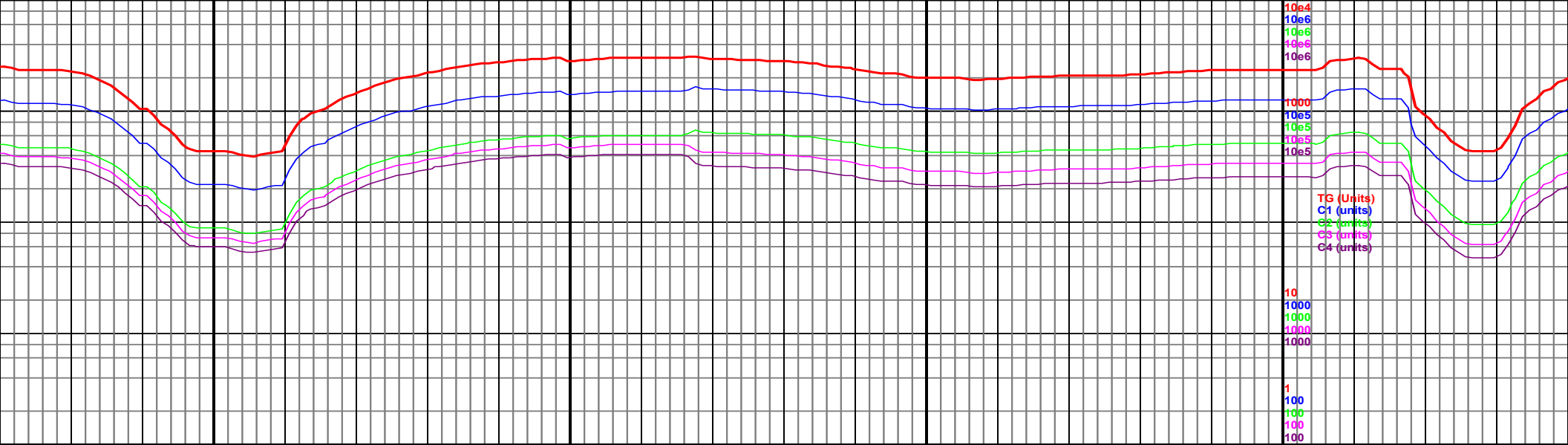


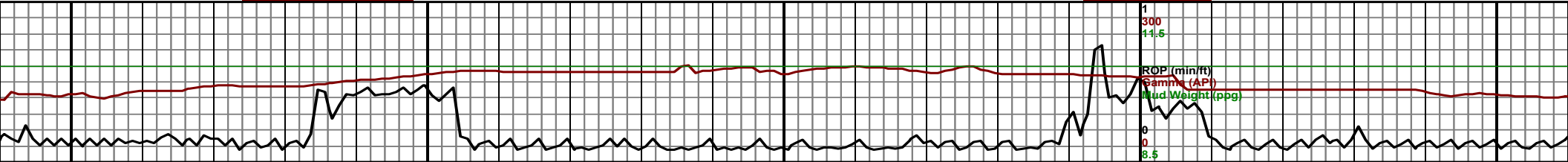
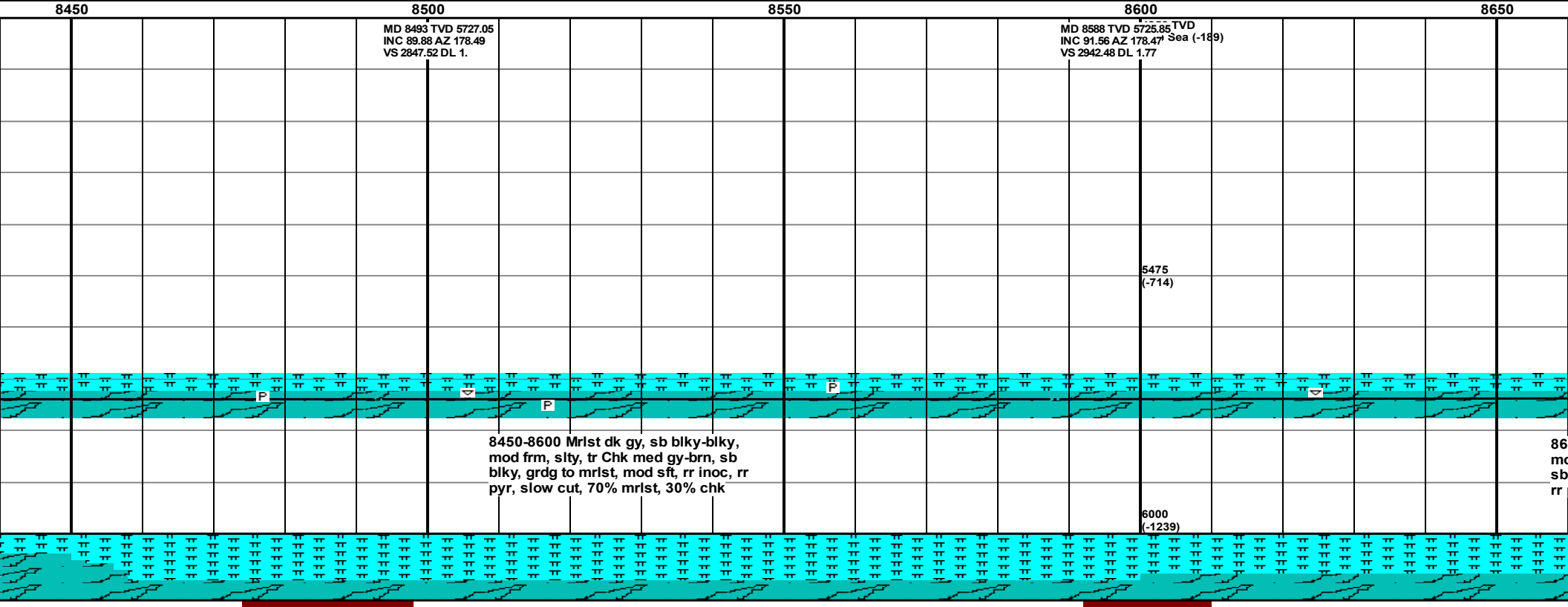
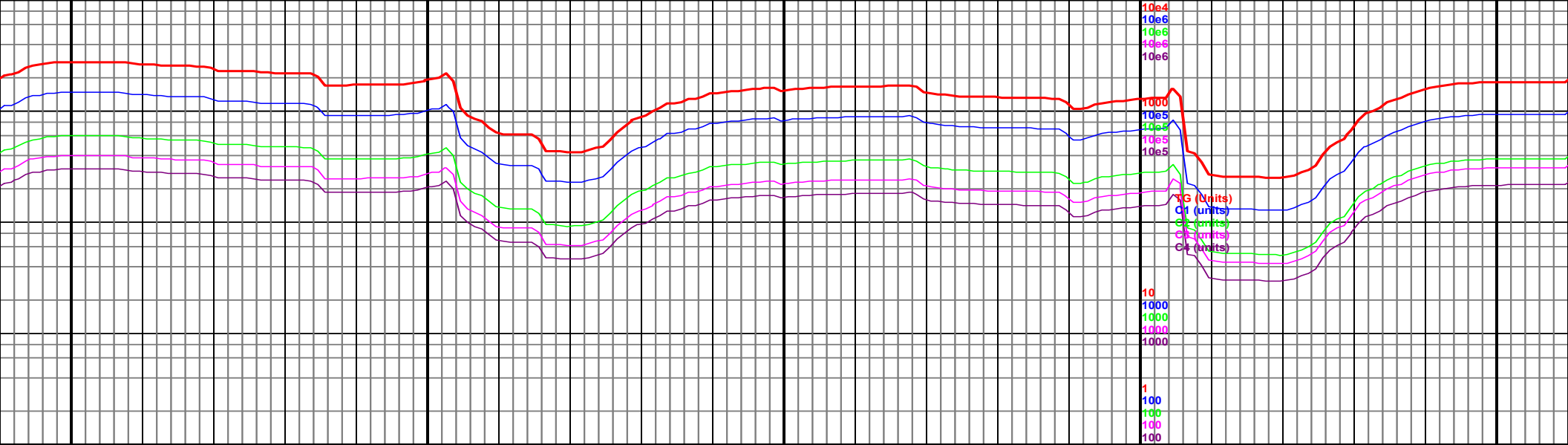


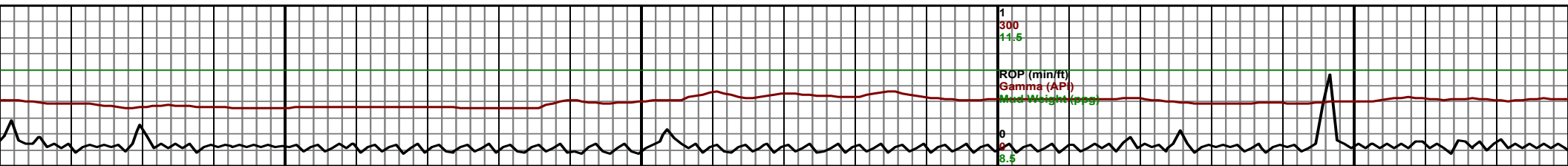
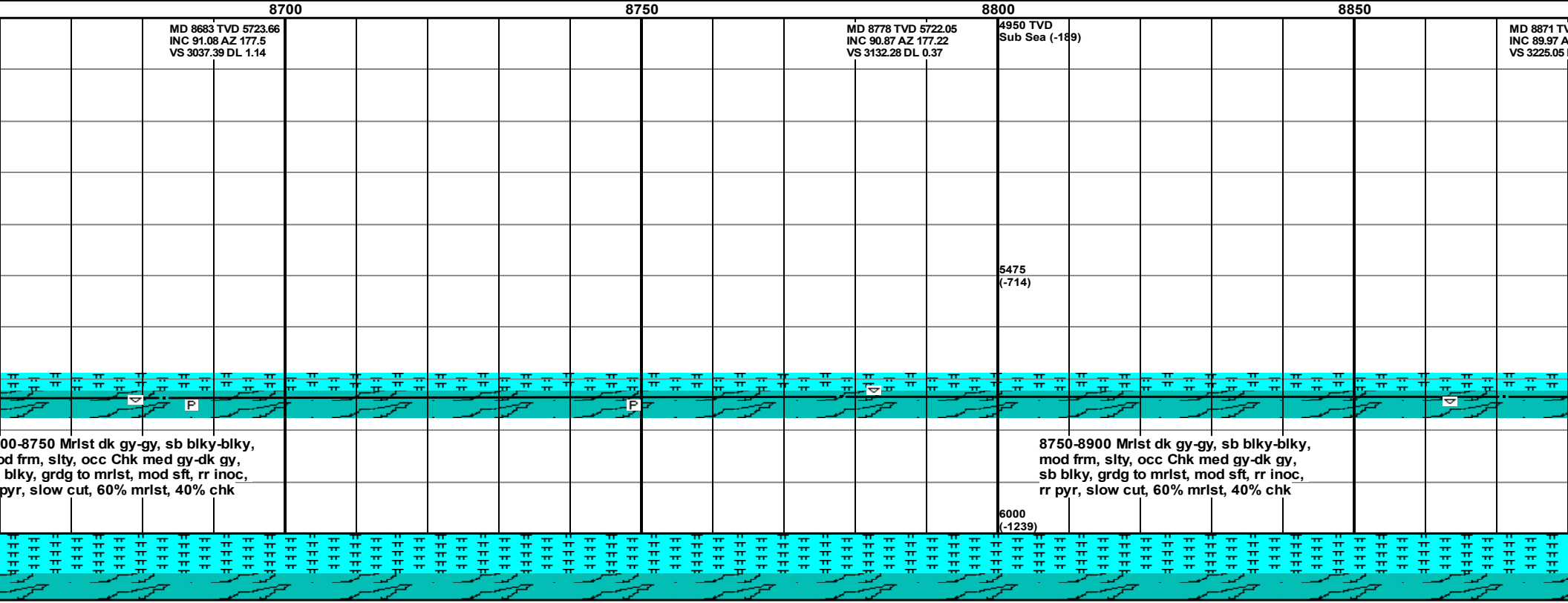
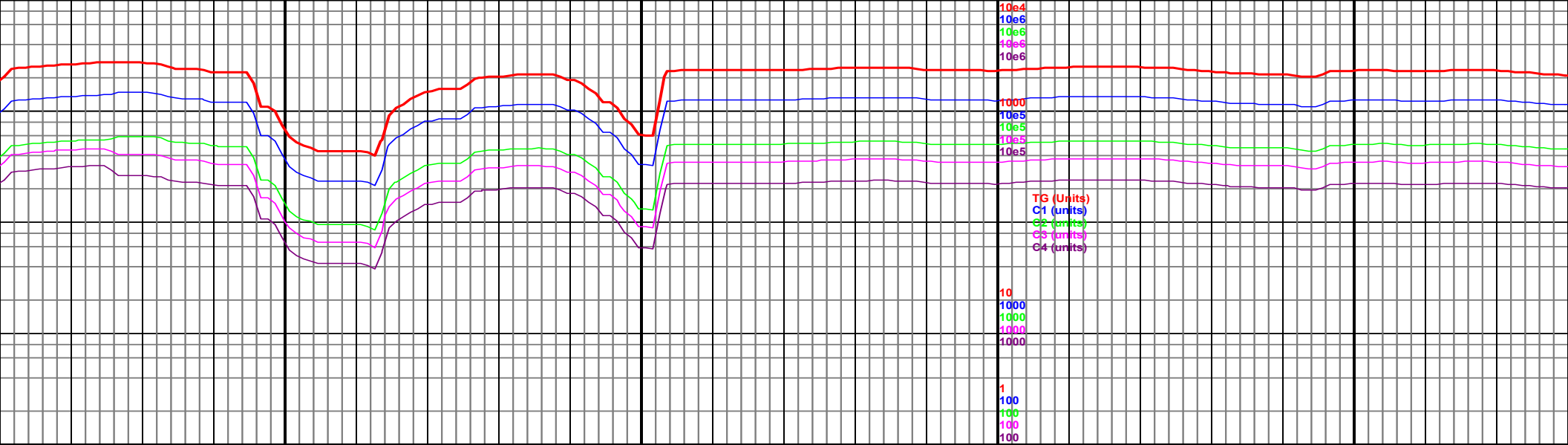


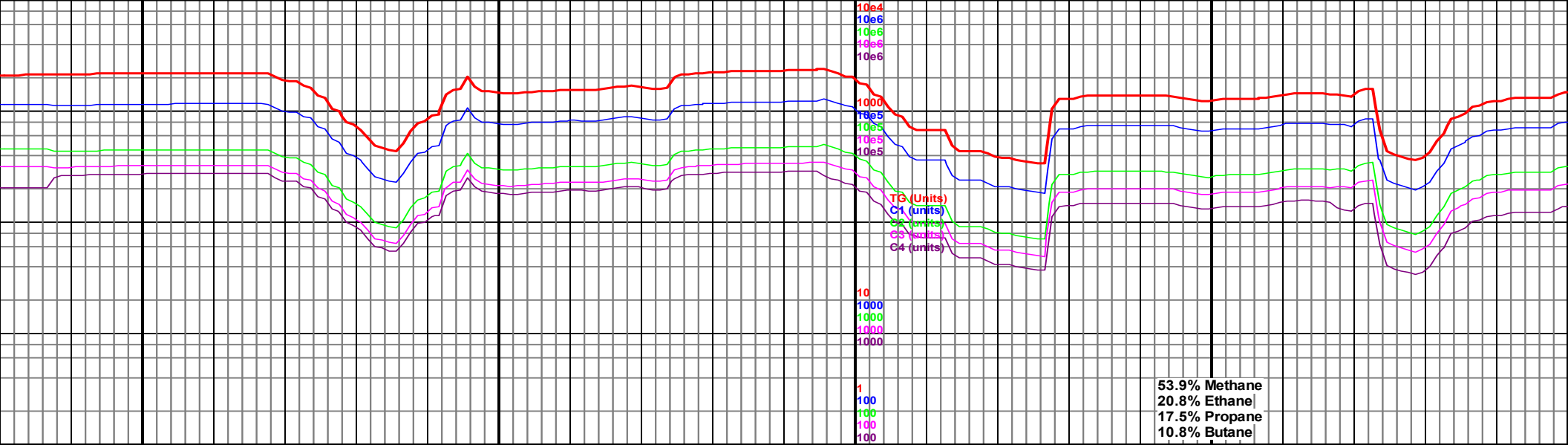










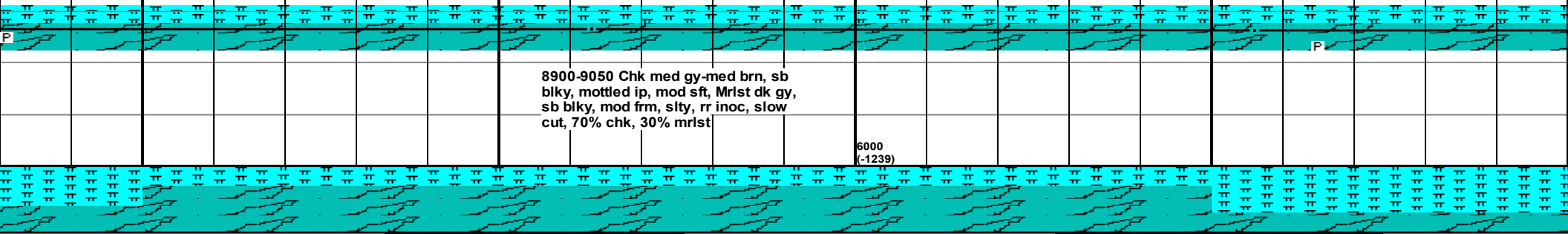


MD 5721.36  
Z 174.91  
DL 2.67

MD 8963 TVD 5722.48  
INC 88.64 AZ 177.73  
VS 3316.84 DL 3.39

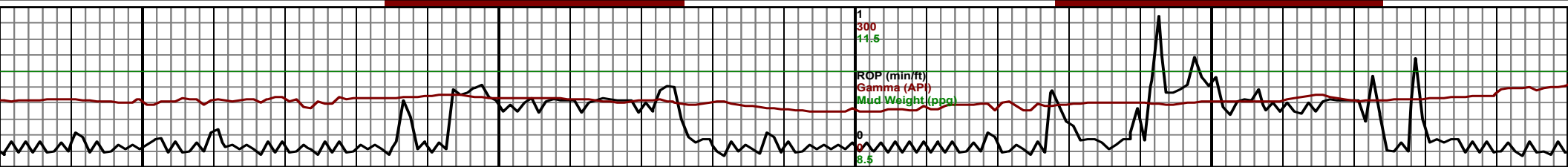
4950 TVD  
Sub Sea (-189)

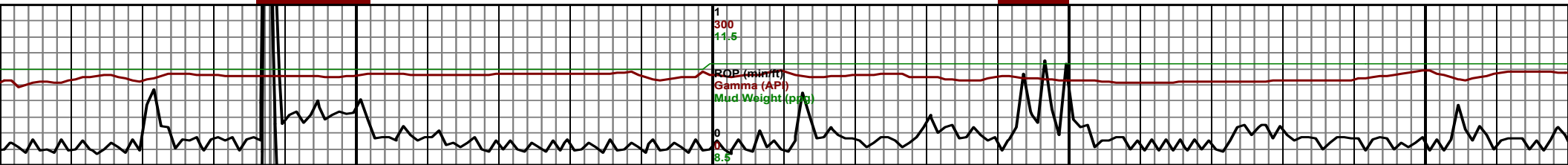
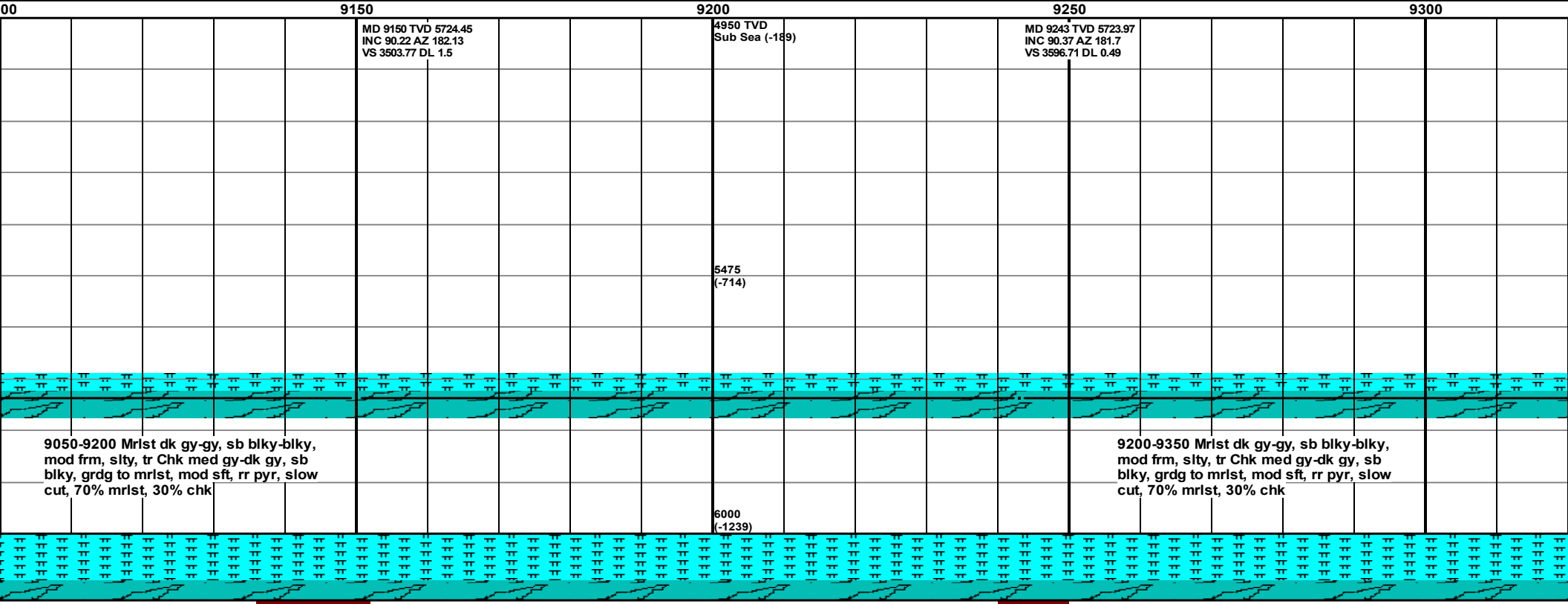
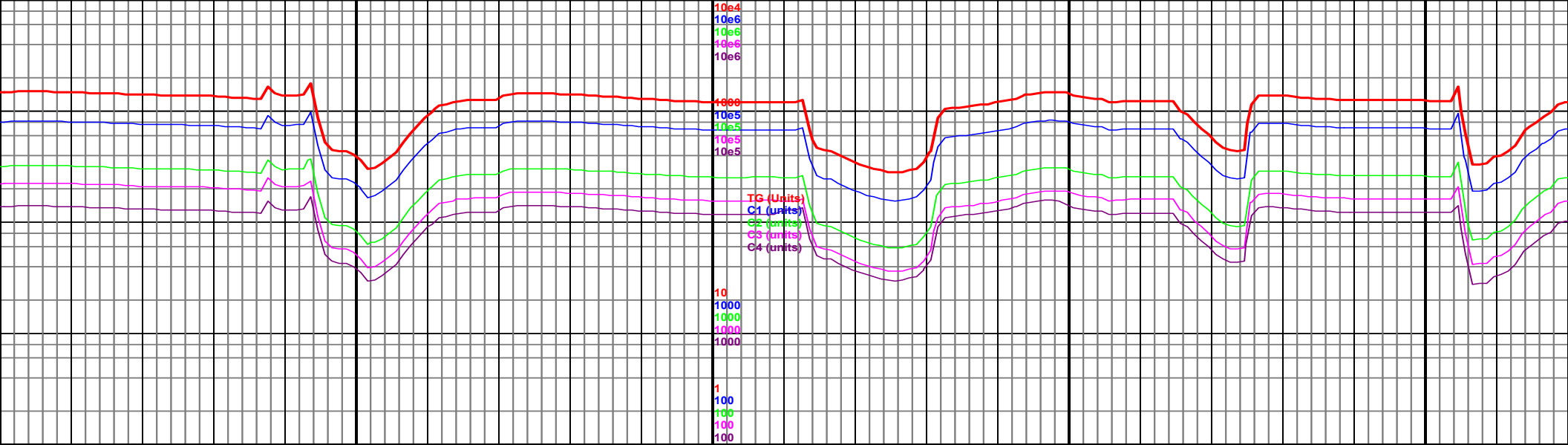
MD 9056 TVD 5724.1  
INC 89.36 AZ 181.01  
VS 3409.81 DL 3.61

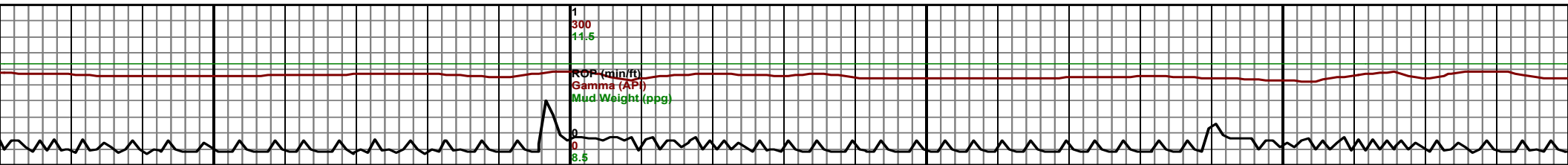
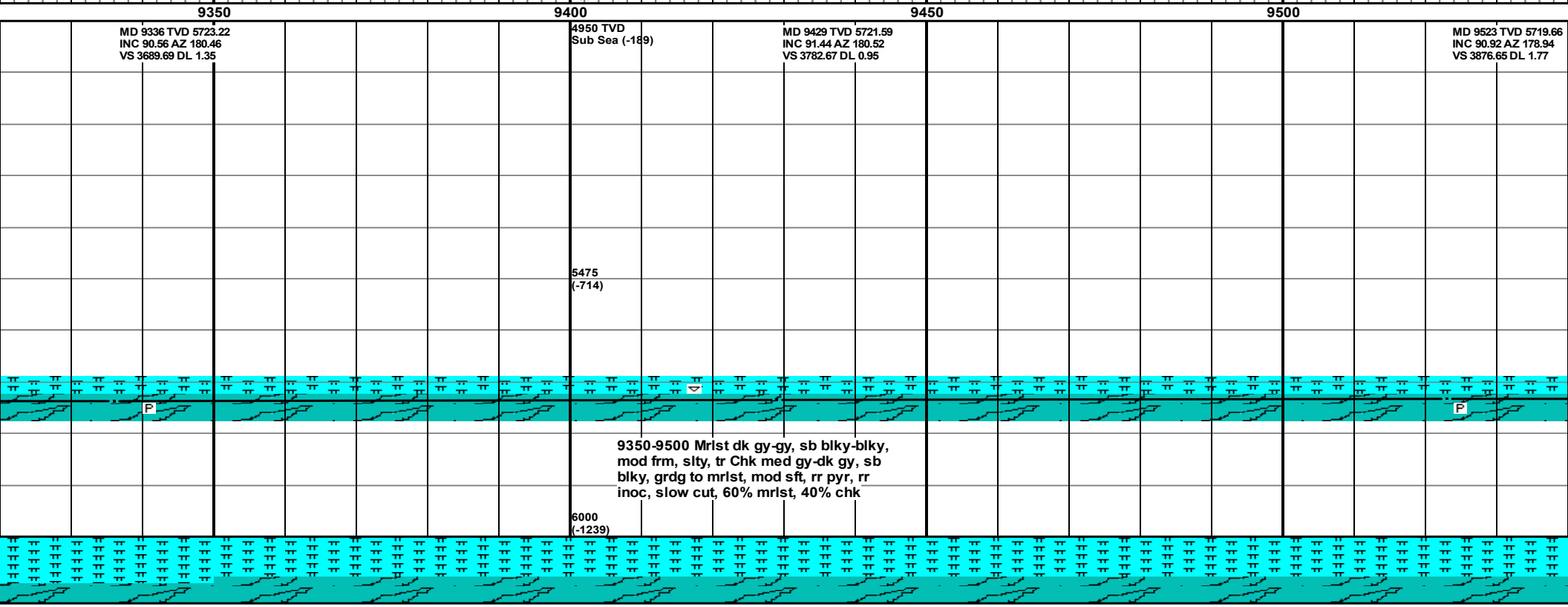
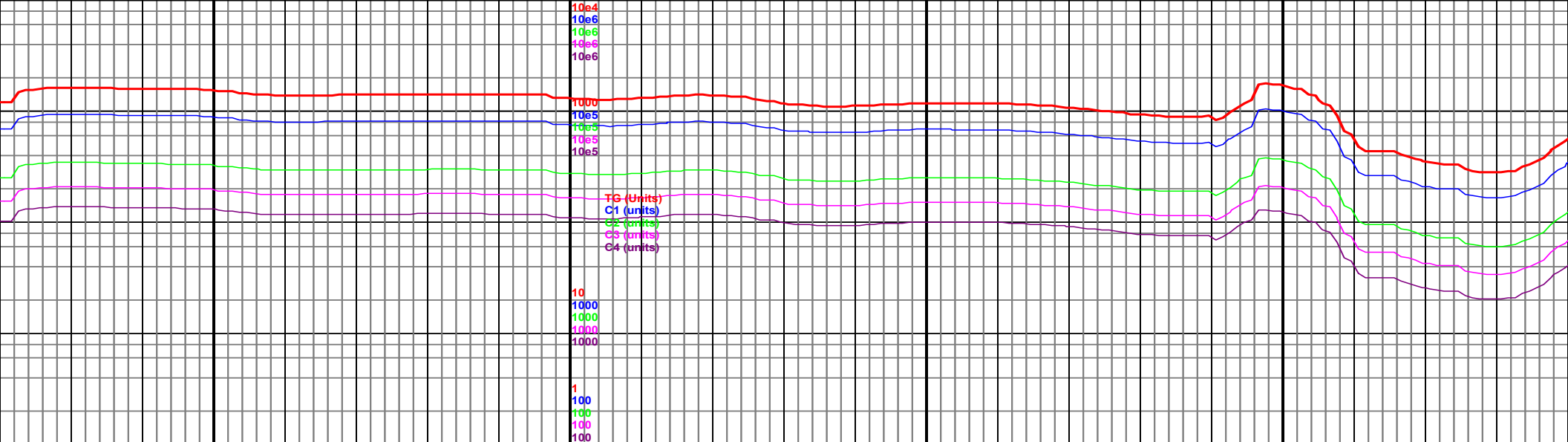


5475  
(-714)

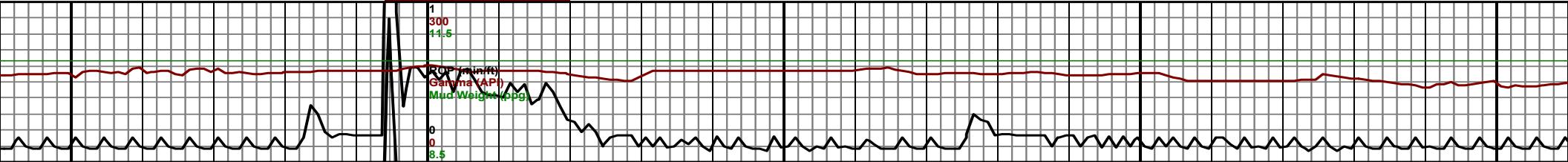
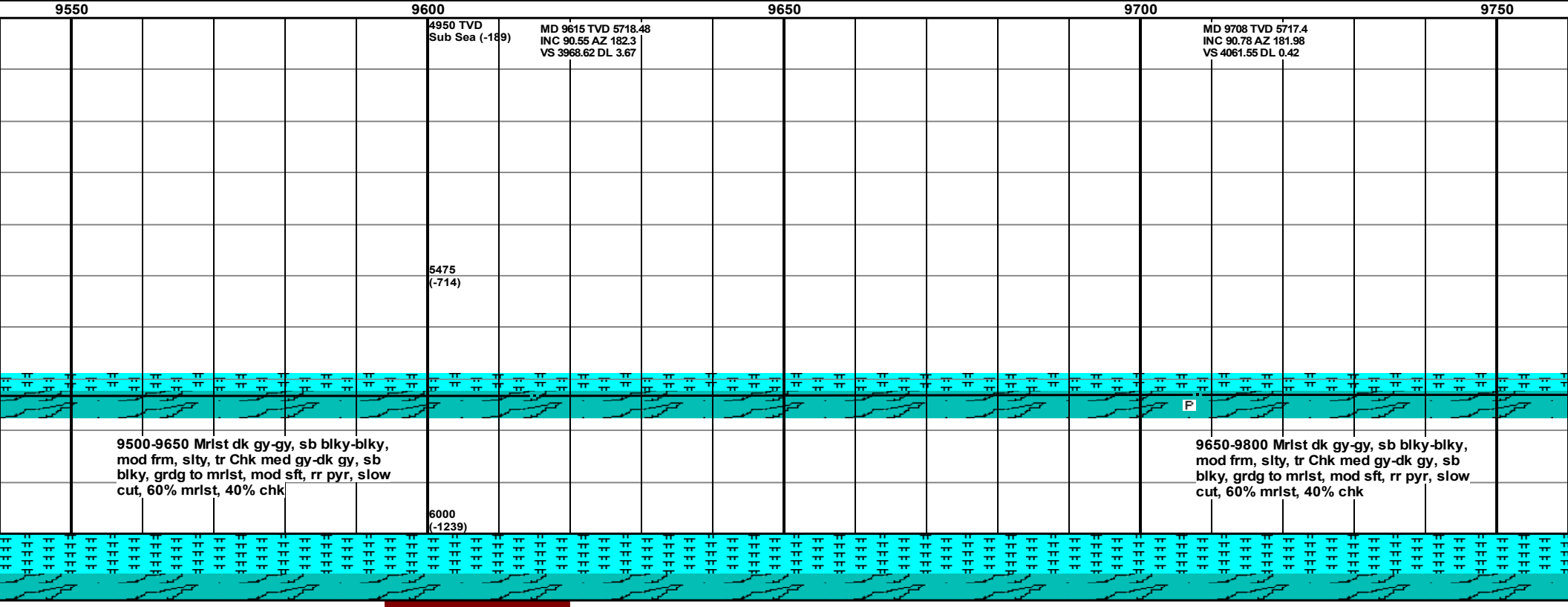
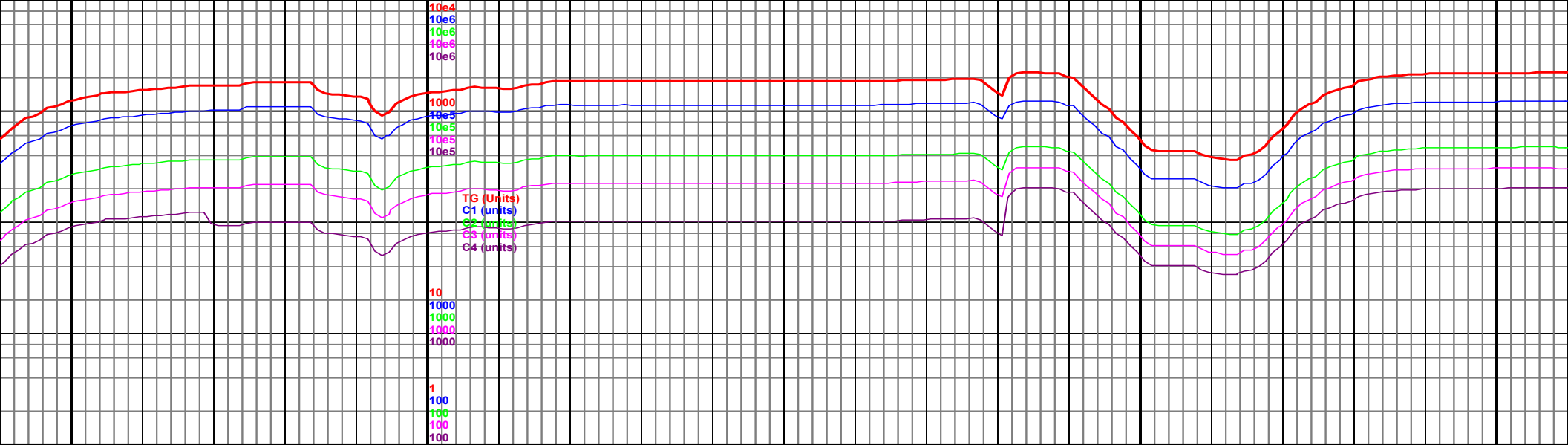
6000  
(-1239)

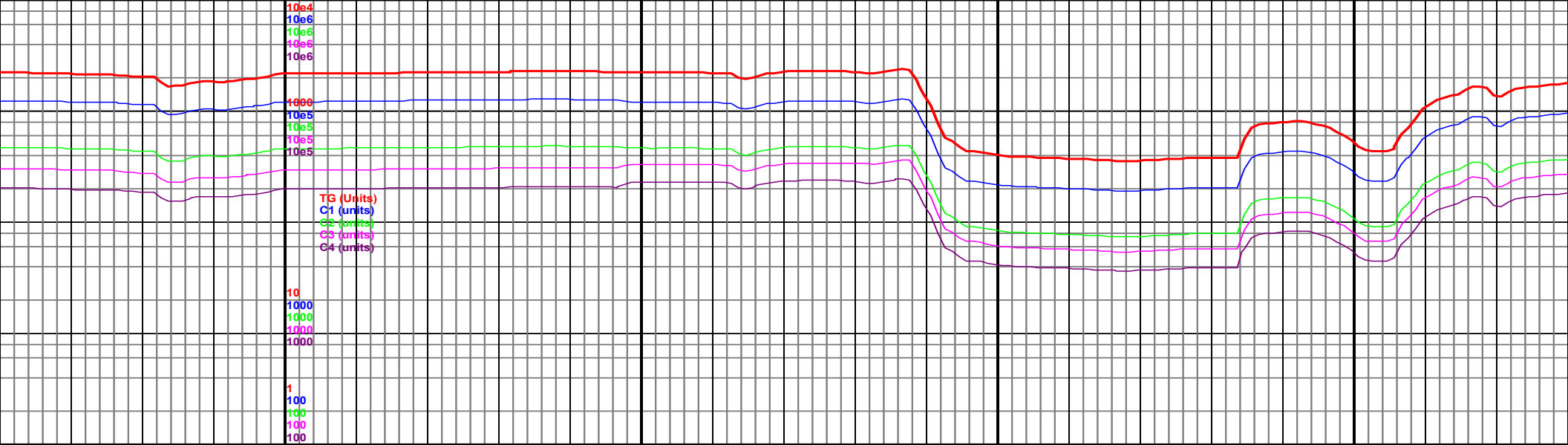












9800

9850

9900

9950

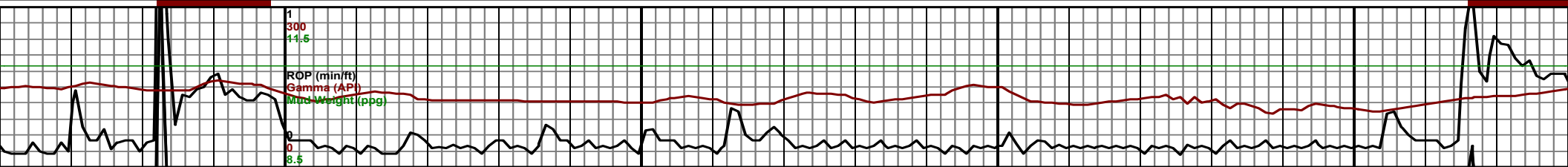
45MD 9801 TVD 5718.07  
SHNC 88.39 AZ 181.37  
VS 4154.5 DL 2.65

MD 9895 TVD 5721.31  
INC 87.66 AZ 181.14  
VS 4248.42 DL 0.81

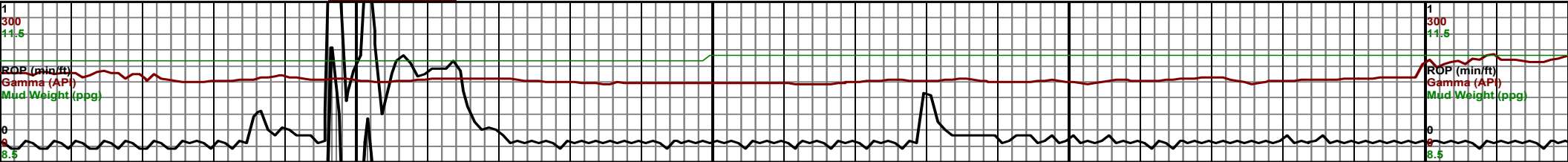
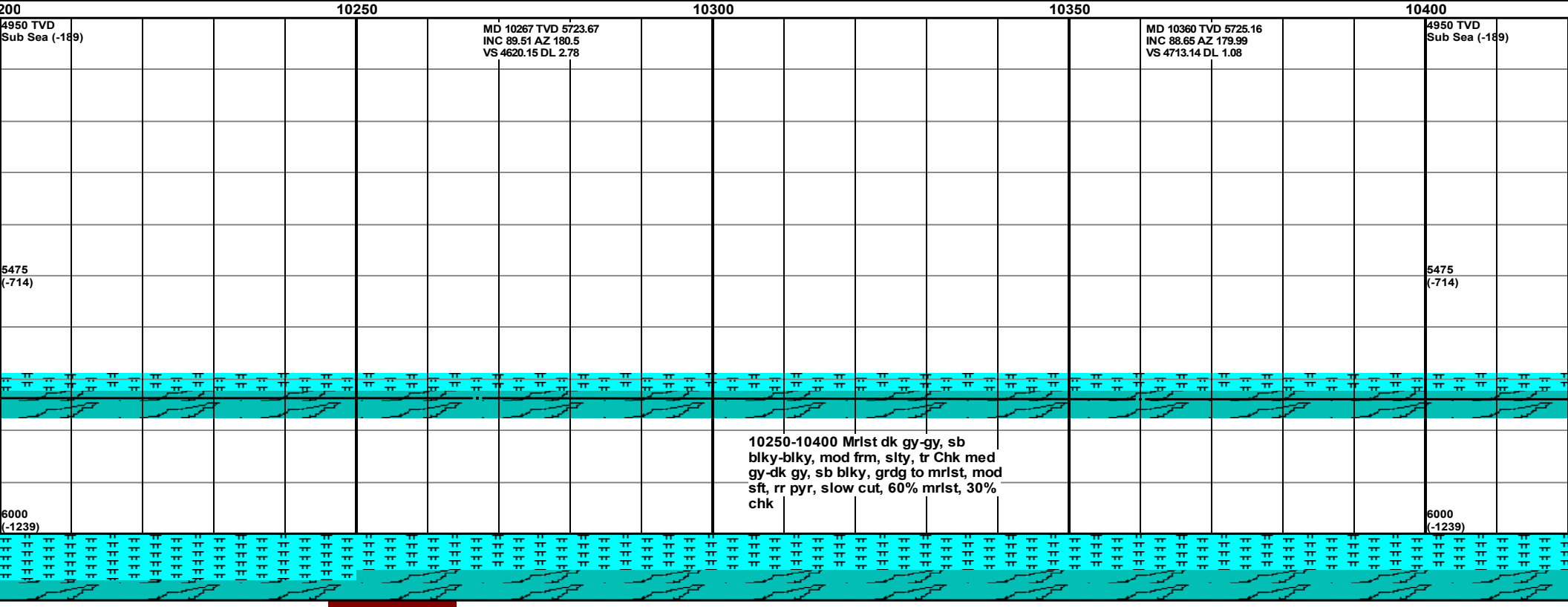
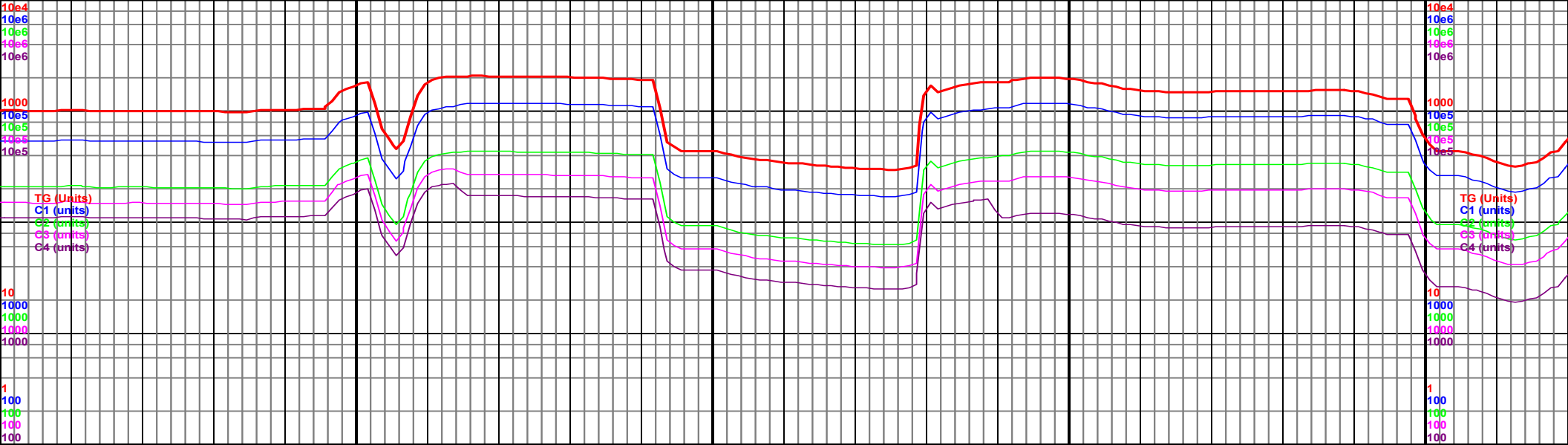
5475  
(-714)

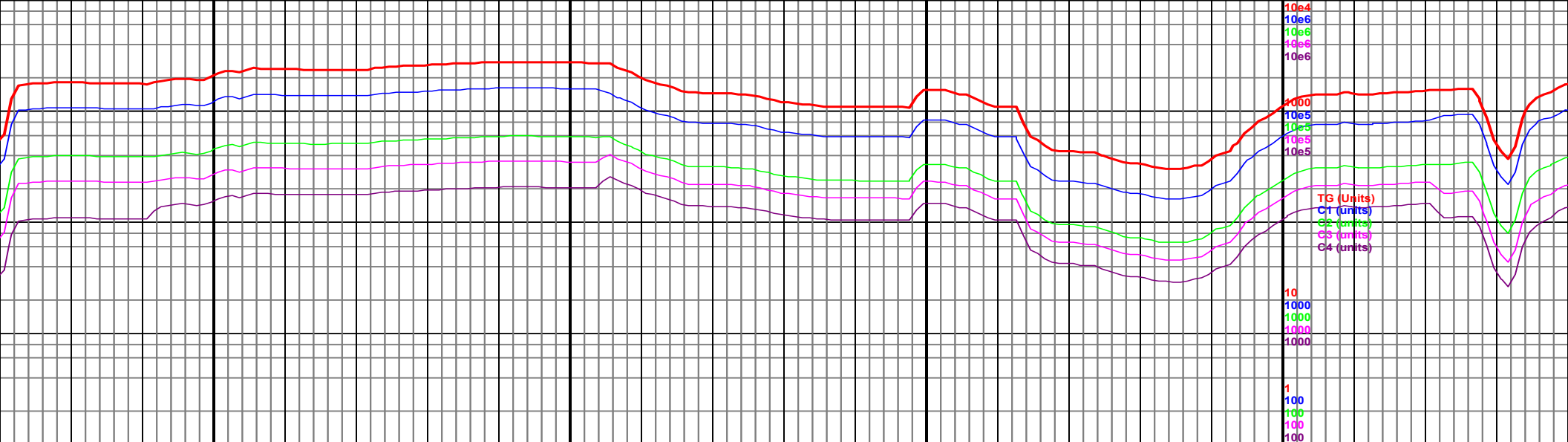
9800-9950 Mrlst dk gy-gy, sb blkly-blky,  
mod frm, slty, tr Chk med gy-dk gy, sb  
blkly, grdg to mrlst, mod sft, rr pyr, rr  
inoc, slow cut, 50% mrlst, 50% chk

6000  
(-1239)









10450

MD 10454 TVD 5726.87  
INC 89.27 AZ 180.28  
VS 4807.12 DL 0.73

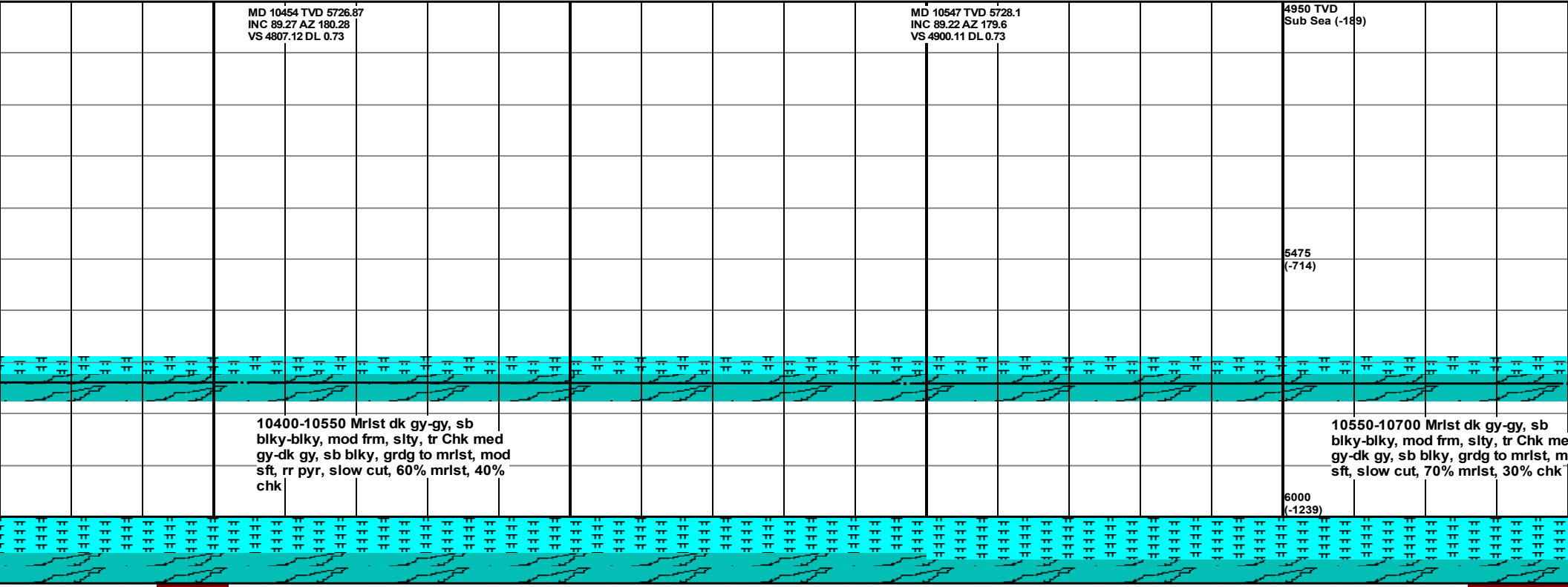
10500

10550

MD 10547 TVD 5728.1  
INC 89.22 AZ 179.6  
VS 4900.11 DL 0.73

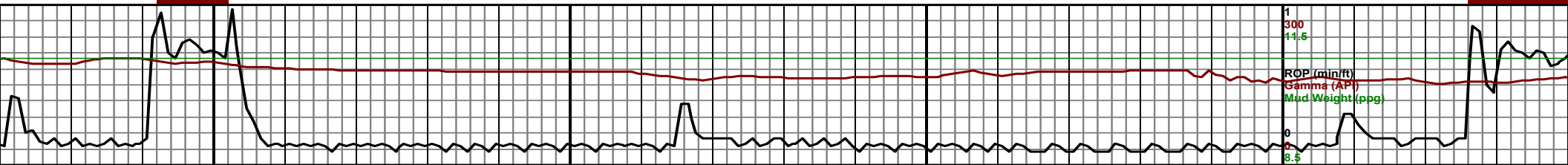
10600

4950 TVD  
Sub Sea (-189)

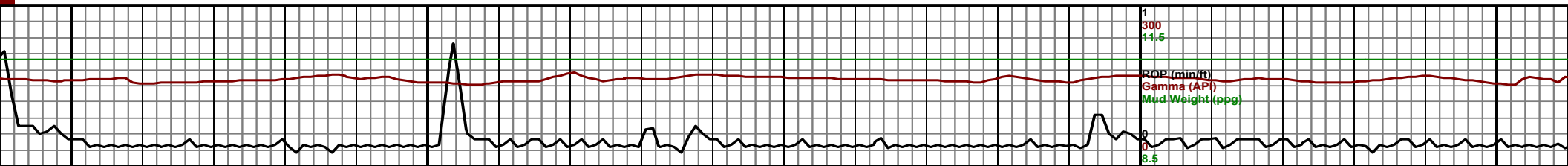
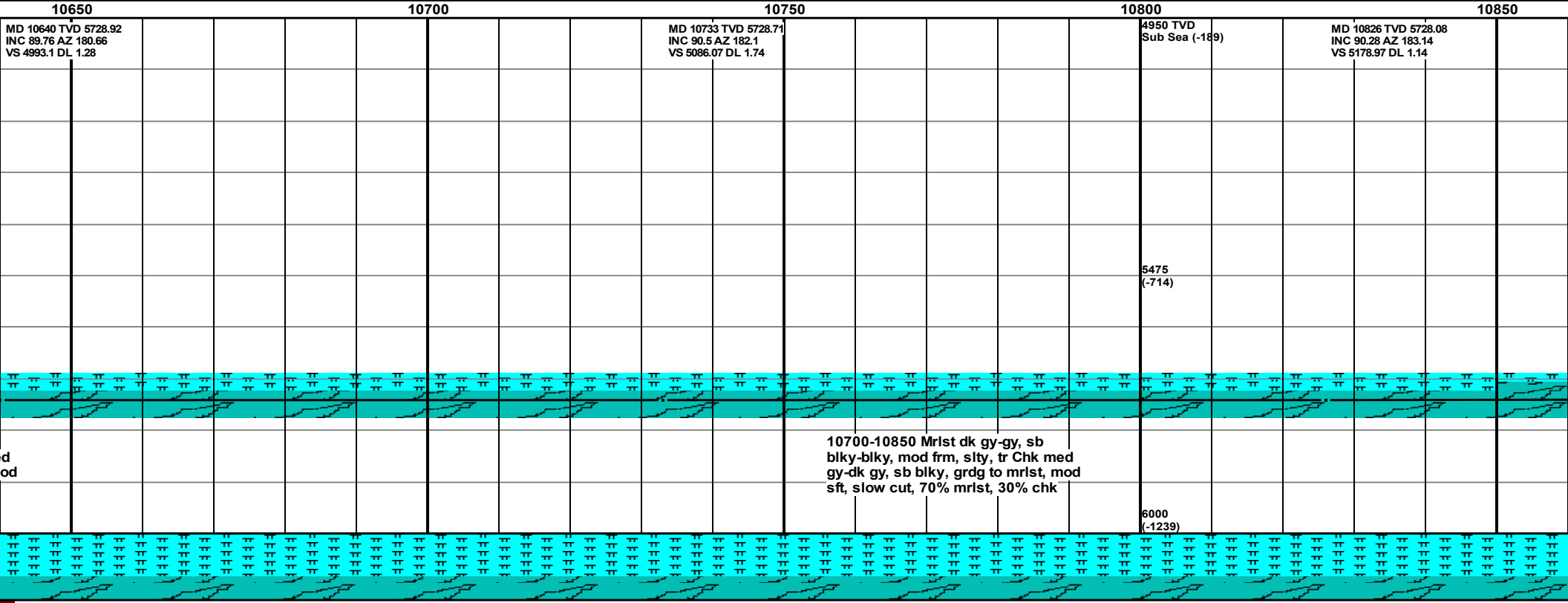
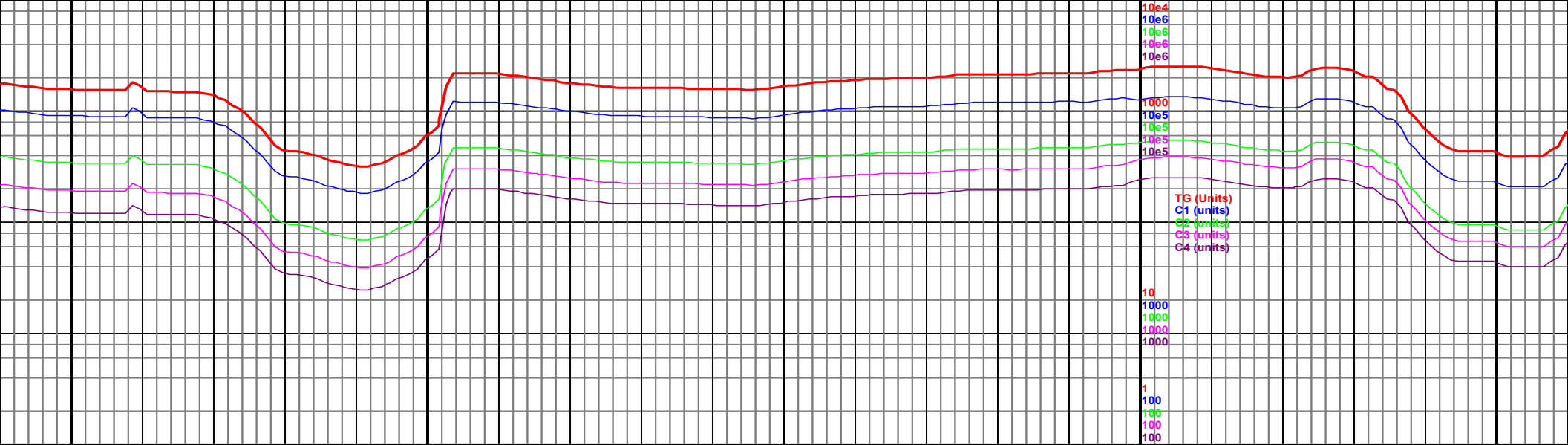


10400-10550 Mrlst dk gy-gy, sb  
blkyl-blky, mod frm, slty, tr Chk med  
gy-dk gy, sb blkyl, grdg to mrlst, mod  
sft, rr pyr, slow cut, 60% mrlst, 40%  
chk

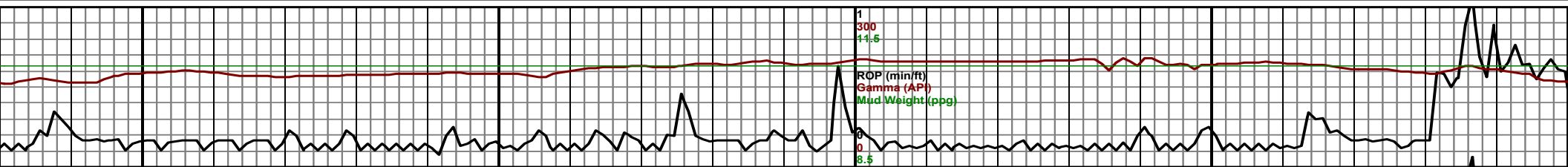
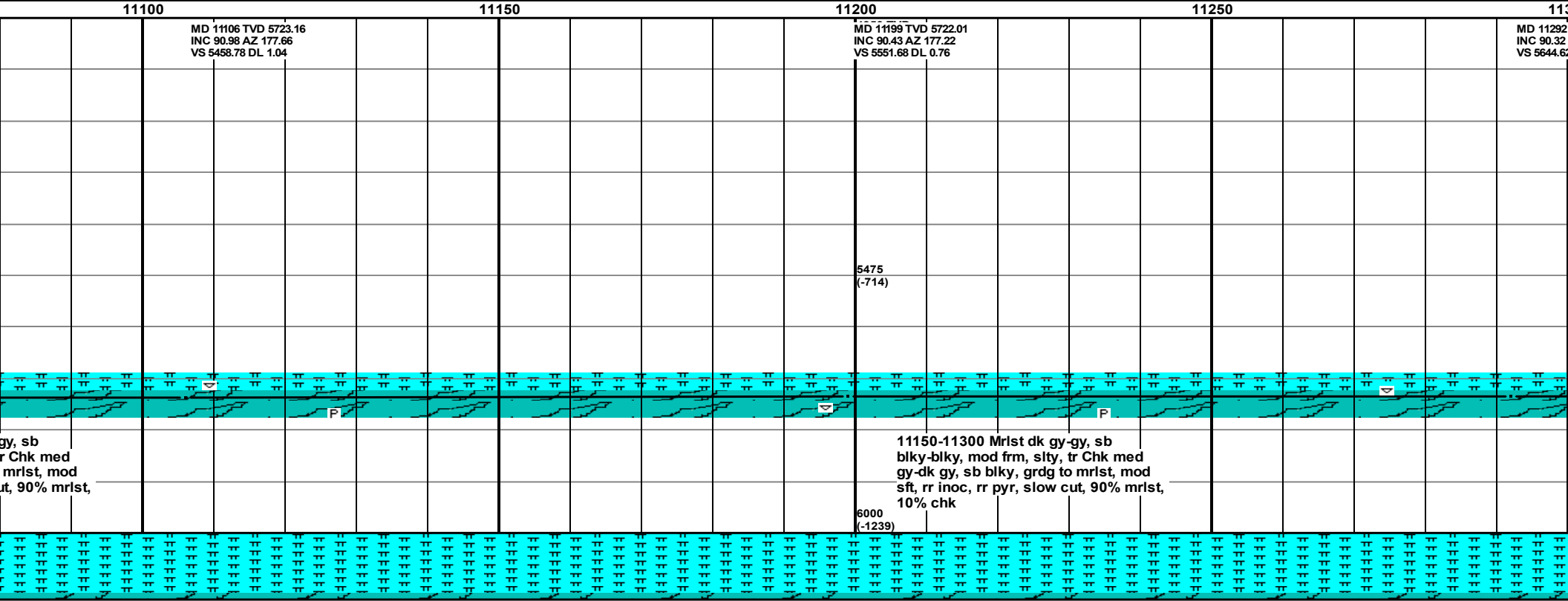
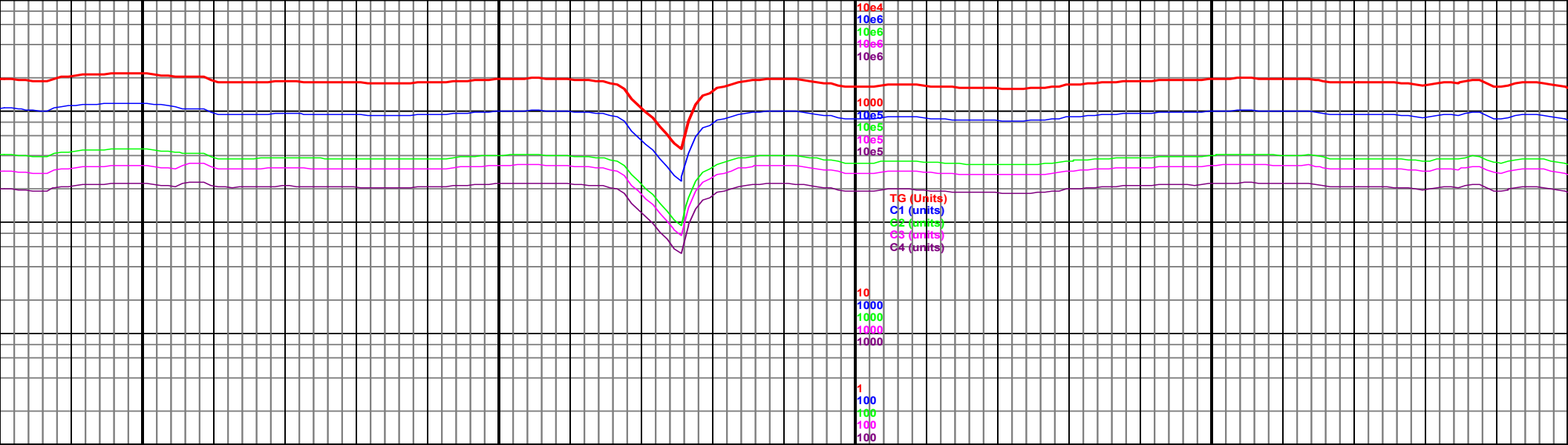
10550-10700 Mrlst dk gy-gy, sb  
blkyl-blky, mod frm, slty, tr Chk me  
gy-dk gy, sb blkyl, grdg to mrlst, m  
sft, slow cut, 70% mrlst, 30% chk



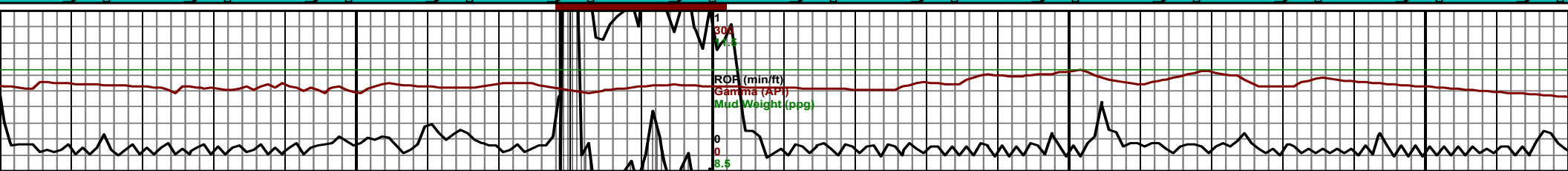
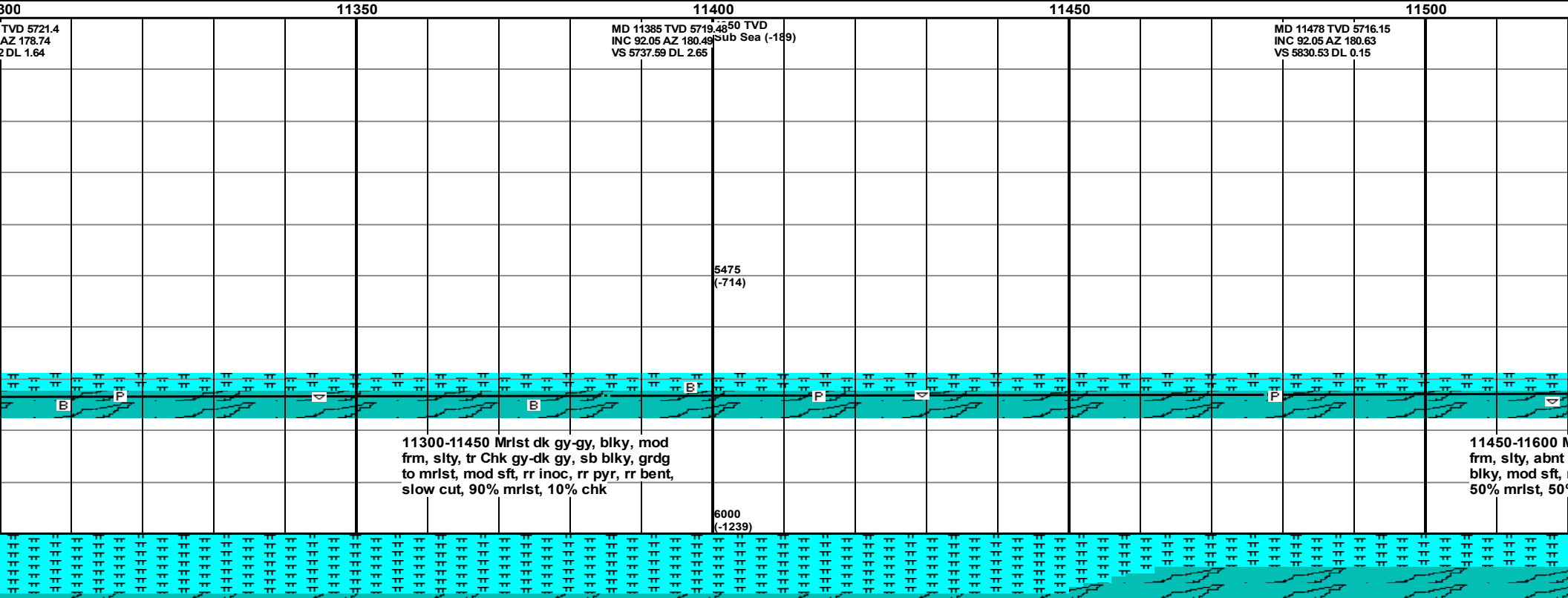
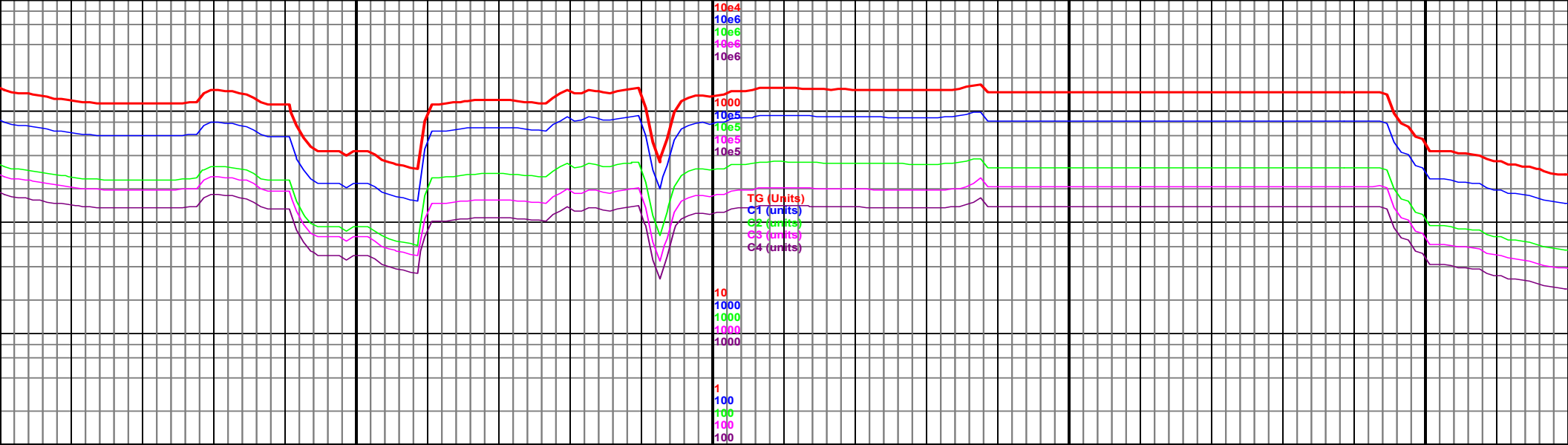
1  
300  
14.5  
ROP (min/ft)  
Gamma (API)  
Mud Weight (ppg)  
0  
8.5

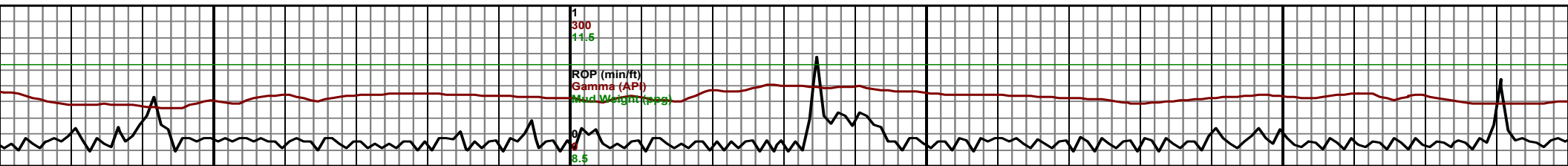
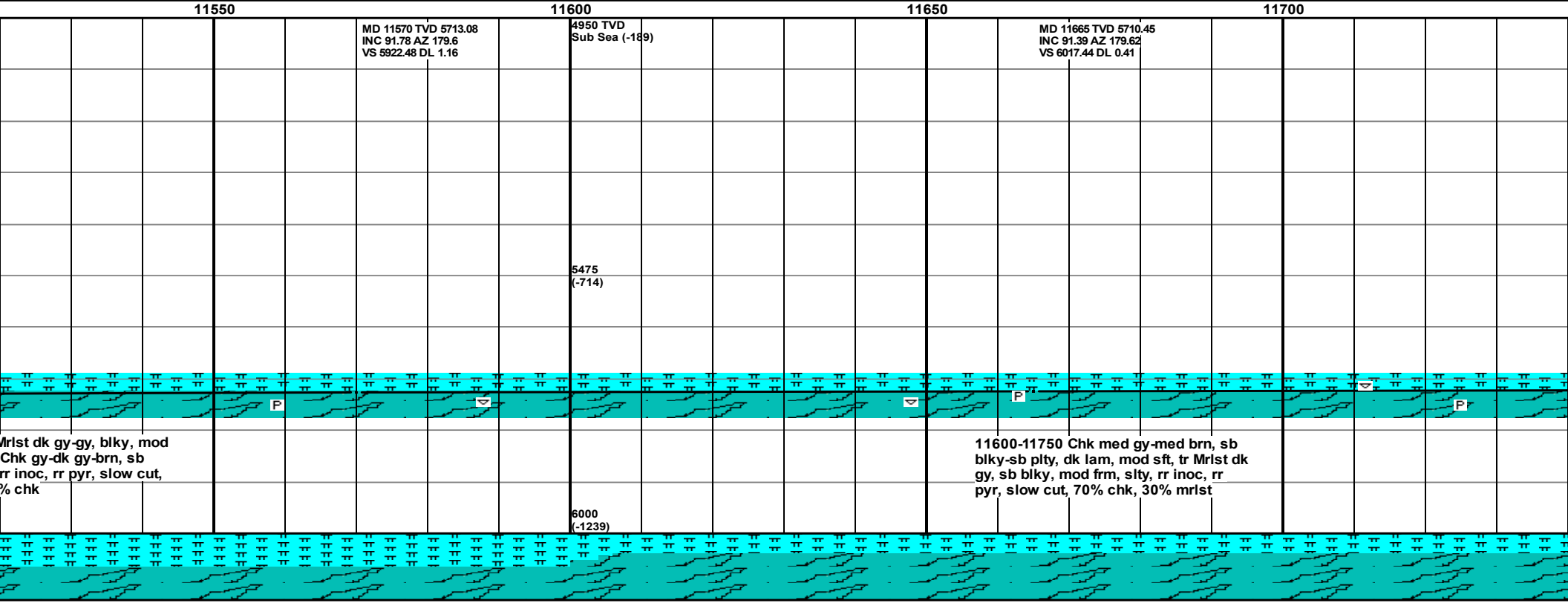
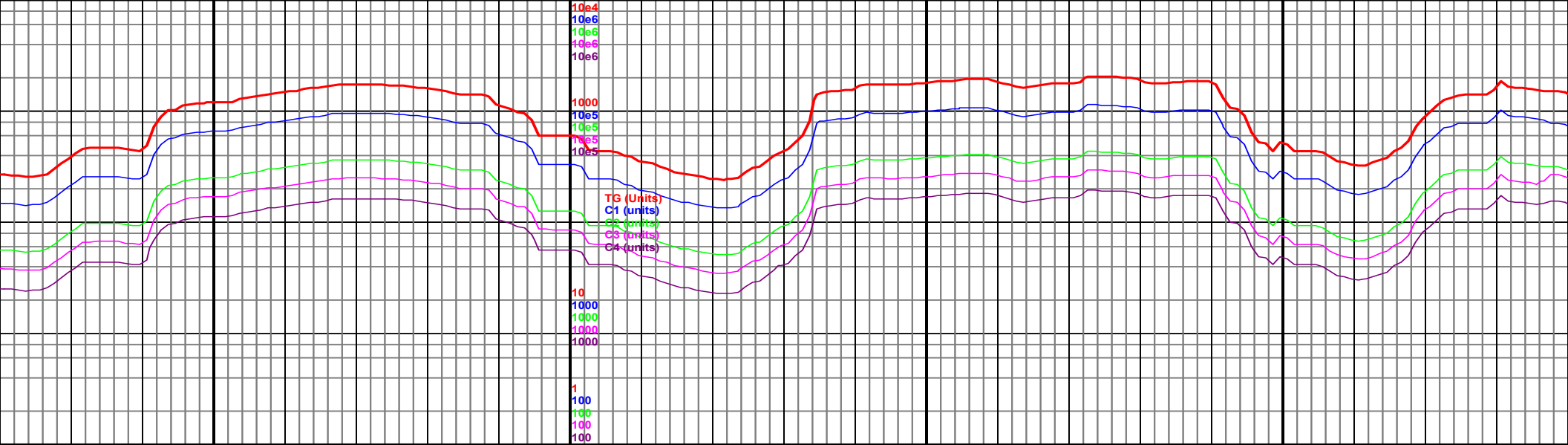


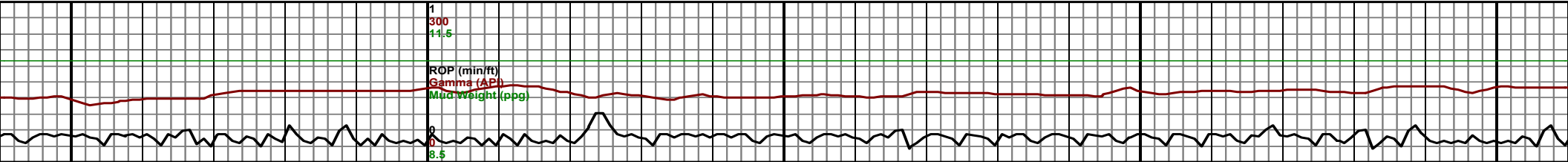
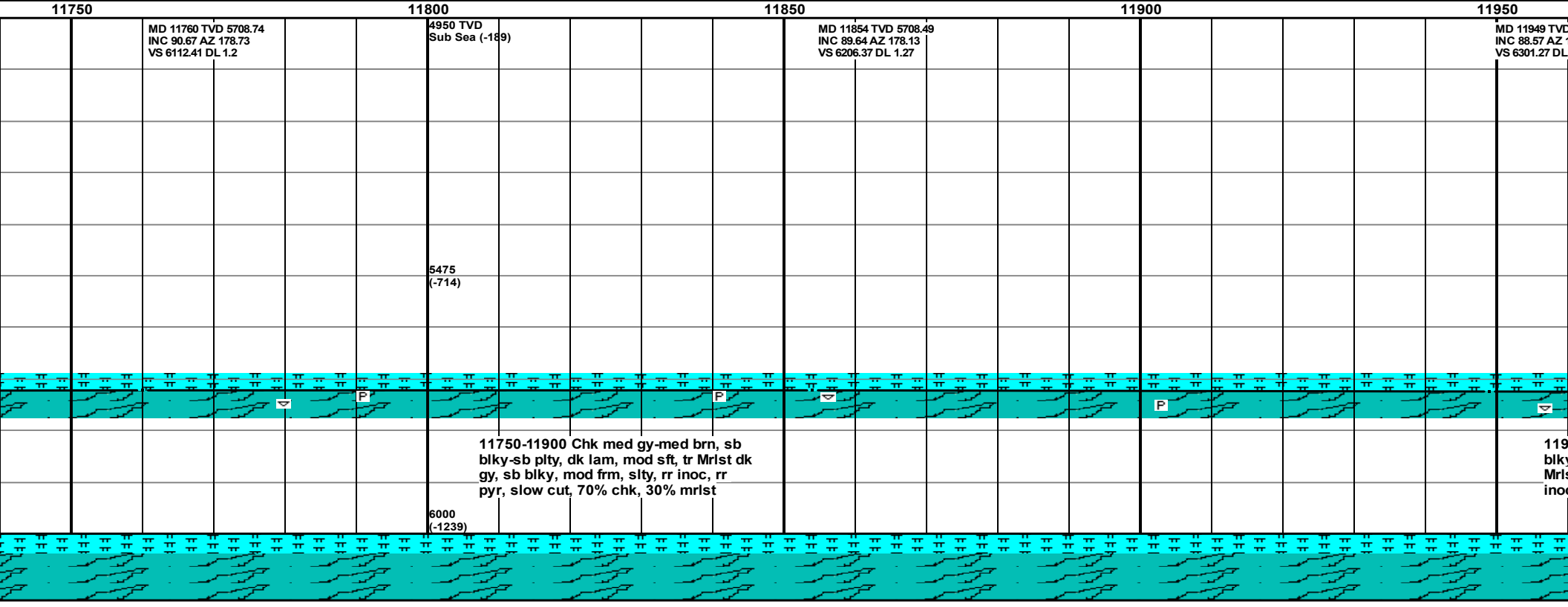
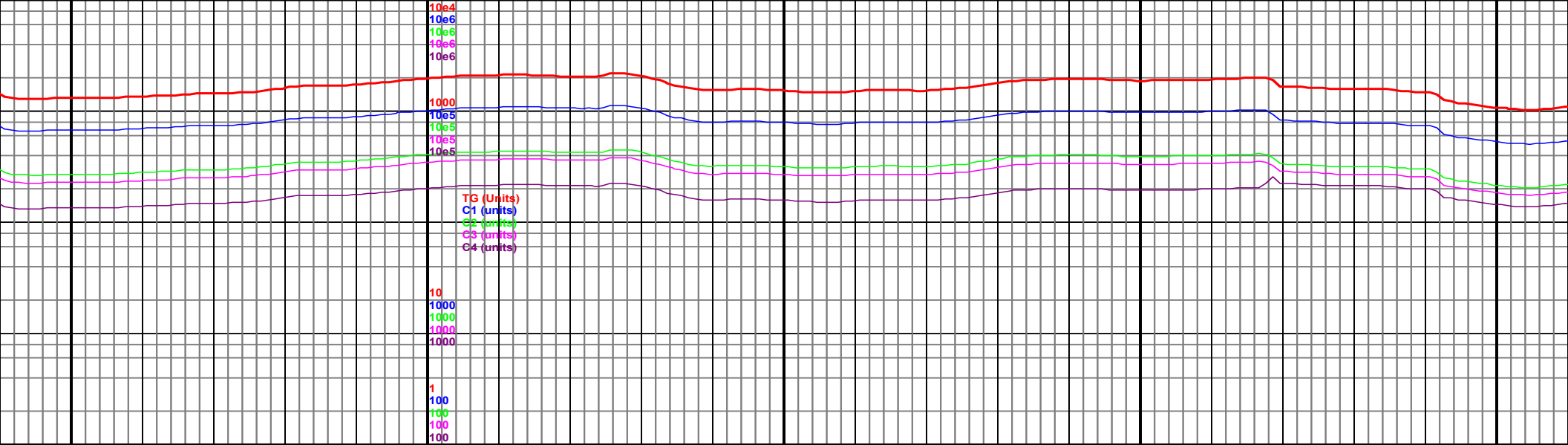




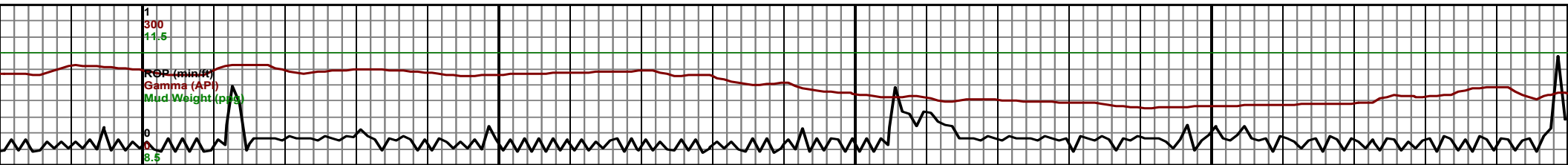
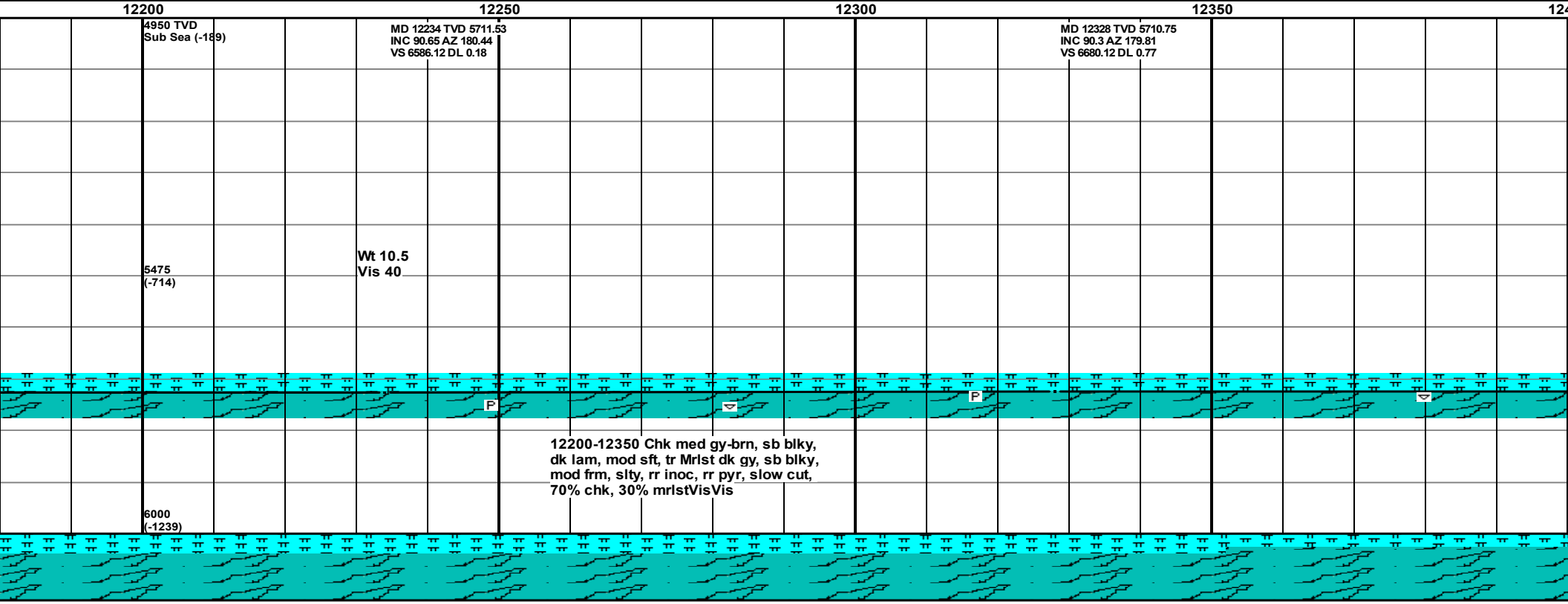
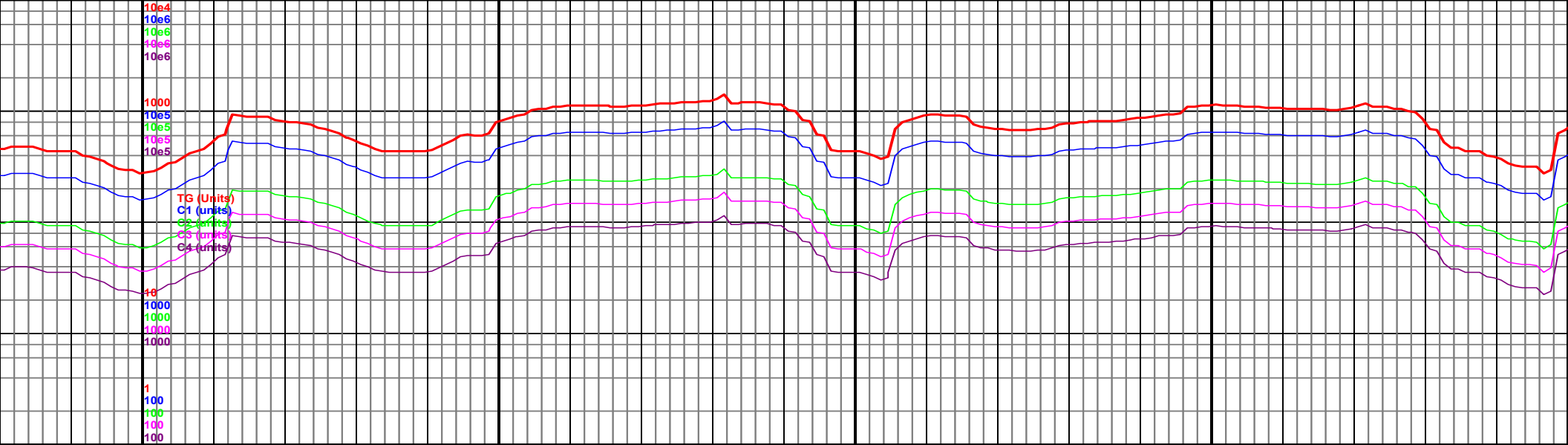


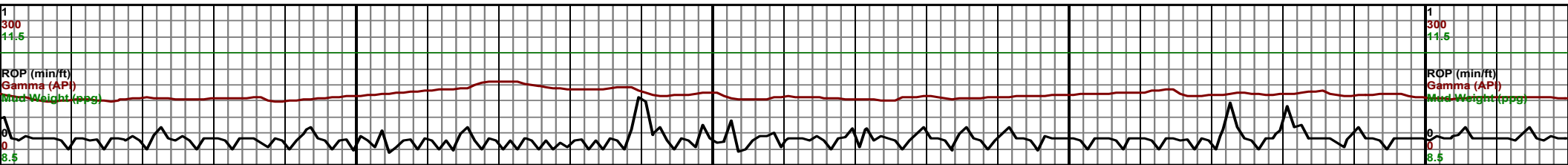
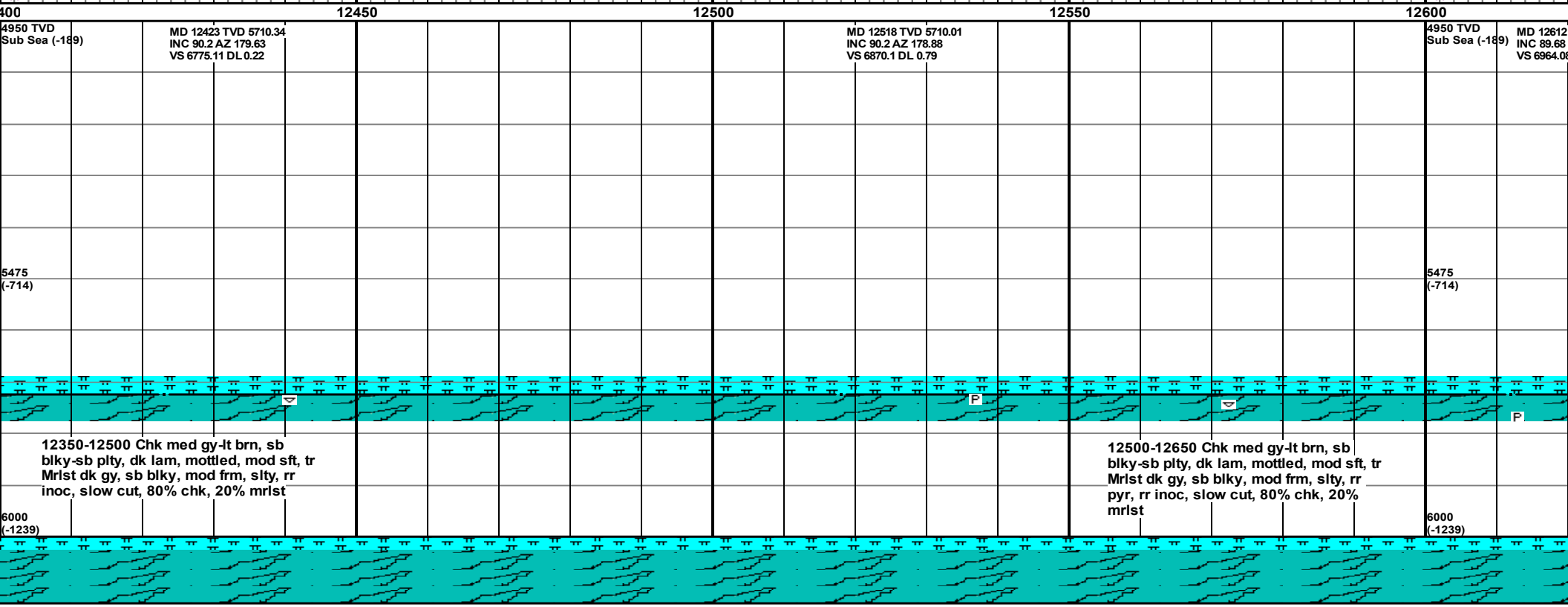
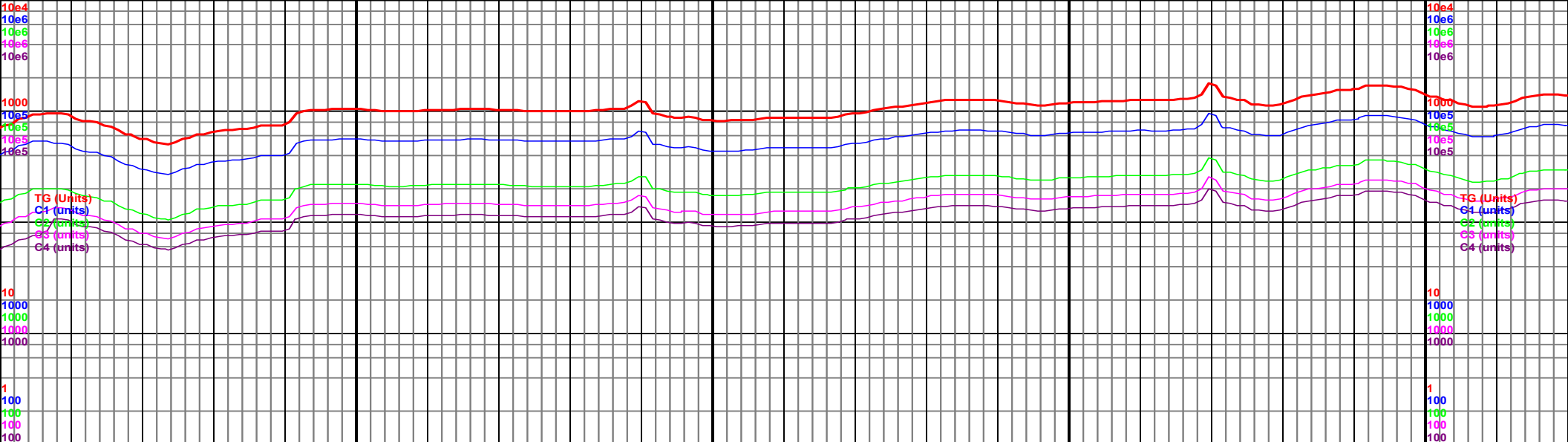


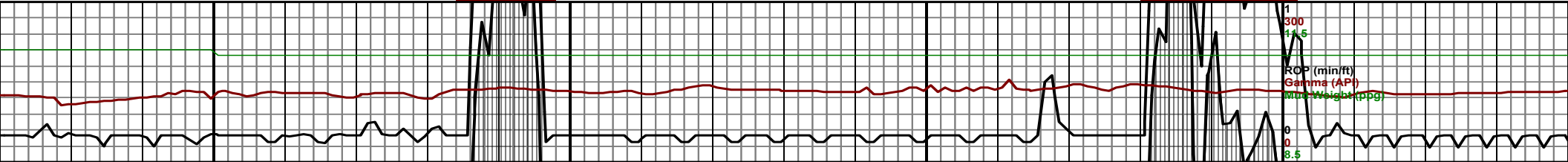
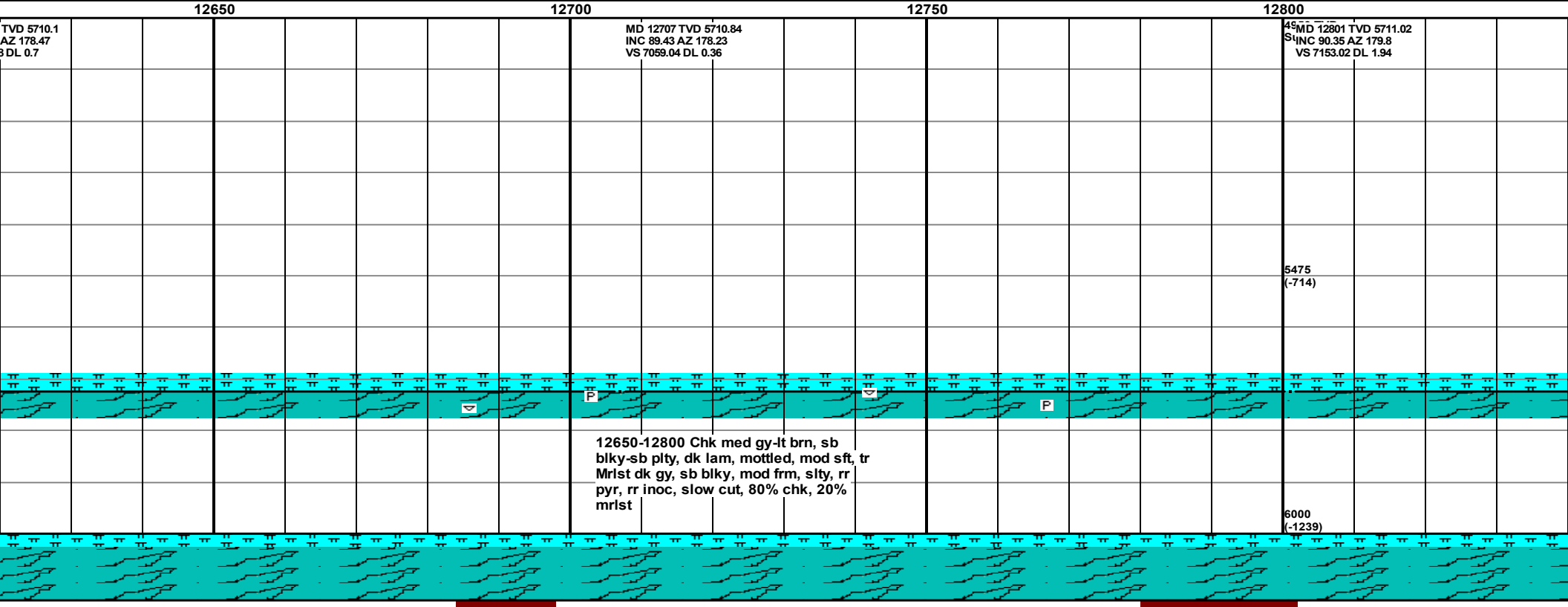
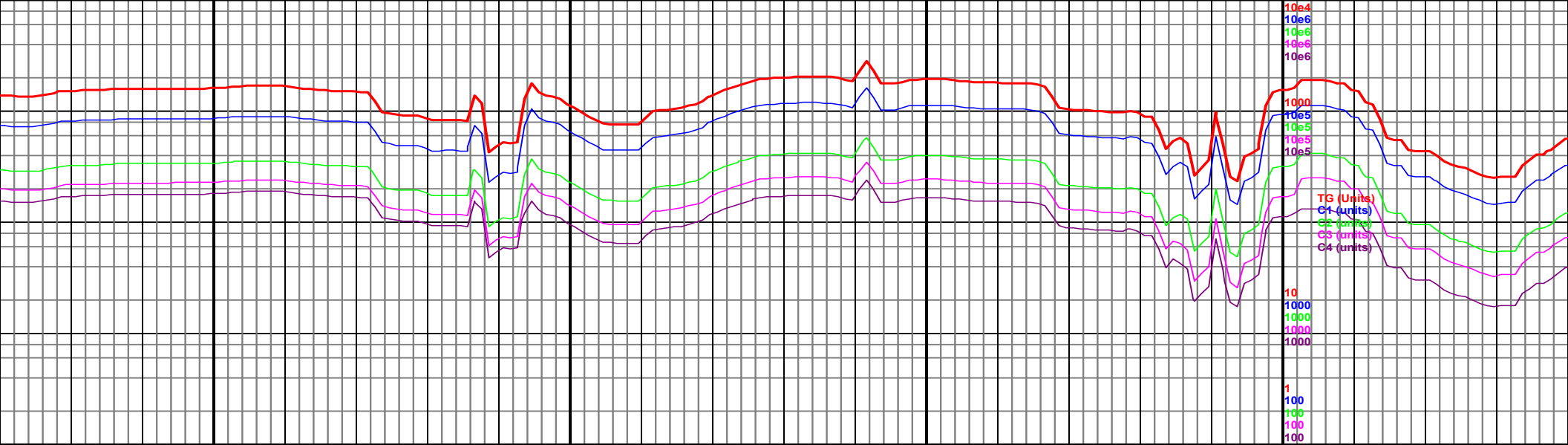


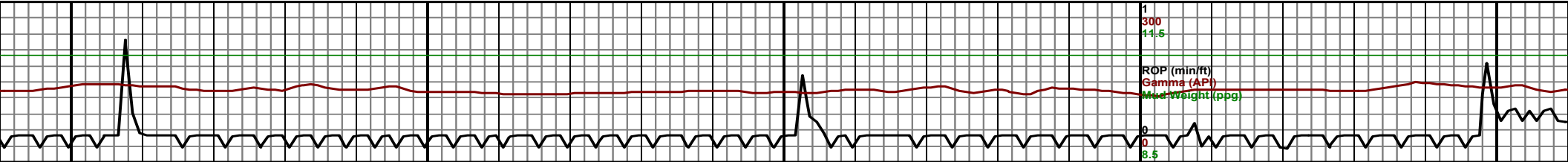
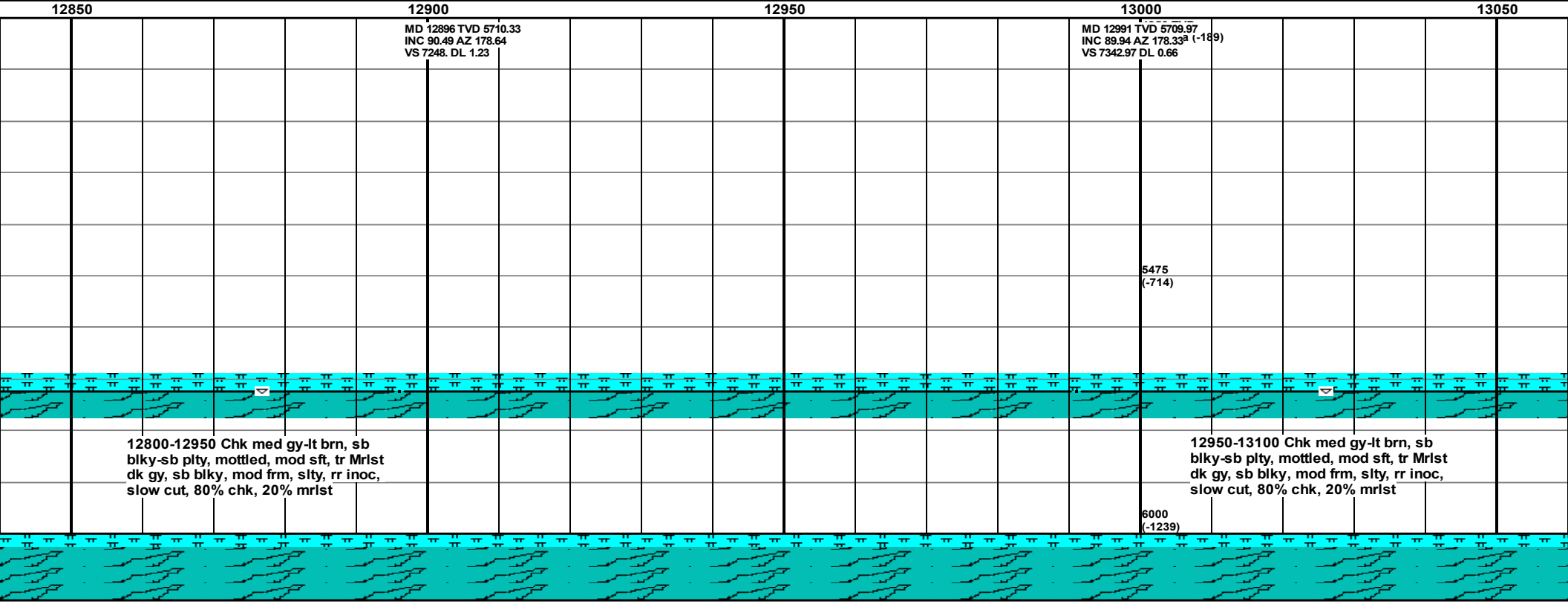
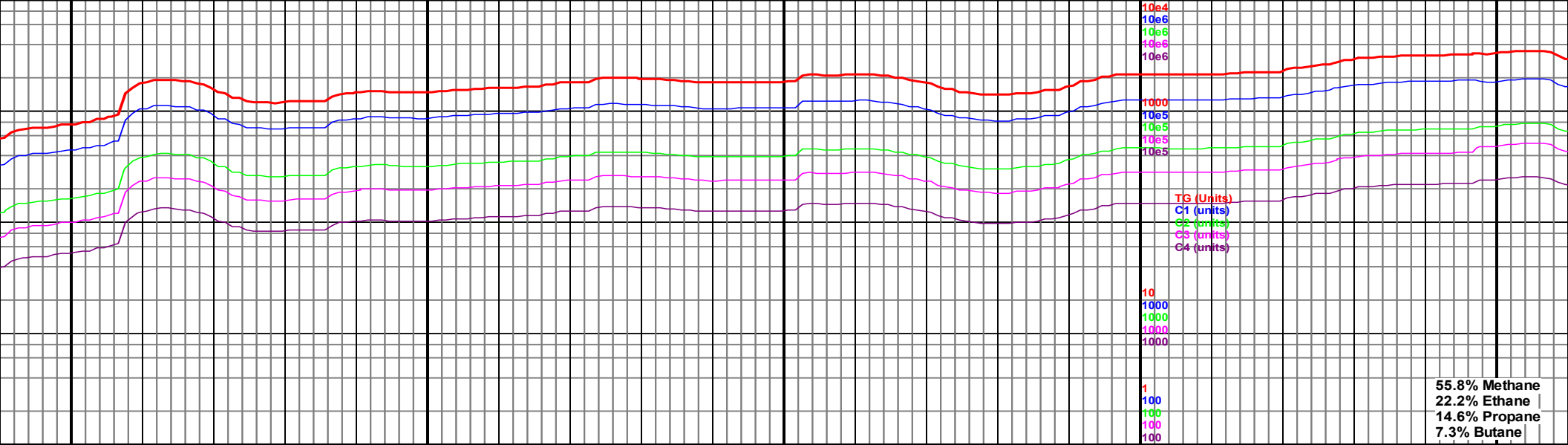




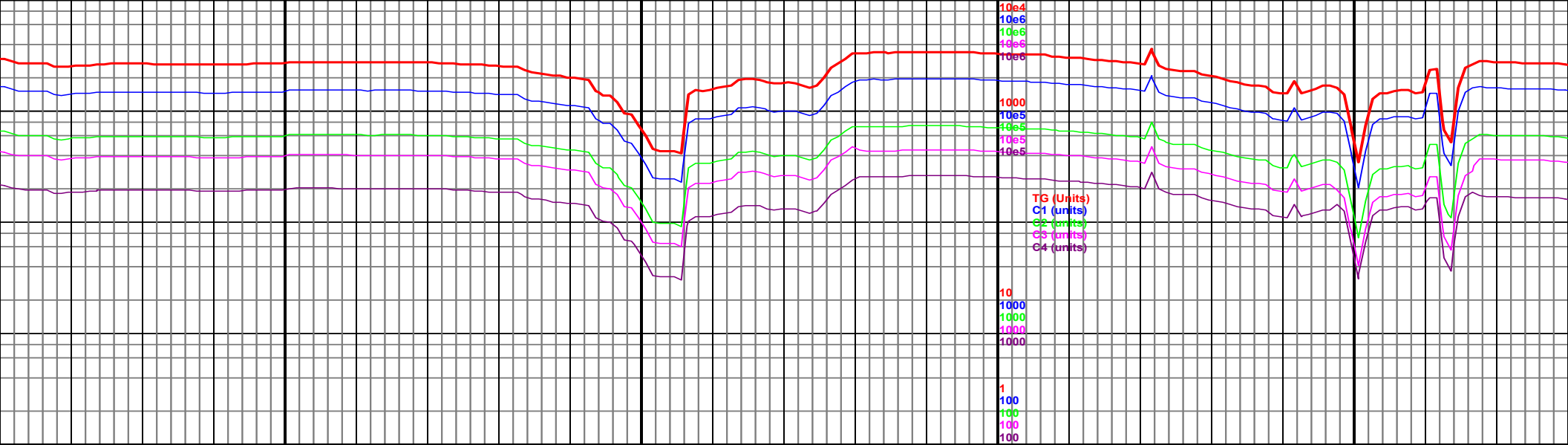












MD 13085 TVD 5710.5  
INC 89.42 AZ 177.89  
VS 7436.92 DL 0.72

MD 13180 TVD 5711.38  
INC 89.51 AZ 178.43  
VS 7531.86 DL 0.58

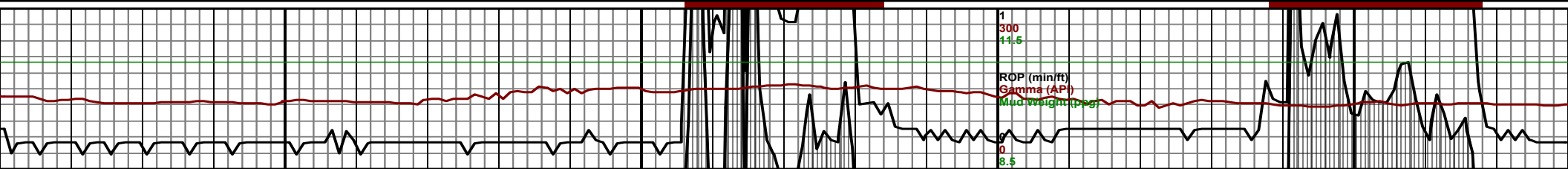
4950 TVD  
Sub Sea (-189)

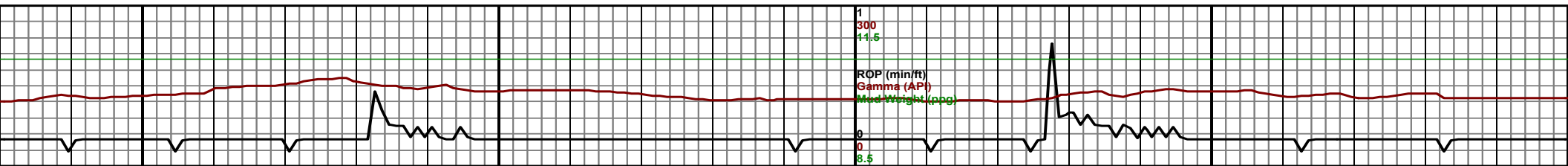
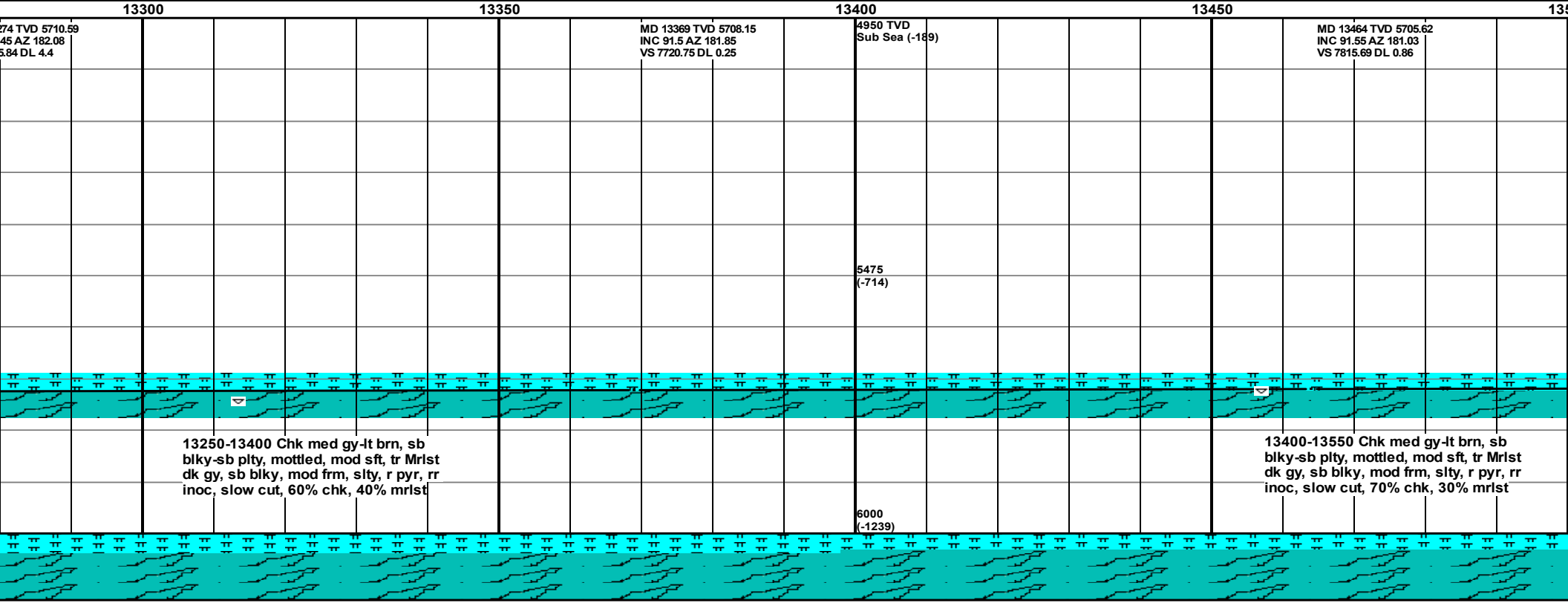
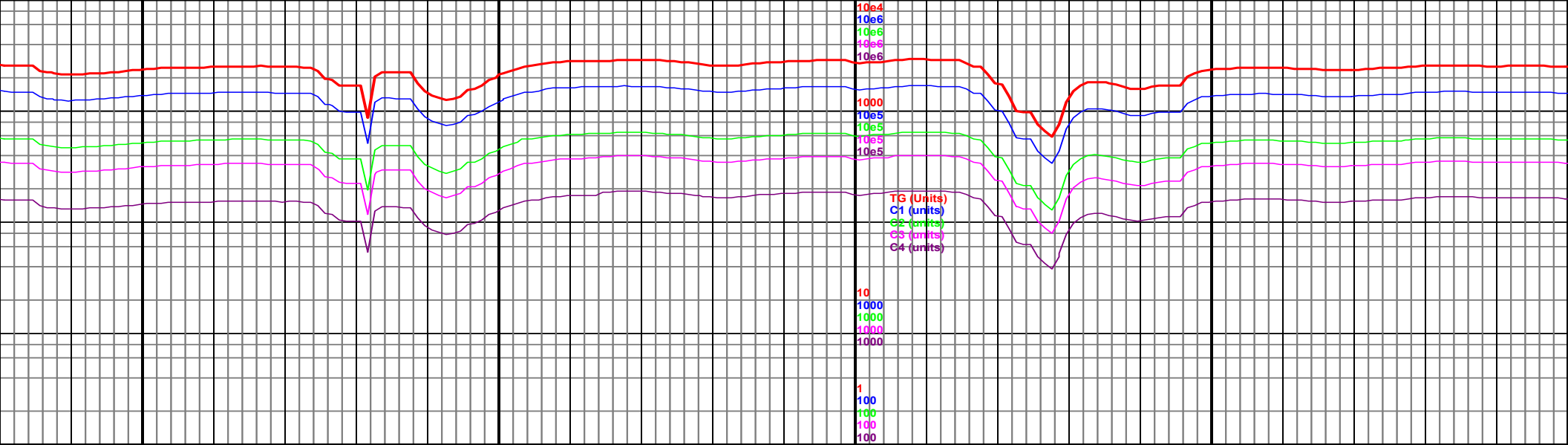
MD 13285 TVD 5711.38  
INC 89.51 AZ 178.43  
VS 7531.86 DL 0.58

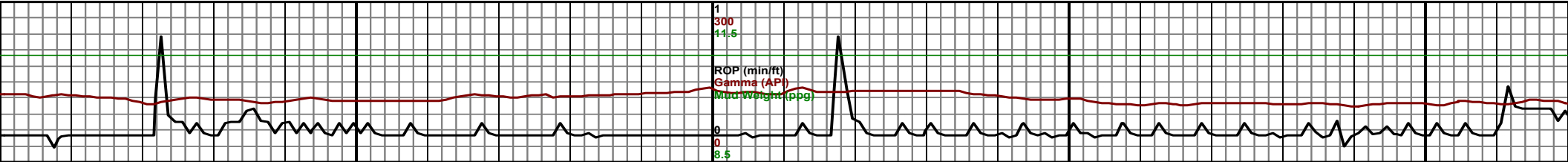
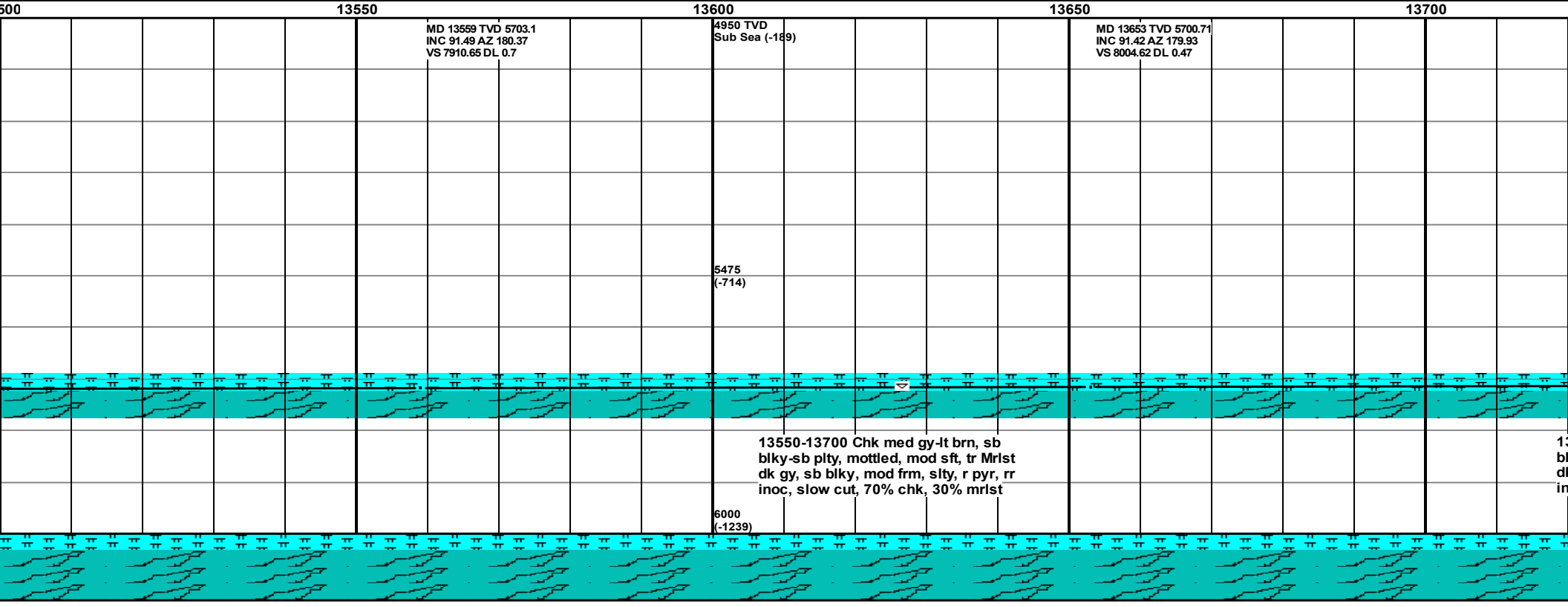
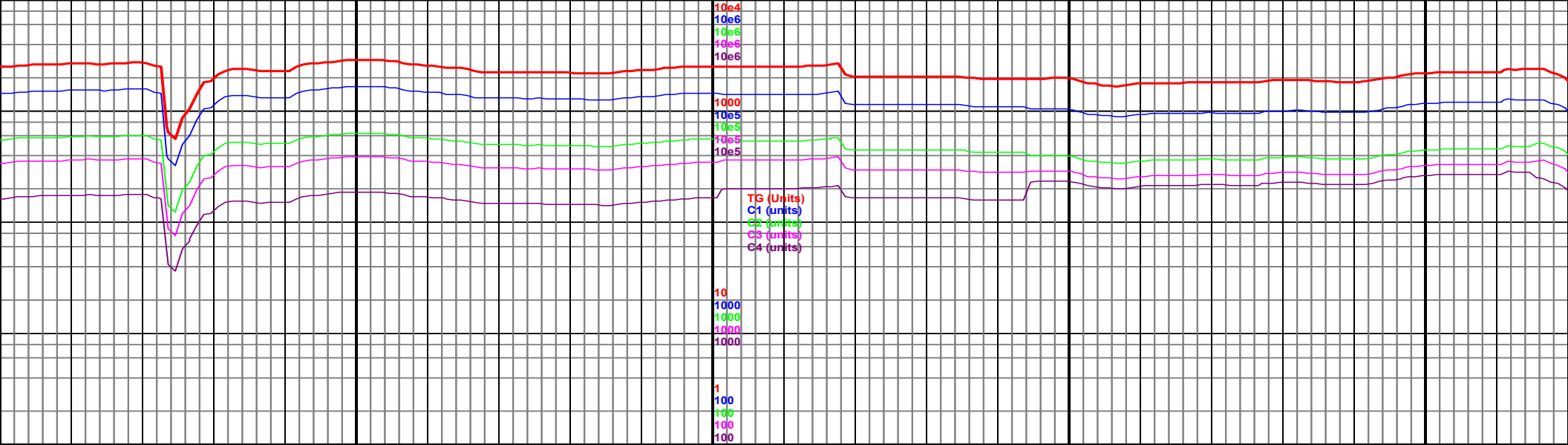
13100-13250 Chk med gy-lt brn, sb  
blky-sb plty, mottled, mod sft, tr Mrlst  
dk gy, sb blky, mod frm, slty, r pyr, rr  
inoc, slow cut, 70% chk, 30% mrlst

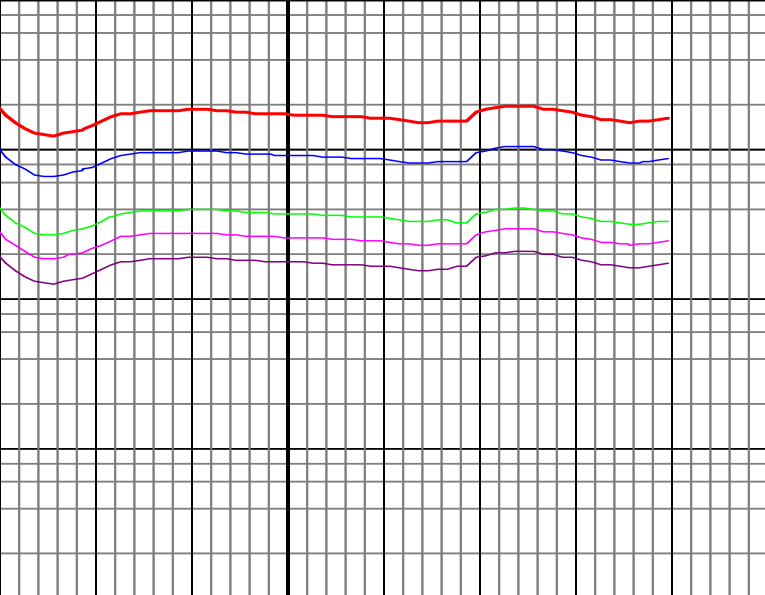
5475  
(-714)

6000  
(-1239)









13750

13

MD 13731 TVD 5698.7  
INC 91.54 AZ 179.63  
VS 8082.59 DL 0.41

TD 13790' MD reached at  
09:28 on 12/16/2016



13700-13790 Chk med gy-lt brn, sb  
lky-sb plty, mottled, mod sft, tr Mrlst  
k gy, sb biky, mod frm, slty, r pyr, rr  
oc, slow cut, 70% chk, 30% mrlst

