



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

**Well Name:** Razor 27K-3408B  
**Location:** NESW 27-T10N-R58W  
**License Number:** 05-123-37697  
**Spud Date:** 9/7/2013  
**Surface Coordinates:** Lat.: 40.808608 Long.: -103.852975  
**Bottom Hole Coordinates:** Lat.: 40.787986 Long.: -103.850997  
**Ground Elevation (ft):** 4749.5 **K.B. Elevation (ft):** 4766  
**Logged Interval (ft):** 5100 **To:** 12390 **Total Depth (ft):** 12390  
**Formation:** Pierre, Sharon Springs, Niobrara  
**Type of Drilling Fluid:** Water Based Mud

**Region:** Redtail Field  
**Drilling Completed:** 9/13/2013

Printed by WellSight Log Viewer 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:** Brian Reddick, Kyle Newman, Luke Schwantes, Lauren Roddy  
**Company:** Acme Geologic Consulting  
**Address:** 108 Berry Street  
Little Rock, AR 72205

## Drilling Company

Cade Drilling, LLC  
Rig #23

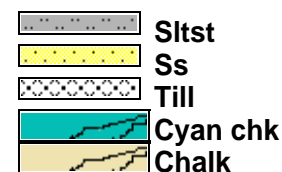
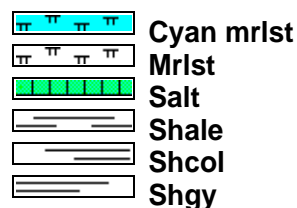
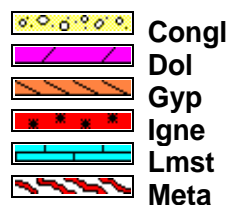
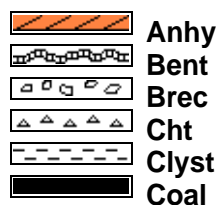
## Gas Detection

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

## Comments

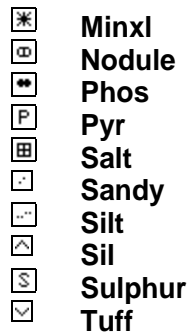
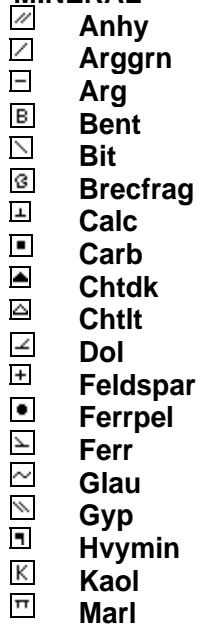
Lithologies and tops at drilled depths, not corrected to elogs. Where the well bore gas is 100% methane, the C1 line is moved to 85% for graphical purposes only.

## ROCK TYPES

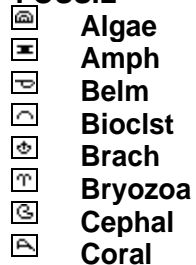


## ACCESSORIES

### MINERAL



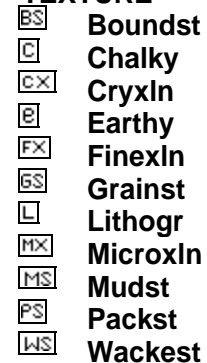
### FOSSIL



### STRINGER











### TEXTURE



OTHER SYMBOLS




POROSITY

-  Earthy
-  Fenest
-  Fracture
-  Inter
-  Moldic
-  Organic
-  Pinpoint
-  Vuggy

SORTING





-  Well
-  Moderate
-  Poor

ROUNDING



-  Rounded
-  Subrnd
-  Subang

-  Angular

OIL SHOW

-  Even
-  Spotted
-  Ques
-  Dead

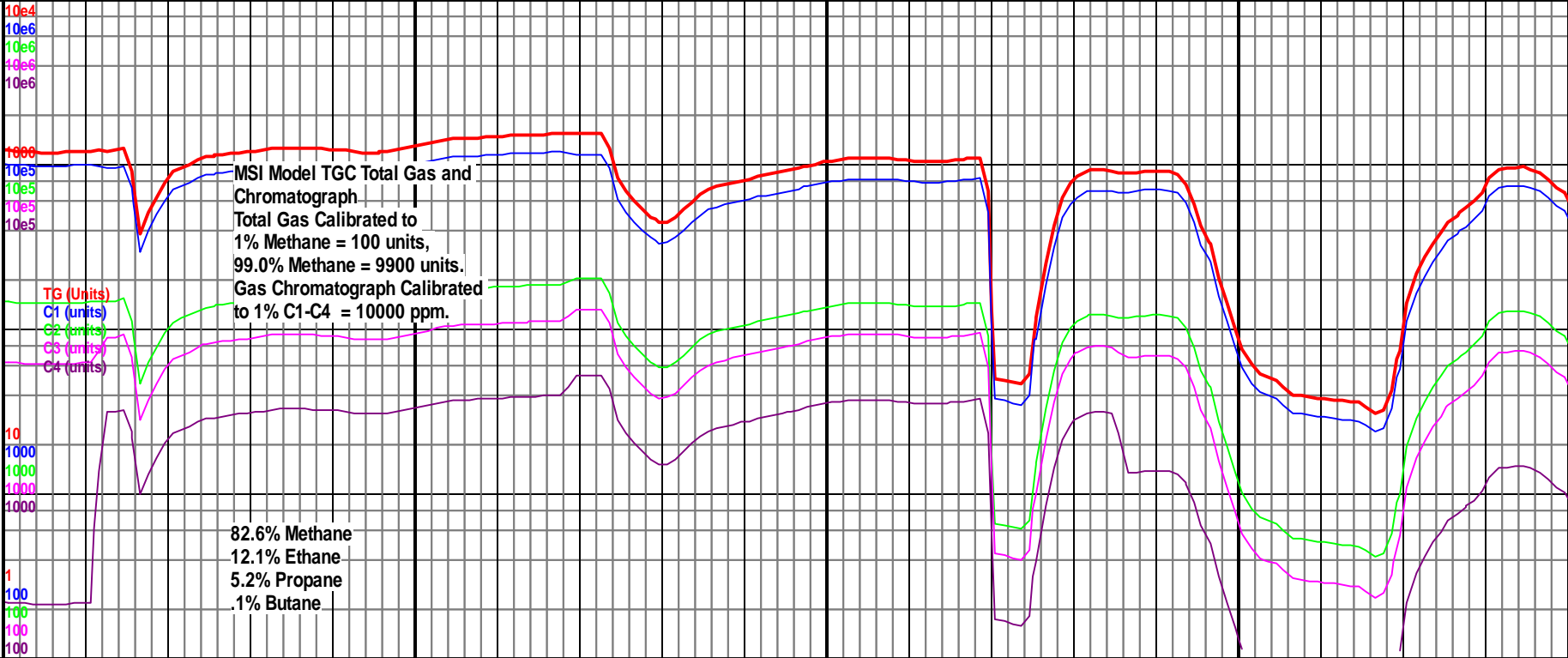
INTERVAL

-  Core
-  Dst

EVENT

-  Rft
-  Sidewall

**TG, C1-C4**  
**TG (Units)** —  
**C1 (units)** —  
**C2 (units)** —  
**C3 (units)** —  
**C4 (units)** —



Depth

00 5050 5100 5150

5000 TVD  
 Sub Sea (-234)  
 MD 5053 TVD 5049.64  
 INC 2.1 AZ 168.4  
 VS 131.93  
 MD 5145 TVD 5141.34  
 INC 6.9 AZ 149.3  
 VS 138.56  
 MD 5175 TVD 5171.34  
 INC 10.9 AZ 146.1  
 VS 142.65

KOP 5105' reached at 16:20  
 on 9/9/2013

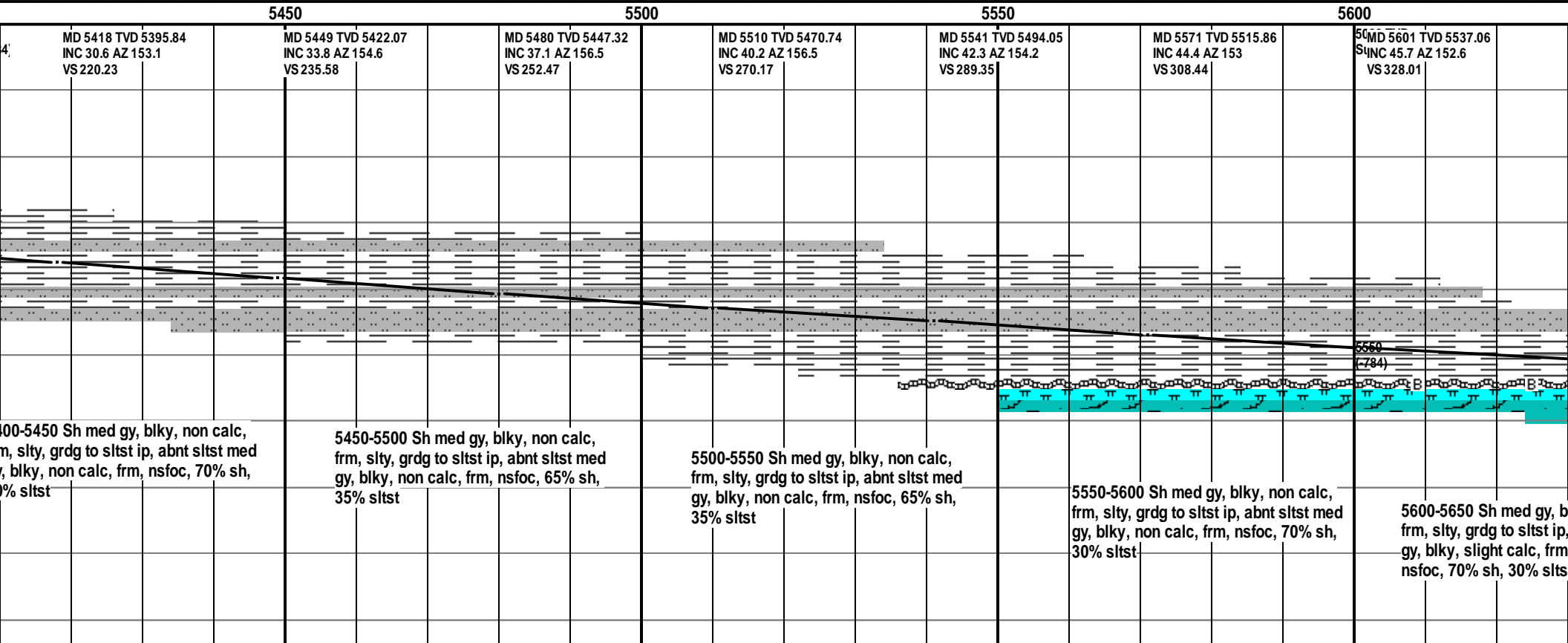
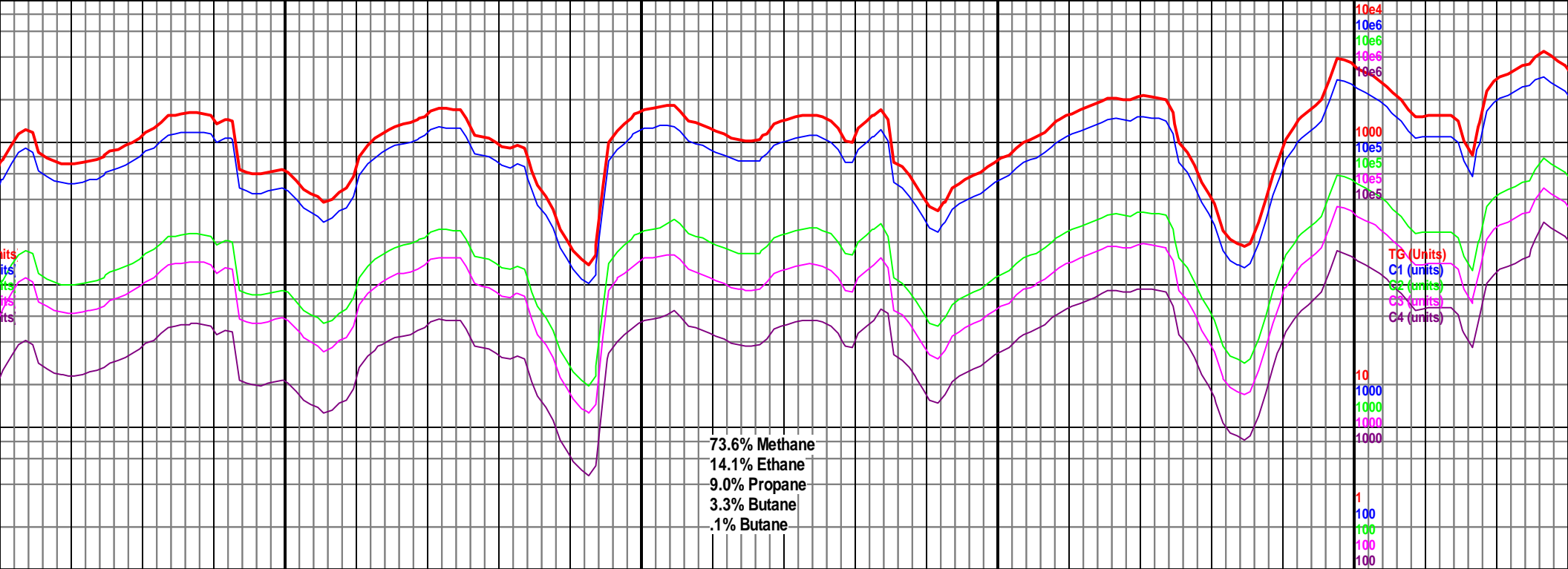
5100-5150 Sh med gy, blk, non calc,  
 frm, slty, grdg to sltst ip, abnt sltst med  
 gy, blk, non calc, frm, arg, nsfoc, 60%  
 sh, 40% sltst

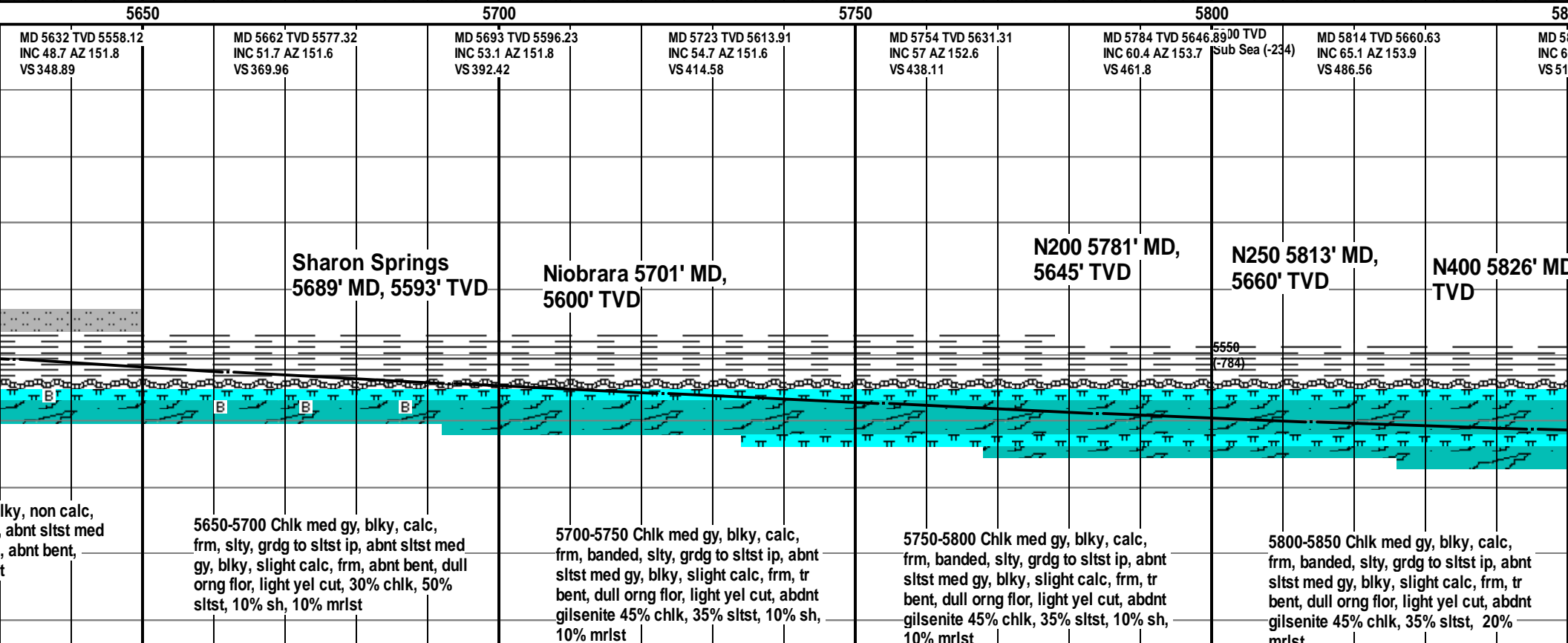
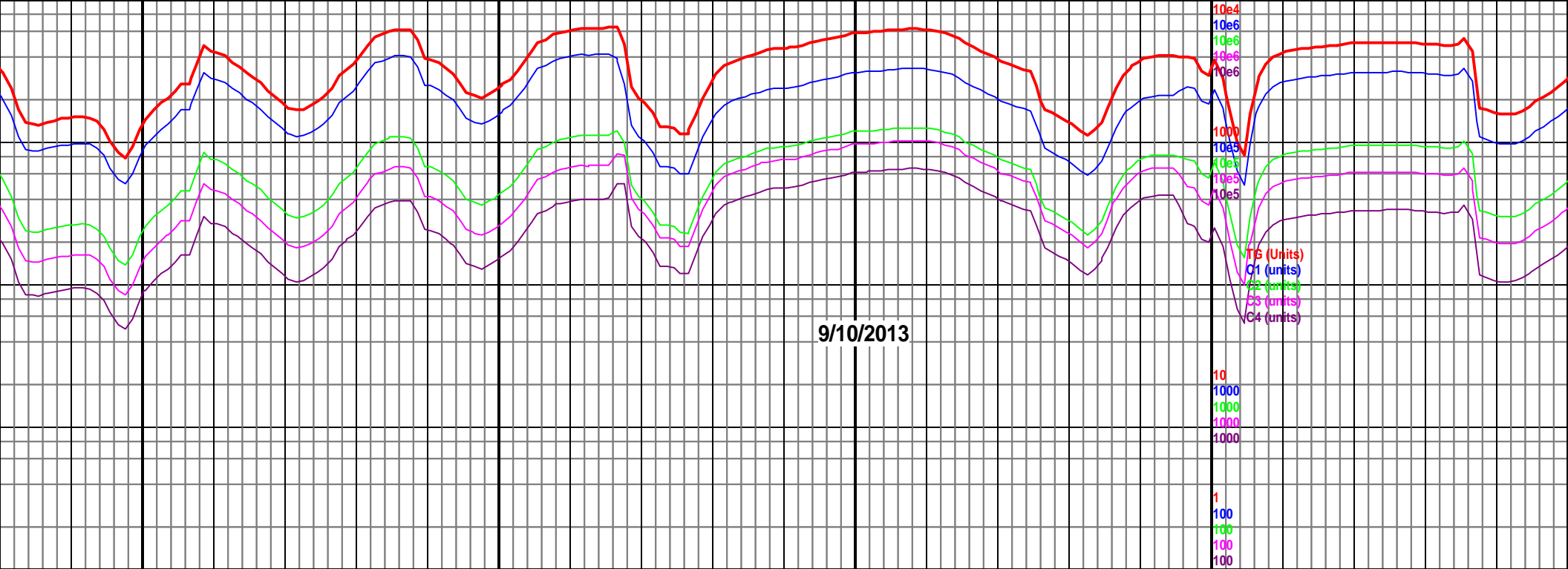
5150-5200 Sh med gy, blk, non calc,  
 frm, slty, grdg to sltst ip, abnt sltst med  
 gy, blk, non calc, frm, nsfoc, 50%  
 sh, 50% sltst

Well Bore Cross Section

5550  
(-784)

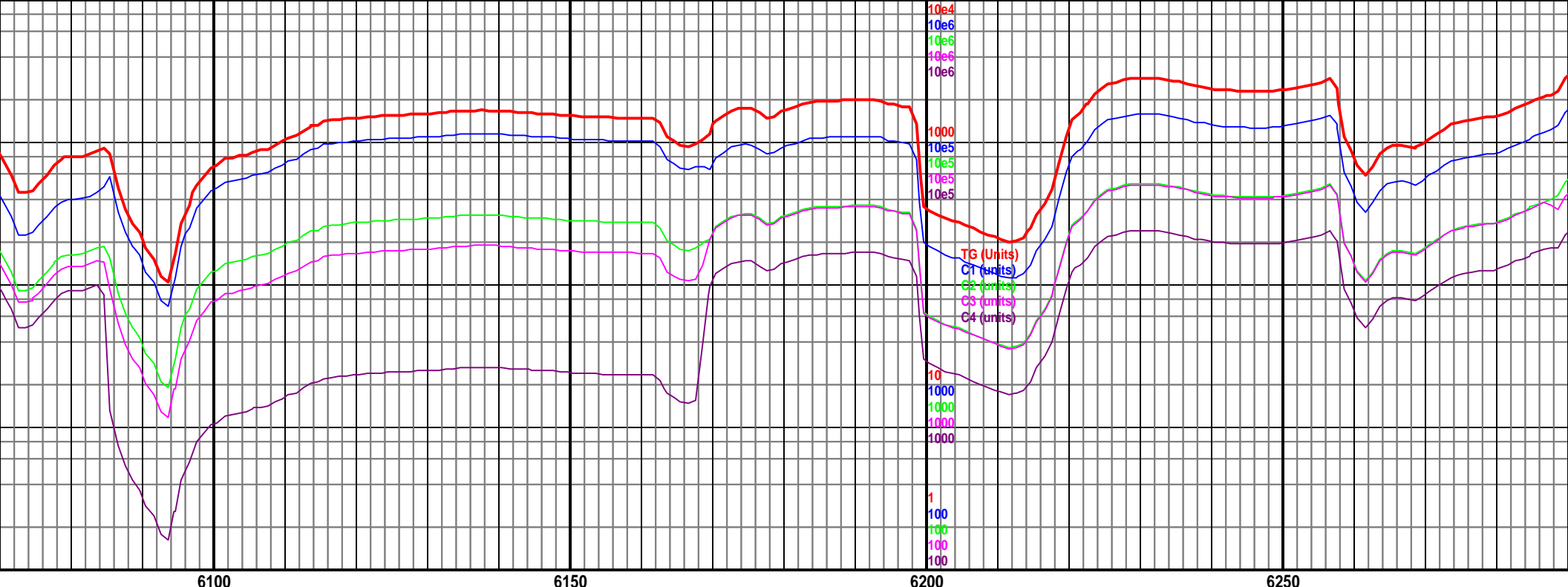












6100

6150

6200

6250

MD 6111 TVD 5710.14  
INC 90.2 AZ 152.1  
VS 755.89

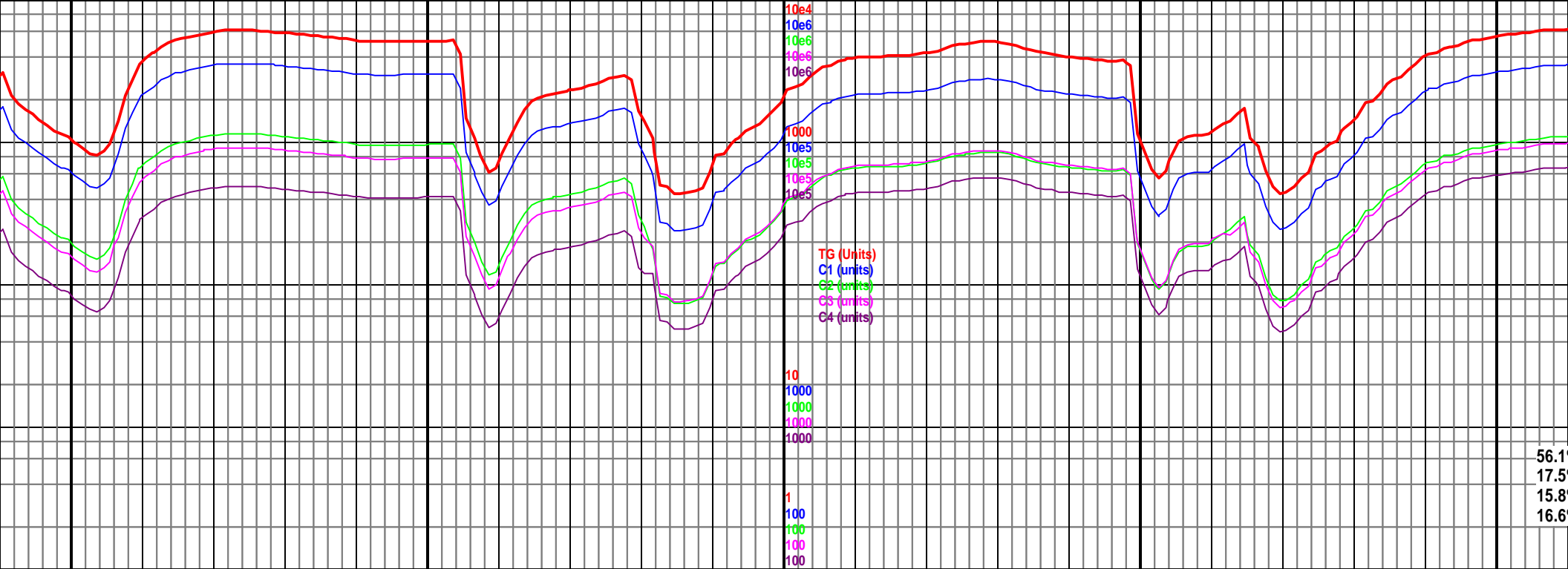
5000 TVD MD 6206 TVD 5709.48  
Sub Sea INC 90.6 AZ 157.6  
VS 844.7

diate  
back  
25

5550  
(-784)

6100-6200 Chlk med gy-gy, blk-sb  
blk, calc, frm, banded, abnt mrlst  
dk-gy-gy, blk-sb blk, slight calc, frm,  
rr bent, dull org flor, abdnt gilsenite,  
fast yel cut, 80% chlk, 20% mrlst

6200-6300 Chlk lt gy-gy, blk-sb blk,  
calc, frm, banded, occ mrlst dk-gy-gy,  
blk-sb blk, slight calc, frm, dull yel  
oil flor, fast yel cut, 80% chlk, 20%



56.1  
17.5  
15.8  
16.6

6300 6350 6400 6450 6500

MD 6301 TVD 5707.73  
INC 91.5 AZ 162.7  
VS 936.23

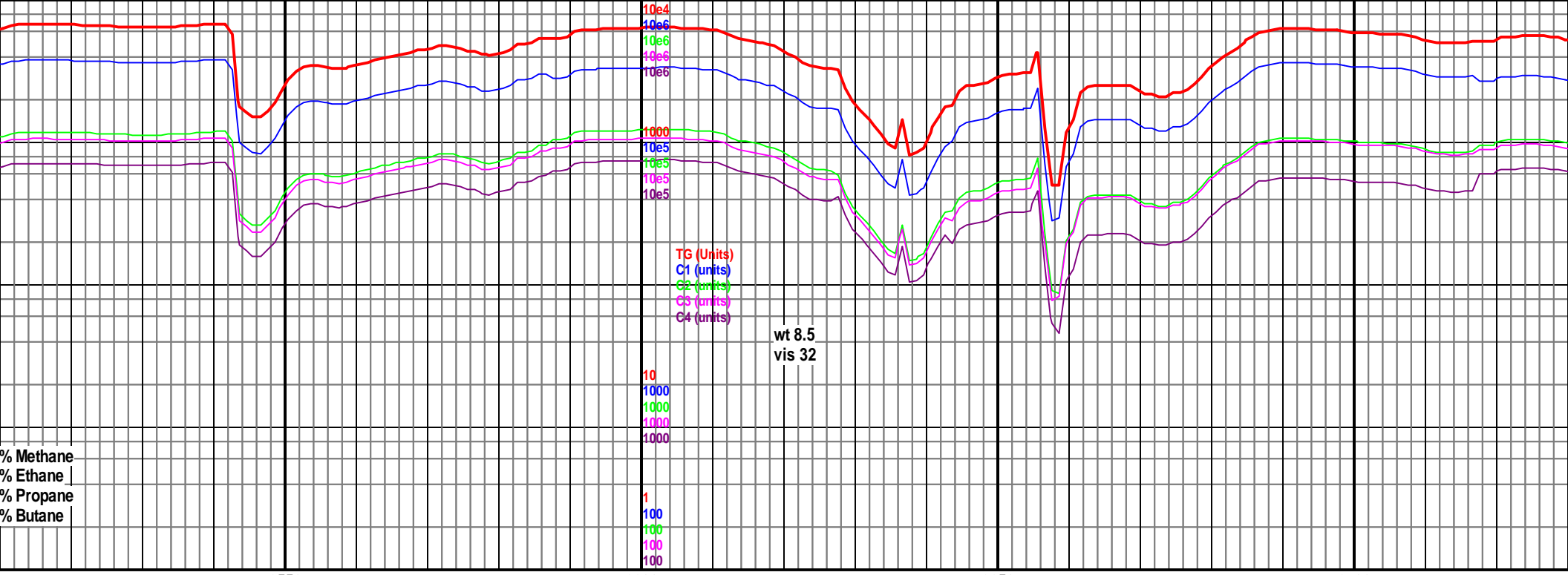
MD 6396 TVD 5706.82  
INC 89.6 AZ 167.2<sup>1</sup>

MD 6491 TVD 5706.32  
INC 91 AZ 170.3  
VS -1087.79

5550  
(-784)

6300-6400 Chlk lt gy-gy, blk-y-sb blk-y,  
calc, frm, banded, tr mrlst dk-gy-gy,  
blk-y-sb blk-y, slight calc, frm, dull yel  
oil flor, fast yel cut, 90% chlk, 10%

6400-6500 Chlk lt gy-gy, blk-y-sb blk-y,  
calc, frm, banded, tr mrlst dk-gy-gy,  
blk-y-sb blk-y, slight calc, frm, dull yel  
oil flor, fast yel cut, 90% chlk, 10%



6550

6600

6650

6700

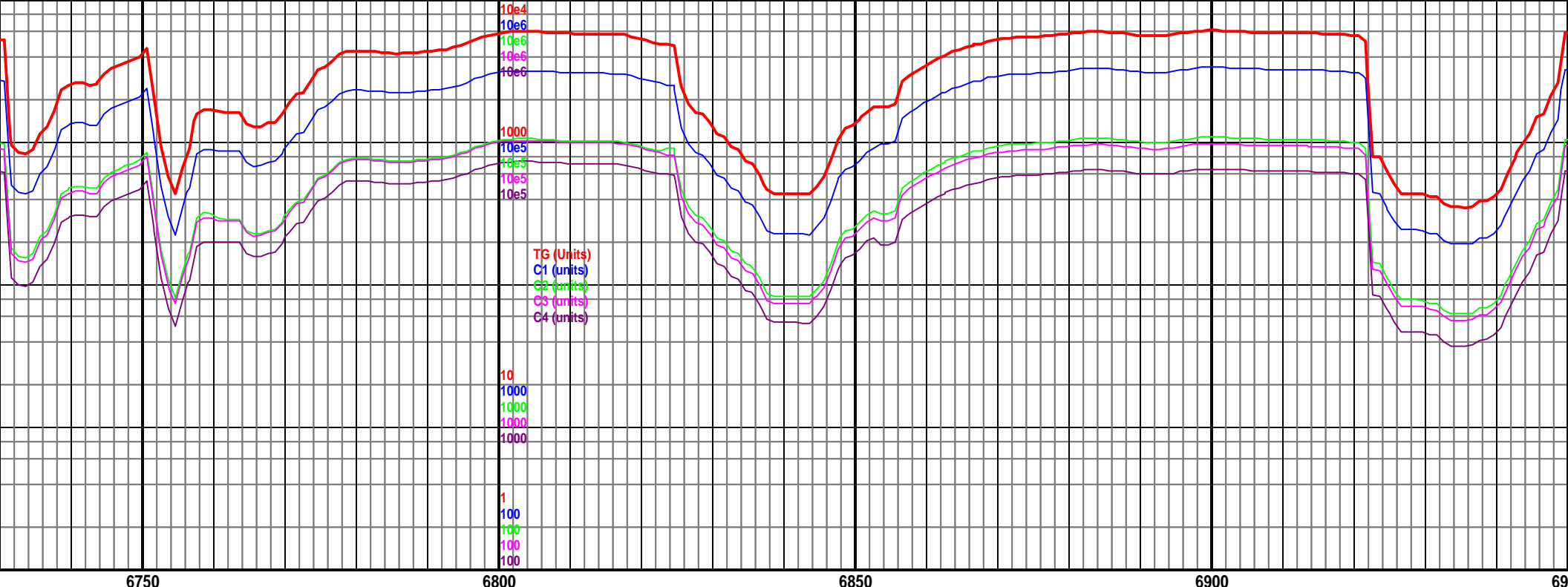
MD 6585 TVD 5706.490 TVD  
INC 88.8 AZ 174 Sub Sea (-234)  
VS 1217.69

MD 6680 TVD 5706.9  
INC 90.7 AZ 177.8  
VS 1312.66

5550  
(-784)

6500-6600 Chlk lt gy-gy, blk-sb blk,  
calc, frm, banded, tr mrlst dk-gy-gy,  
blk-sb blk, slight calc, frm, tr inoc  
frags, dull yel oil flor, fast yel cut, 90%

6600-6700 Chlk lt gy-gy, blk-sb blk,  
calc, frm, banded, tr mrlst dk-gy-gy,  
blk-sb blk, slight calc, frm, tr inoc  
frags, dull yel oil flor, fast yel cut, 90%



MD 6775 TVD 5706.74  
INC 89.5 AZ 182.4  
VS 1407.34

5000 TVD  
Sub Sea (-234)

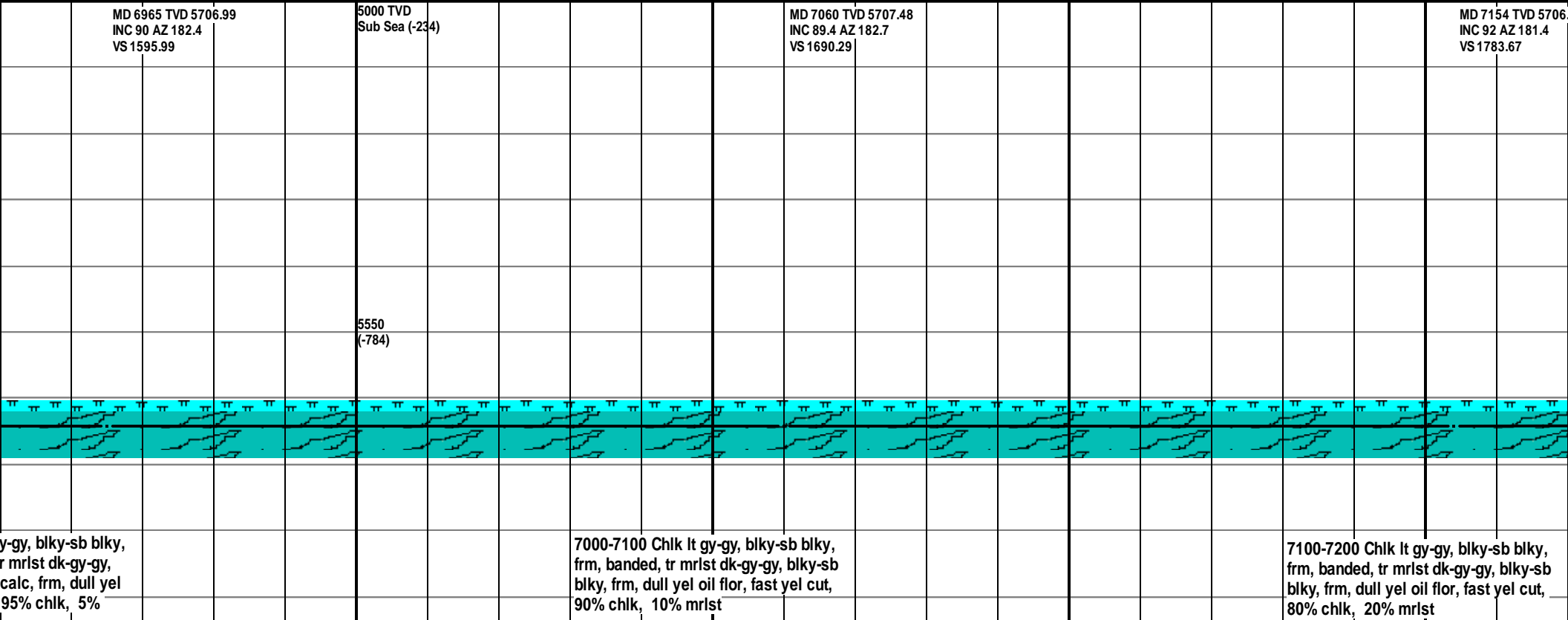
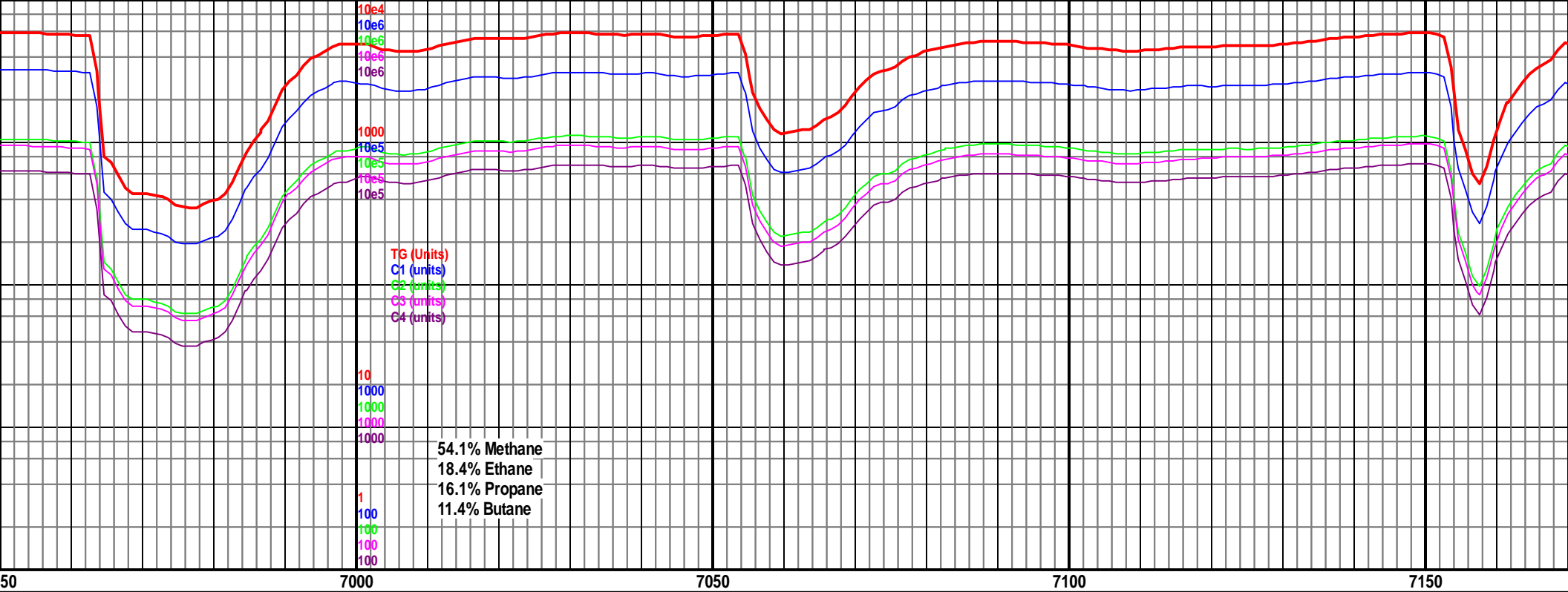
MD 6870 TVD 5707.07  
INC 90.1 AZ 182.4  
VS 1501.67

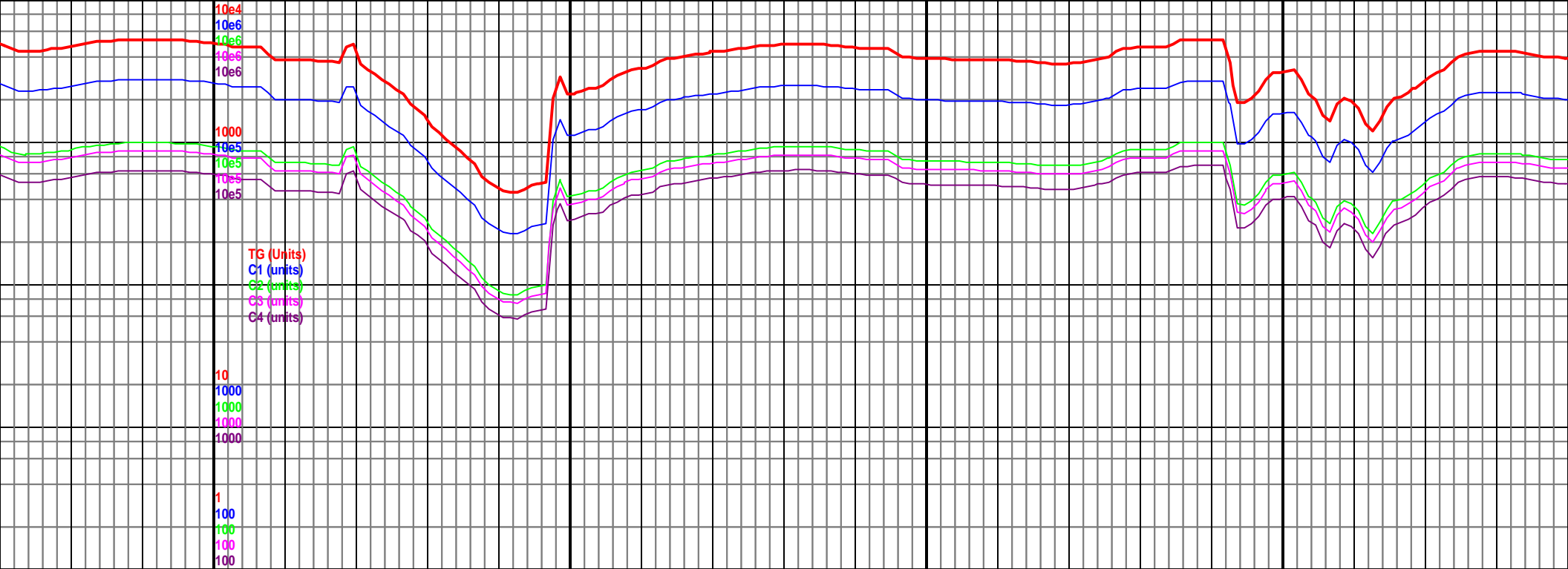
5550  
(-784)

6700-6800 Chlk lt gy-gy, blk-sb blk, calc, frm, banded, tr mrlst dk-gy-gy, blk-sb blk, slight calc, frm, tr inoc frags, dull yel oil flor, fast yel cut, 90% chlk, 10% mrlst

6800-6900 Chlk lt gy-gy, blk-sb blk, calc, frm, banded, tr mrlst dk-gy-gy, blk-sb blk, slight calc, frm, dull yel oil flor, fast yel cut, 90% chlk, 10% mrlst

6900-7000 Chlk lt gy-gy, blk-sb blk, calc, frm, banded, tr mrlst dk-gy-gy, blk-sb blk, slight calc, frm, dull yel oil flor, fast yel cut, 90% chlk, 10% mrlst



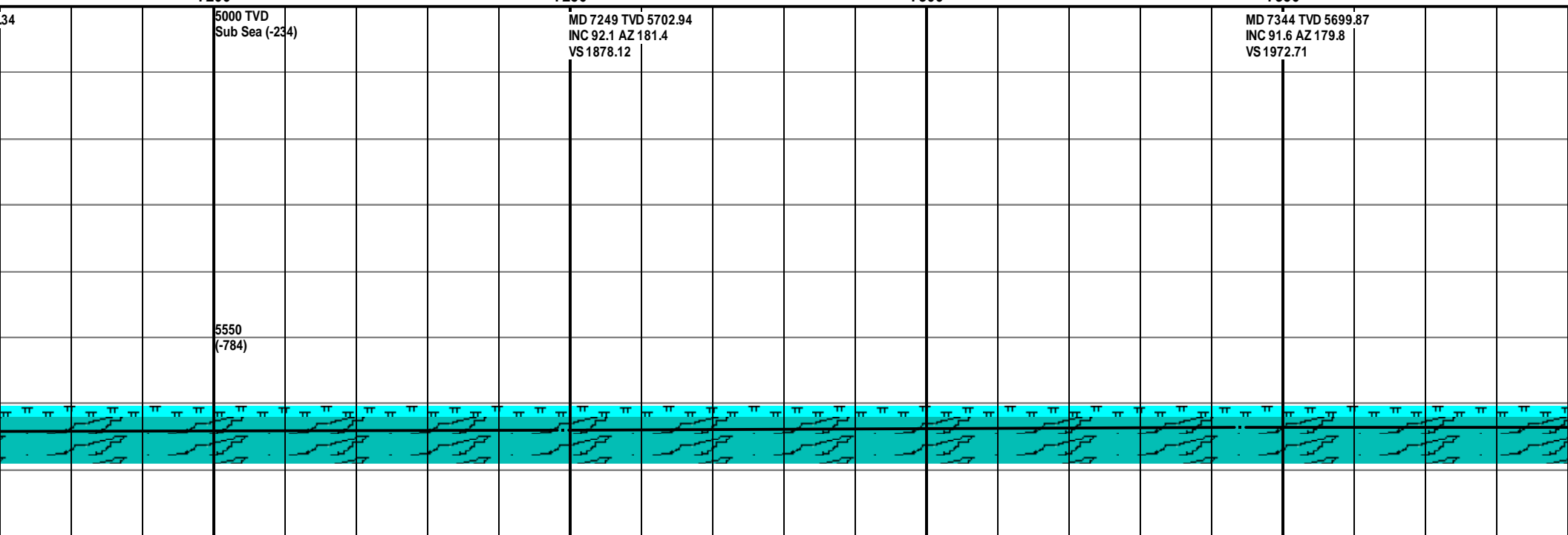


7200

7250

7300

7350



5000 TVD  
Sub Sea (-234)

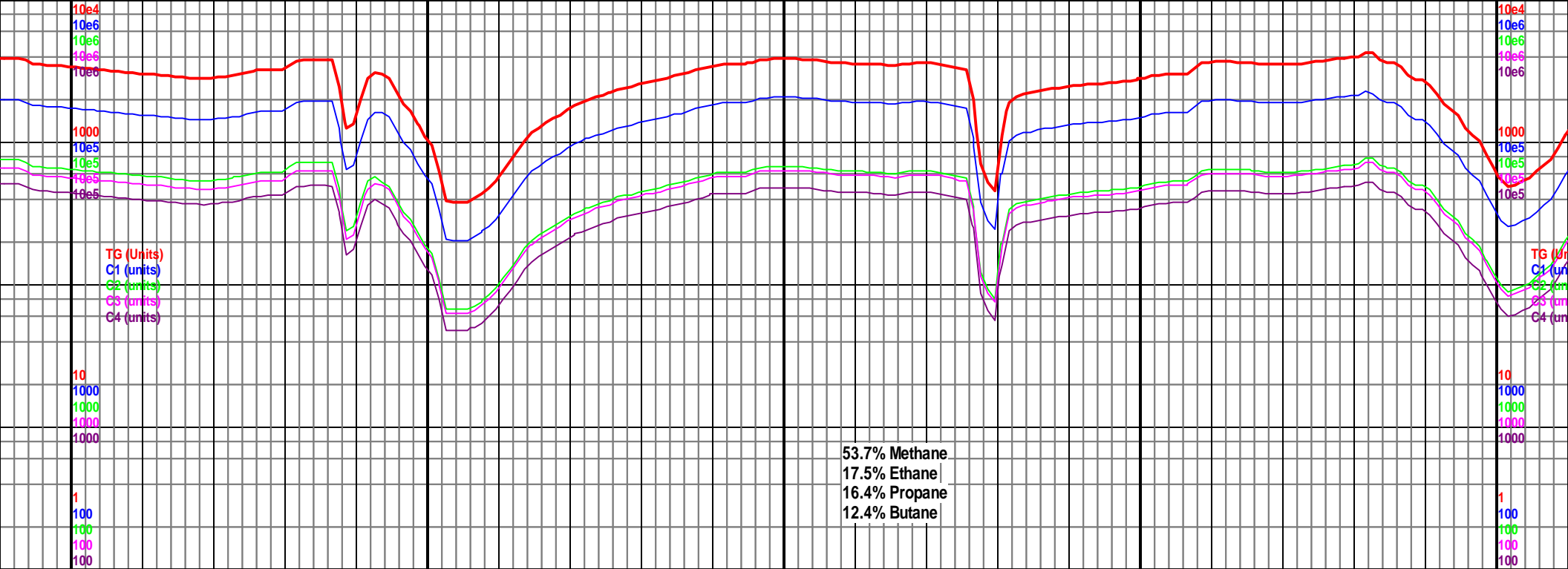
MD 7249 TVD 5702.94  
INC 92.1 AZ 181.4  
VS 1878.12

MD 7344 TVD 5699.87  
INC 91.6 AZ 179.8  
VS 1972.71

5550  
(-784)

7200-7300 Chlk lt gy-gy, blk-y-sb blk-y,  
frm, banded, tr mrlst dk-gy-gy, blk-y-sb  
blk-y, frm, dull yel oil flor, slo yel cut,  
90% chlk, 10% mrlst

7300-7400 Chlk lt gy-gy, blk-y-sb blk-y,  
frm, banded, tr mrlst dk-gy-gy, blk-y-sb  
blk-y, frm, dull yel oil flor, slo yel cut,  
95% chlk, 5% mrlst



7400 7450 7500 7550 7600

5000 TVD  
Sub Sea (-234)

MD 7439 TVD 5699.04  
INC 89.4 AZ 178.9  
VS 2067.49

MD 7533 TVD 5699.53  
INC 90 AZ 179.6  
VS 2161.3

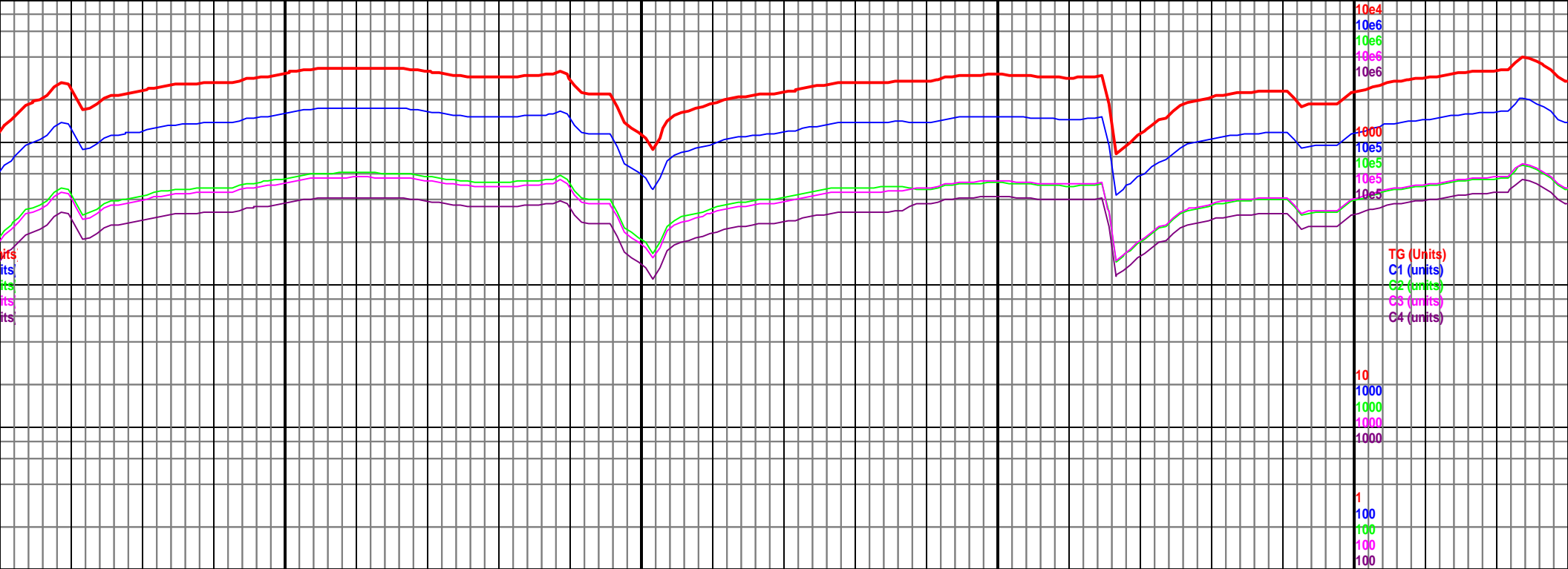
5000 TVD  
Sub Sea (-234)

5550  
(-784)

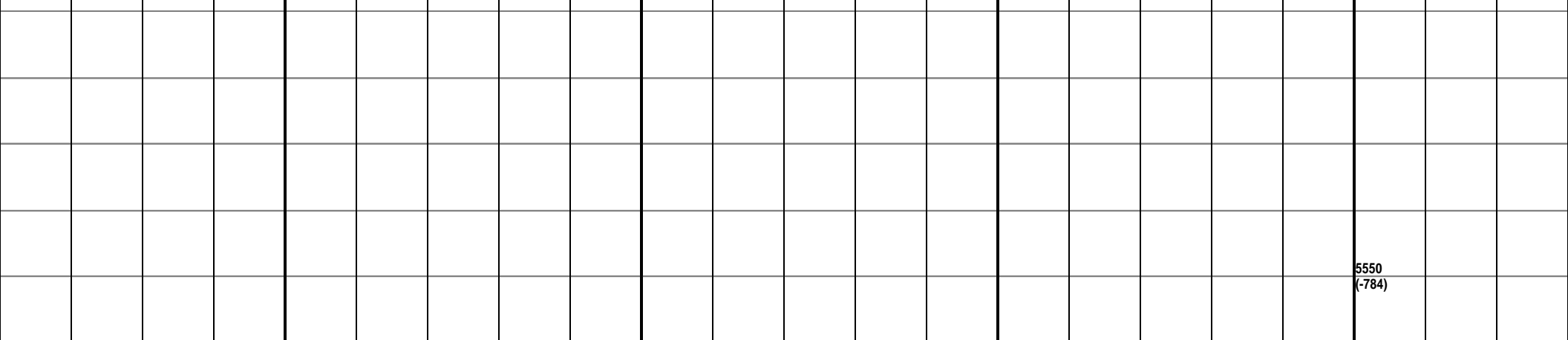
5550  
(-784)

7400-7500 Chlk lt gy-gy, blk-y-sb blk-y,  
frm, banded, tr mrlst dk-gy-gy, blk-y-sb  
blk-y, frm, dull yel oil flor, fast yel cut,  
85% chlk, 15% mrlst

7500-7600 Chlk dk gy-gy, blk-y-sb blk-y,  
frm, banded, tr mrlst dk-gy-gy, blk-y-sb  
blk-y, frm, dull yel oil flor, med slo yel  
cut, 95% chlk, 5% mrlst



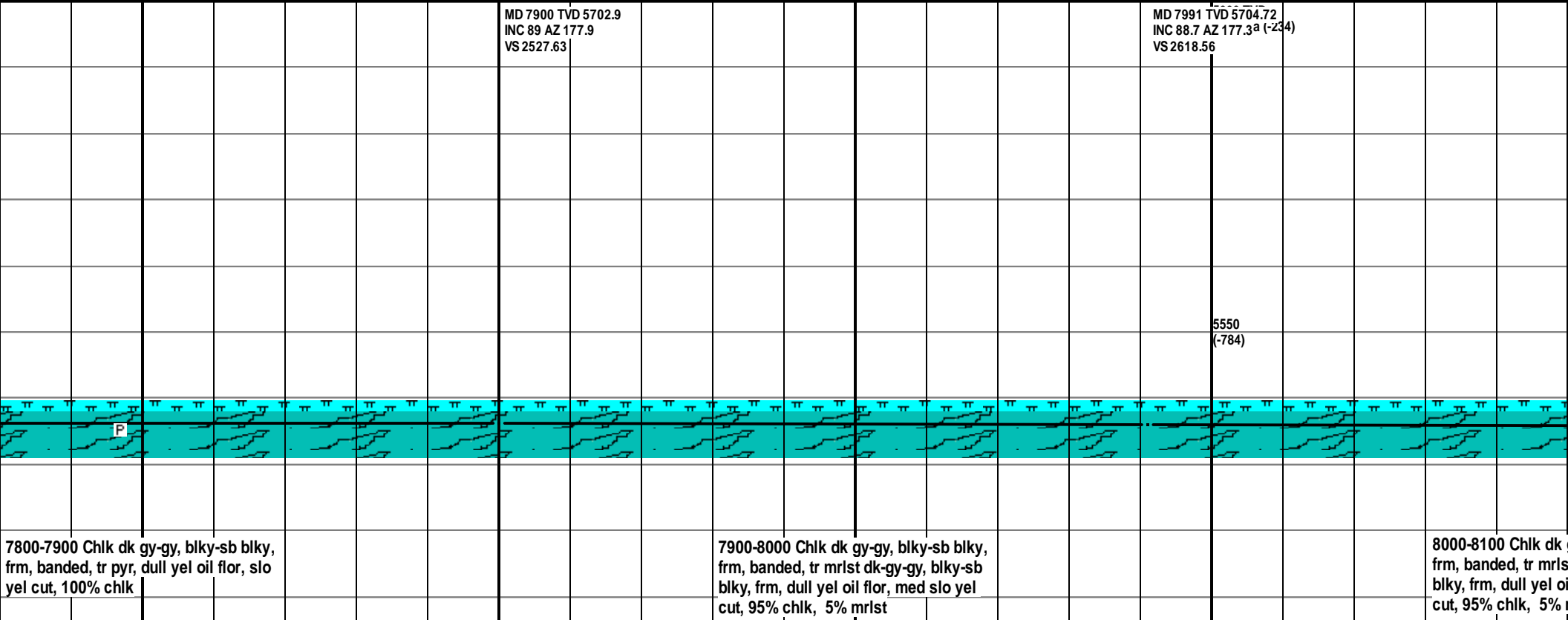
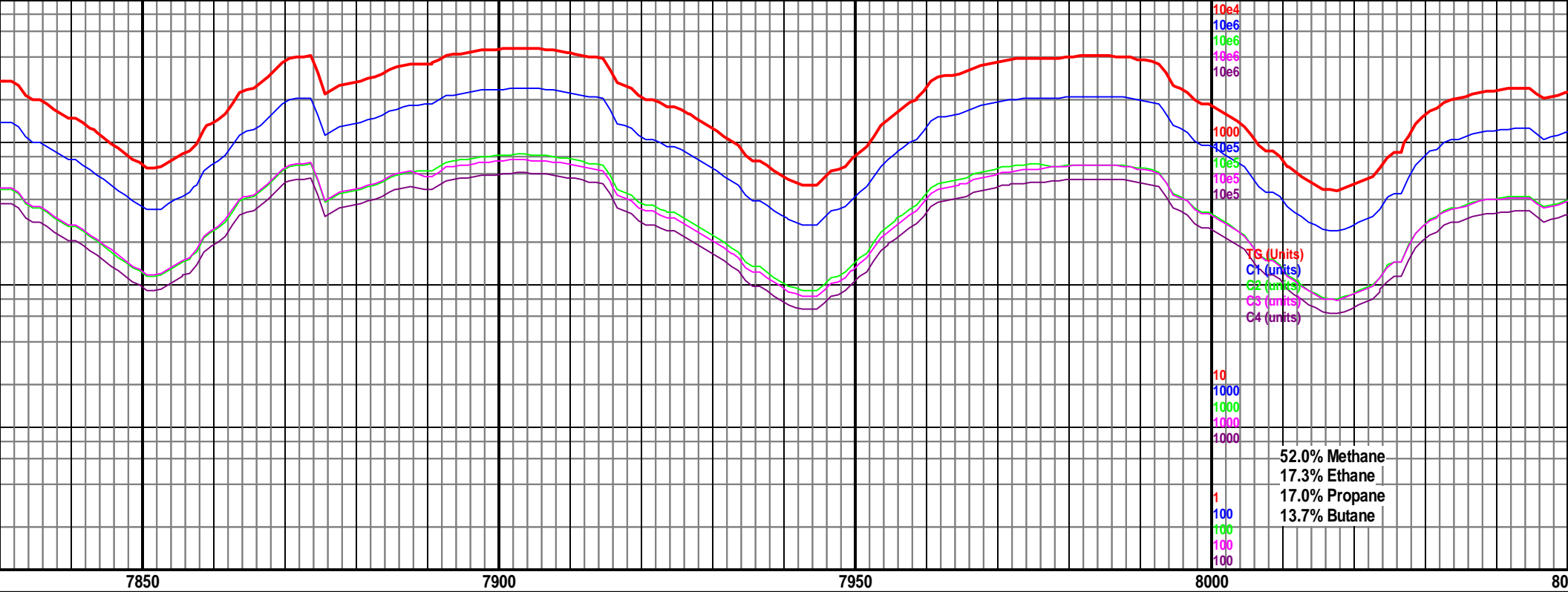
7650				7700				7750				7800			
4	MD 7625 TVD 5699.93 INC 89.5 AZ 179.4 VS 2253.08					MD 7717 TVD 5700.5 INC 89.8 AZ 179 VS 2344.89							5000 TVD Sub Sea (-) VS 2435.75	MD 7808 TVD 5701.37 INC 89.1 AZ 178.6	

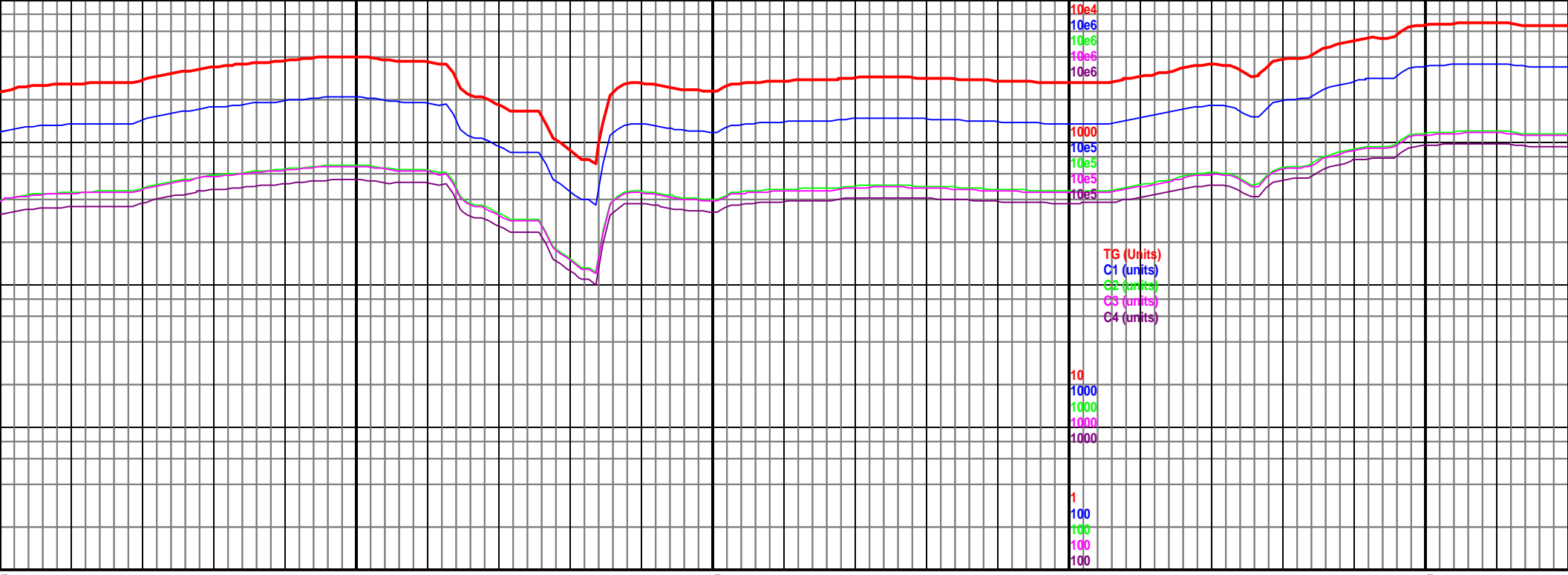


7600-7700	Chlk dk gy-gy, bkly-sb bkly, frm, banded, dull yel oil flor, med slo yel cut, rr inoc, 100% chlk
-----------	--

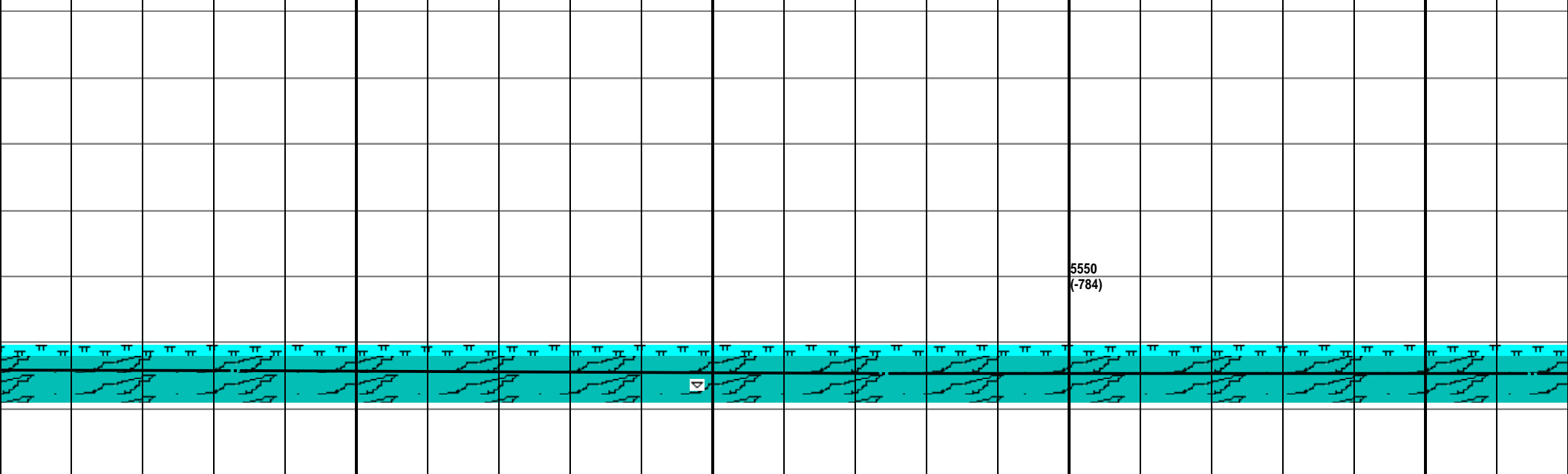
7700-7800	Chlk dk gy-gy, bkly-sb bkly, frm, banded, dull yel oil flor, slo yel cut, 100% chlk
-----------	---



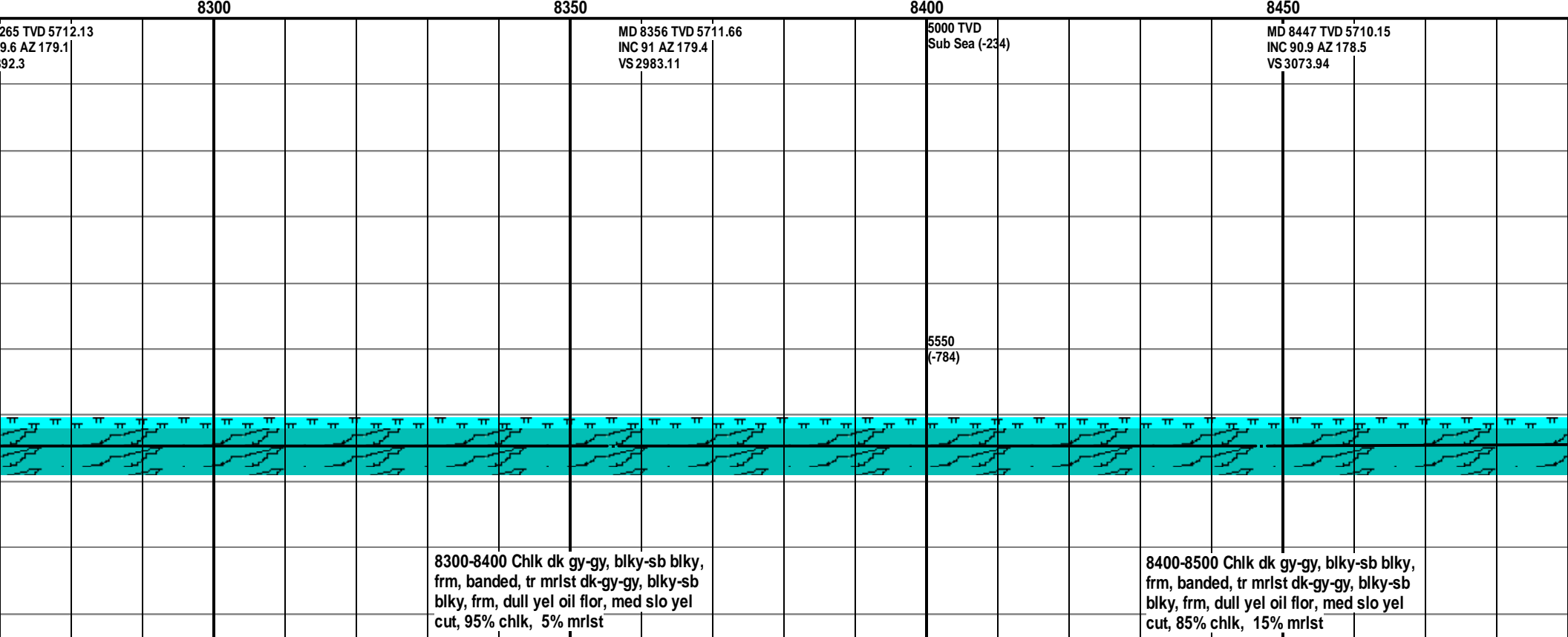
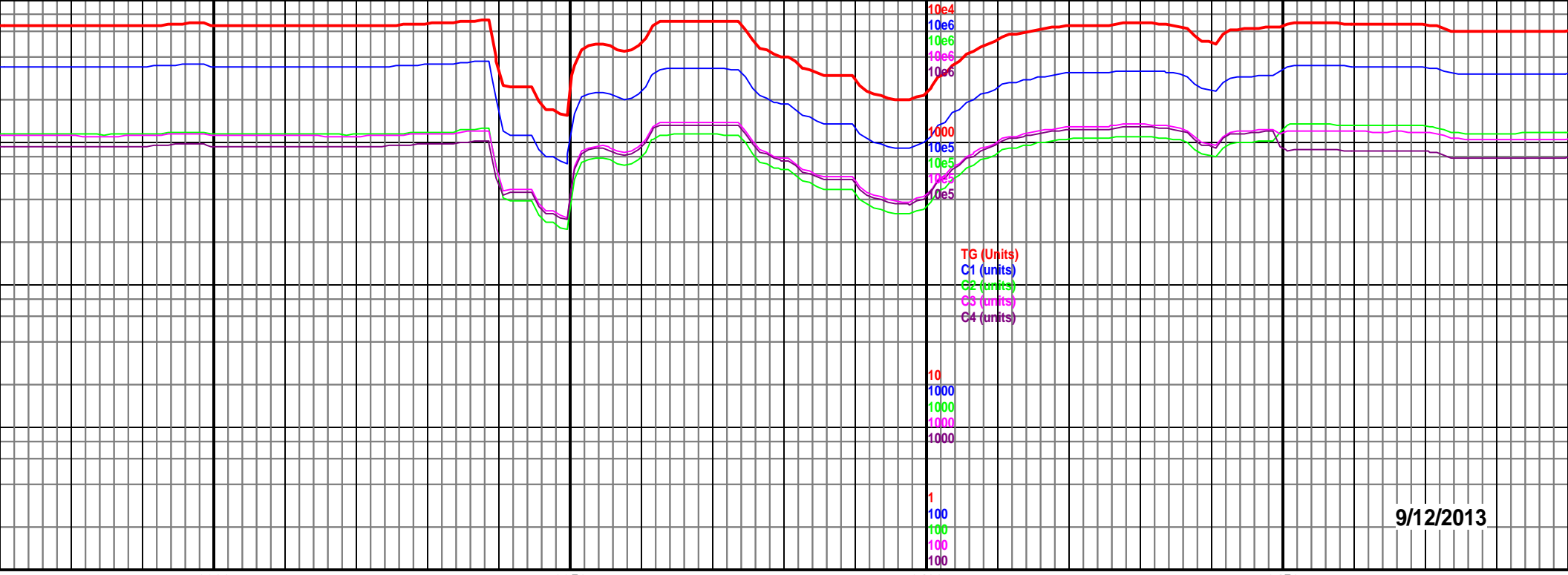


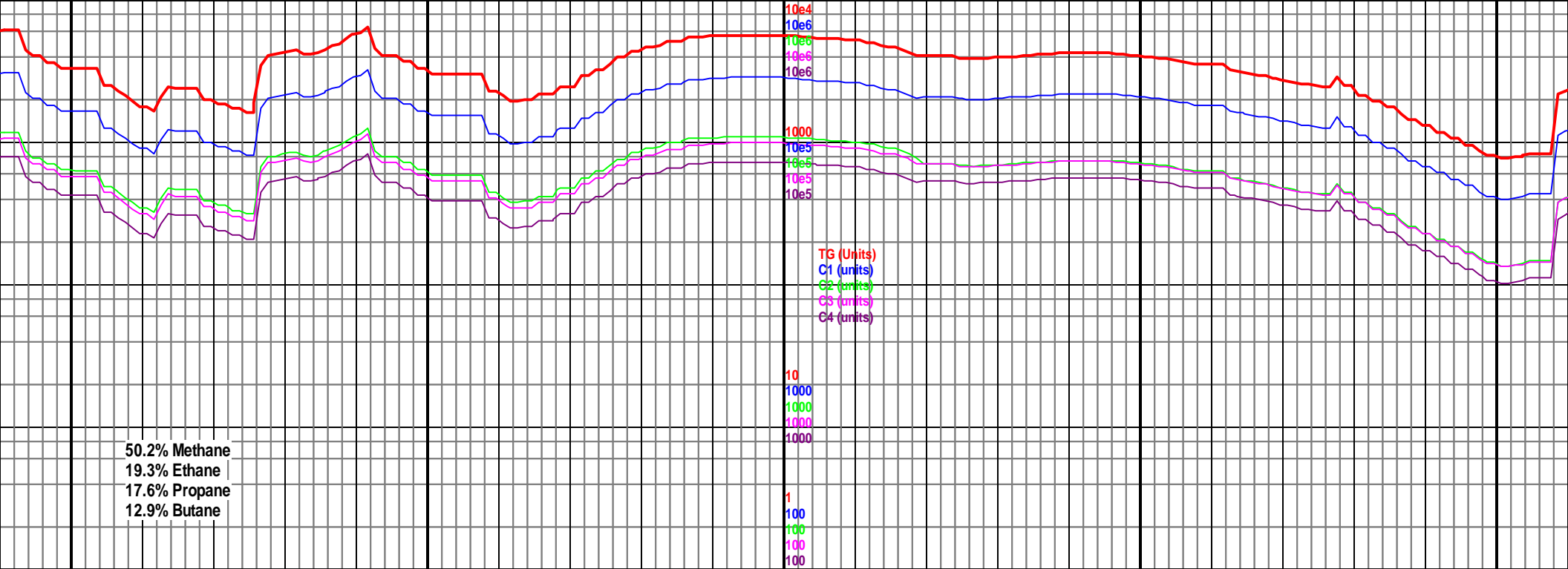


MD 8083 TVD 5707.13 INC 88.3 AZ 176.9 VS 2710.49	MD 8174 TVD 5710.15 INC 87.9 AZ 177.1 VS 2801.41	5000 TVD Sub Sea (-234)	MD 8174 TVD 5710.15 INC 87.9 AZ 177.1 VS 2801.41
--	--	----------------------------	--



gy-gy, blk-sb blk, t dk-gy-gy, blk-sb il flor, med slo yel mrlst	8100-8200 Chlk dk gy-gy, blk-sb blk, frm, banded, tr mrlst dk-gy-gy, blk-sb blk, frm, rr inoc, dull yel oil flor, med slo yel cut, 90% chlk, 10% mrlst	8200-8300 Chlk dk gy-gy, blk-sb blk, frm, banded, tr mrlst dk-gy-gy, blk-sb blk, frm, dull yel oil flor, med slo yel cut, 90% chlk, 10% mrlst
---	---	--





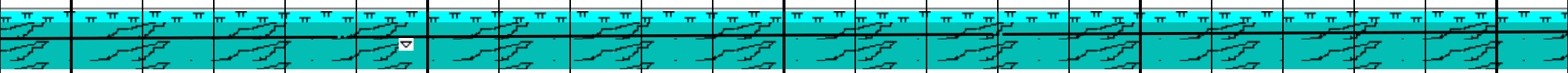
8500 8550 8600 8650 8700

MD 8538 TVD 5706.89  
INC 93.2 AZ 180.6  
VS 3164.65

5000 TVD  
Sub Sea (-234)

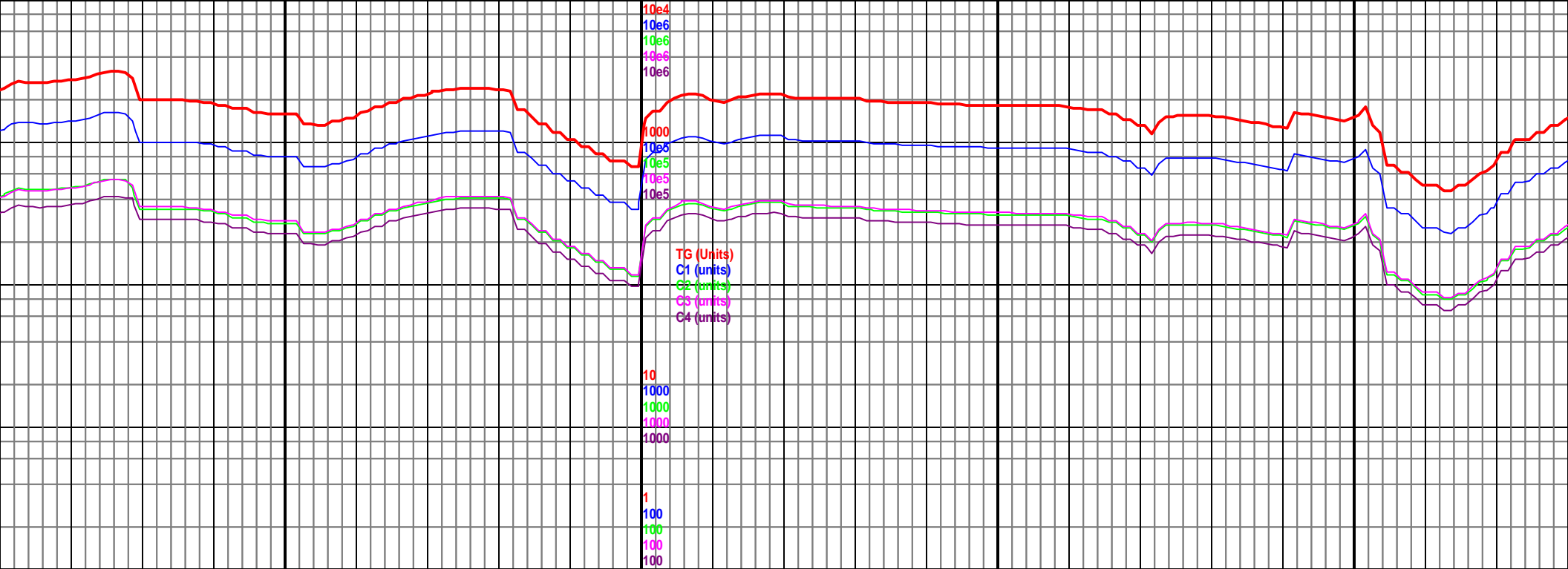
MD 8630 TVD 5701.28  
INC 93.8 AZ 180.3  
VS 3256.14

5550  
(-784)



8500-8600 Chlk dk gy-gy, blk-sb blk, frm, banded, tr mrlst dk-gy-gy, blk-sb blk, frm, rr inoc, dull yel oil flr, med slo yel cut, 90% chlk, 10% mrlst

8600-8700 Chlk dk gy-gy, blk-sb blk, frm, banded, tr mrlst dk-gy-gy, blk-sb blk, frm, dull yel oil flr, med slo yel cut, 95% chlk, 5% mrlst



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

10  
1000  
10000  
100000  
1000000  
10000000  
100000000  
1000000000

1  
100  
1000  
10000  
100000  
1000000  
10000000  
100000000

MD 8720 TVD 5696.33  
INC 92.5 AZ 182  
VS 3345.58

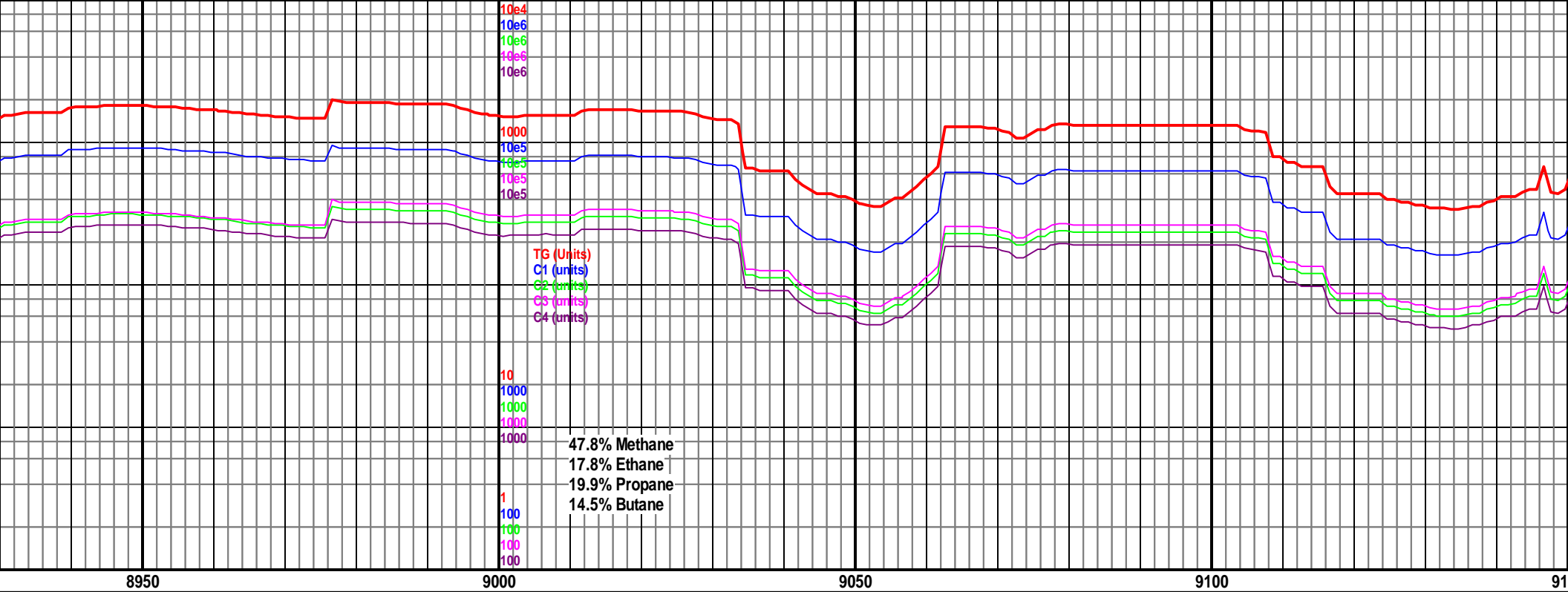
5000 TVD  
Sub Sea (-234)  
MD 8812 TVD 5694.32  
INC 90 AZ 182.6  
VS 3436.92

MD 8903 TVD 5695.67  
INC 88.3 AZ 183.1  
VS 3527.17

5550  
(-784)

8700-8800 Chlk dk gy-gy, blk-y-sb blk-y,  
frm, banded, dull yel oil flr, rr inoc, slo  
yel cut, 100% chlk

8800-8900 Chlk dk gy-gy, blk-y-sb blk-y,  
frm, banded, dull yel oil flr, slo yel  
cut, 100% chlk



MD 8994 TVD 5698.61  
INC 88 AZ 182.5(-234)  
VS 3617.4

MD 9085 TVD 5701.15  
INC 88.8 AZ 179.8  
VS 3707.93

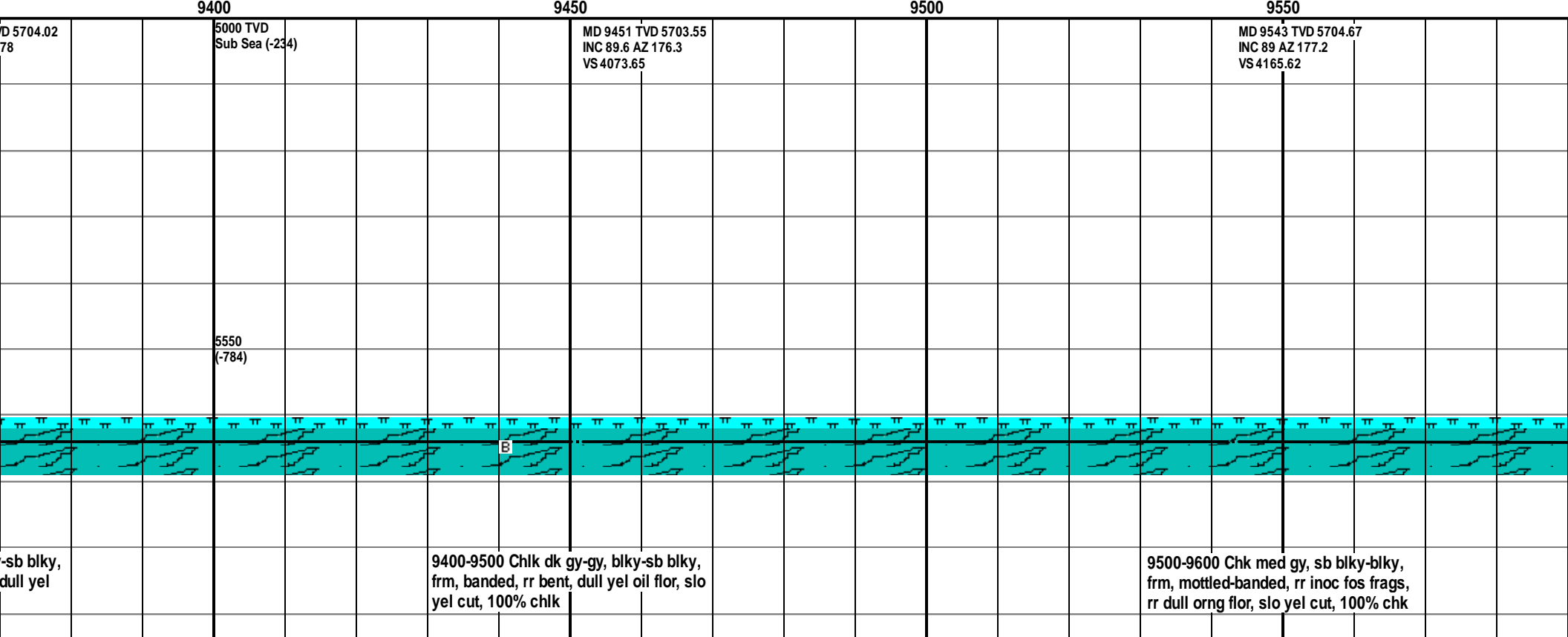
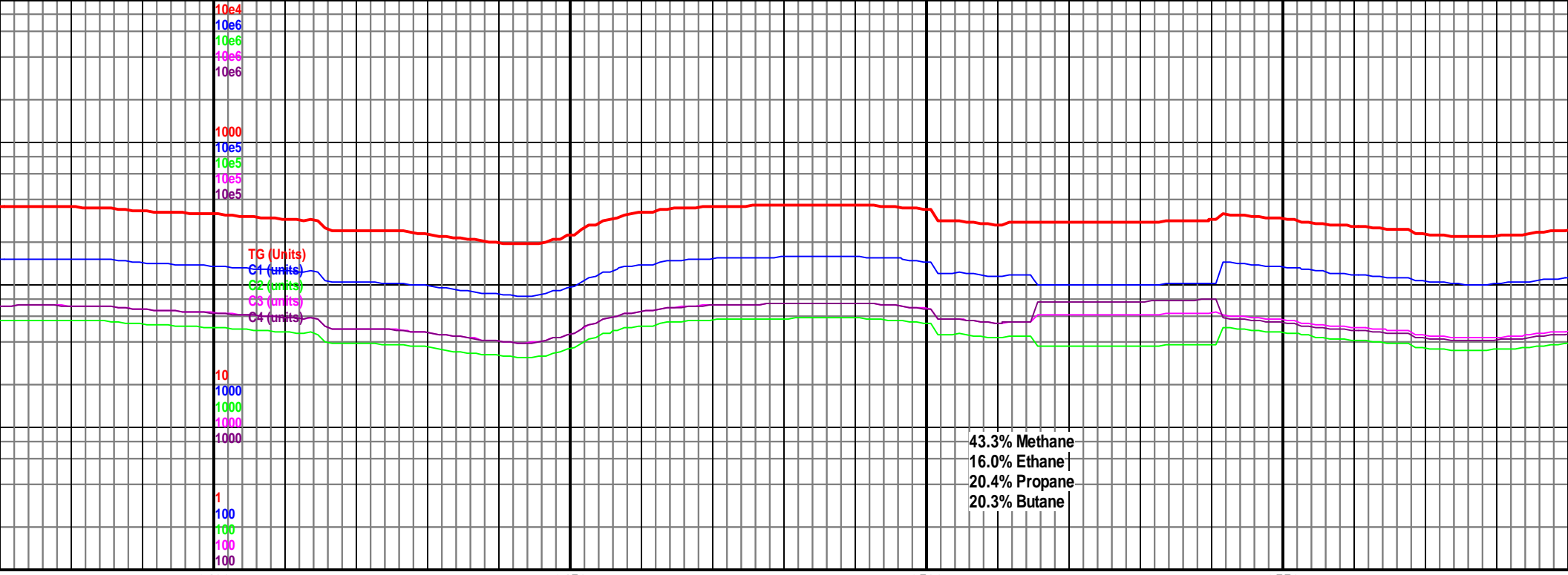
5550  
(-784)

8900-9000 Chlk dk gy-gy, blk-sb blk,  
frm, banded, tr mrlst dk-gy-gy, blk-sb  
blk, frm, rr inoc, dull yel oil flor, med  
slo yel cut, 95% chlk, 5% mrlst

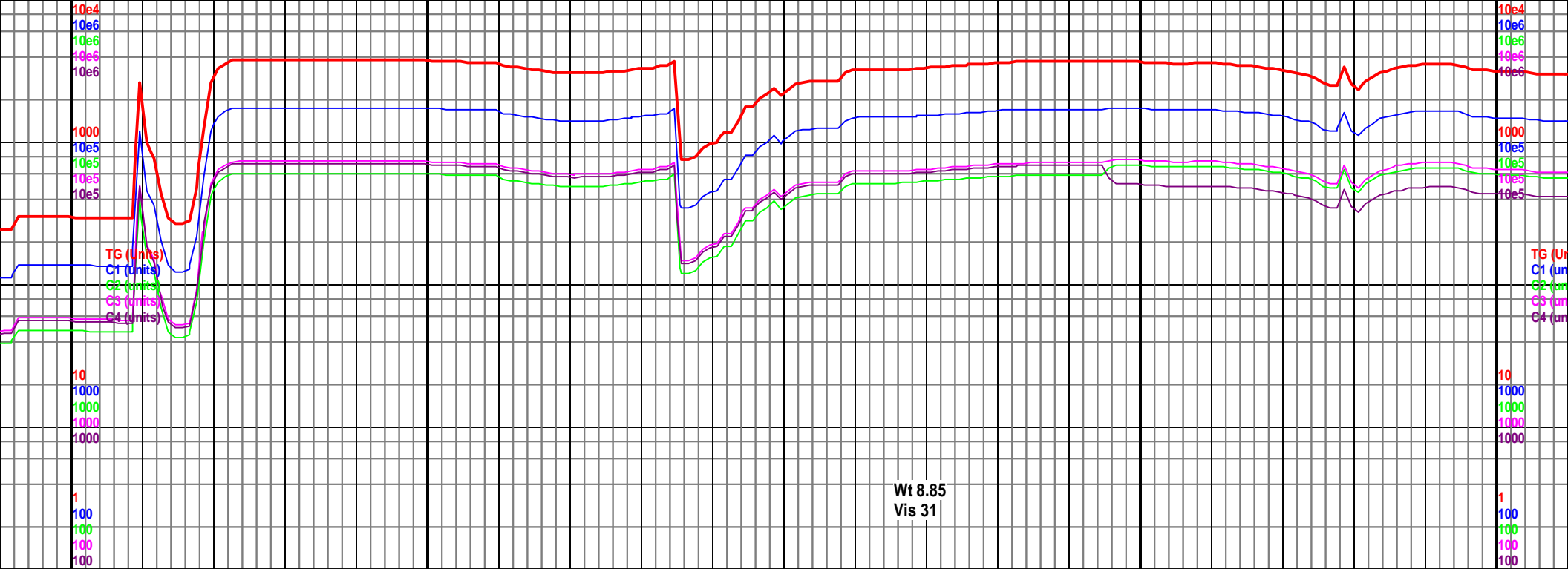
9000-9100 Chlk dk gy-gy, blk-sb blk,  
frm, banded, tr bent, dull yel oil flor, slo  
yel cut, 100% chlk

9100-9200 Chlk dk  
frm, banded, rr bent  
oil flor, slo yel cut,









9600 9650 9700 9750 9800

5000 TVD  
Sub Sea (-234)

MD 9635 TVD 5705.47  
INC 90 AZ 179.6  
VS 4257.5

MD 9727 TVD 5706.04  
INC 89.3 AZ 179.3  
VS 4349.28

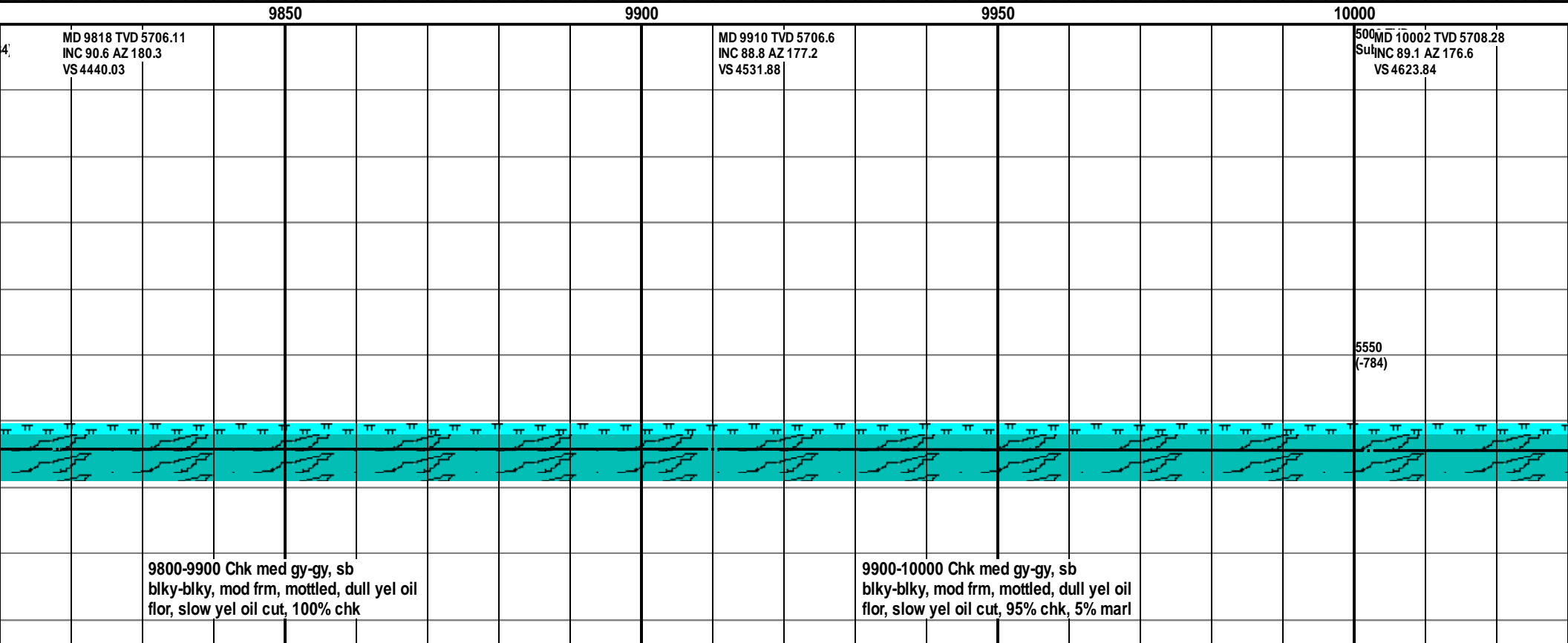
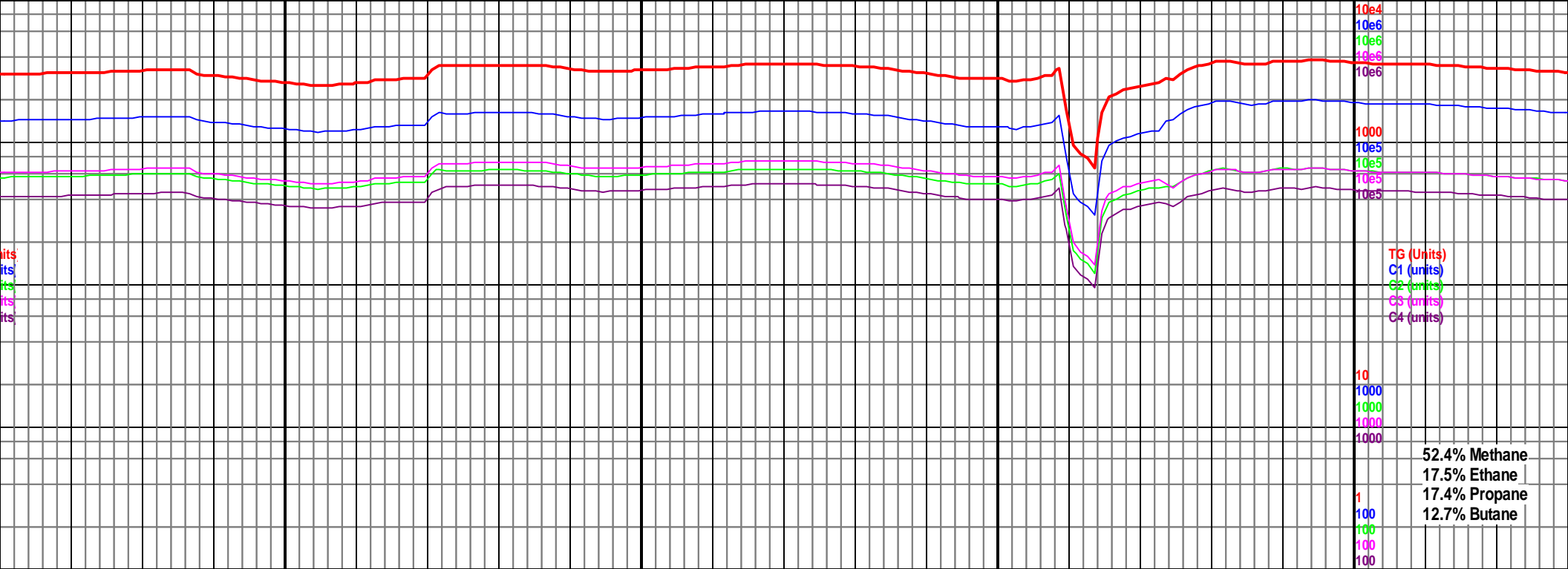
5000 TVD  
Sub Sea (-234)

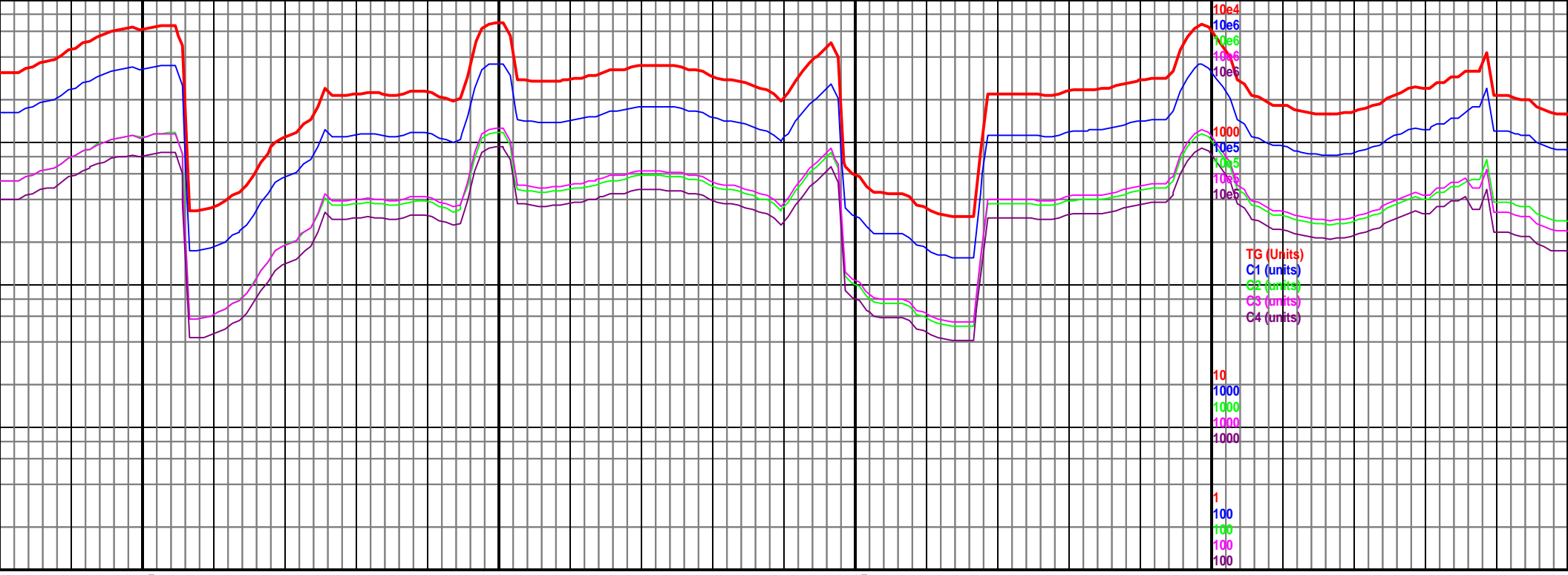
5550  
(-784)

5550  
(-784)

9600-9700 Chk med gy-gy, sb  
blky-blky, mod frm-frm, mottled, dull  
yel oil flor, fast streaming yel cut,  
100% chk

9700-9800 Chk med gy-gy, sb  
blky-blky, mod frm-frm, mottled, dull  
yel oil flor, fast streaming yel cut,  
100% chk, oil on shaker





10050

10100

10150

10200

10250

MD 10094 TVD 5708.92  
INC 90.1 AZ 177.3  
VS 4715.81

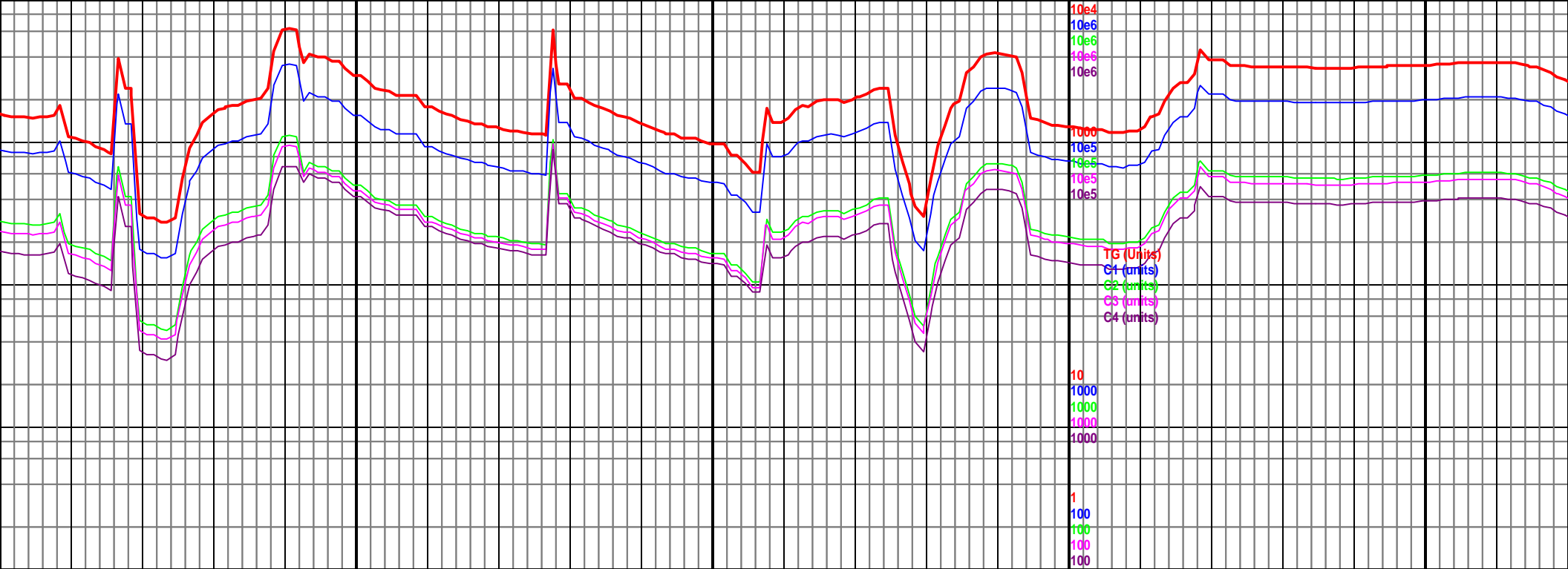
MD 10185 TVD 5707.65 TVD  
INC 91.5 AZ 180.2 Sub Sea (-234)  
VS 4806.65

5550  
(-784)

10000-10100 Chk lt gy-gy, sb blkly-blky,  
mod frm, mottled, dull yel oil flor, fast  
streaming oil cut, 95% chk, 5% marl

10100-10200 Chk lt gy-gy, sb blkly-blky,  
mod frm, mottled, occ marl dk gy, frm,  
sb blkly, rr bent, tr brit yel min flor, abnt  
dull yel oil flor, slow streaming oil cut,

10200-10250 Chk lt gy-gy, sb blkly-blky,  
mod frm, mottled, dull yel oil flor, fast  
streaming oil cut, 95% chk, 5% marl



10250 10300 10350 10400 10450

MD 10277 TVD 5705.41  
INC 91.3 AZ 180.9  
VS 4898.27

MD 10368 TVD 5704.29  
INC 90.1 AZ 180.9  
VS 4988.87

5000 TVD  
Sub Sea (-234)

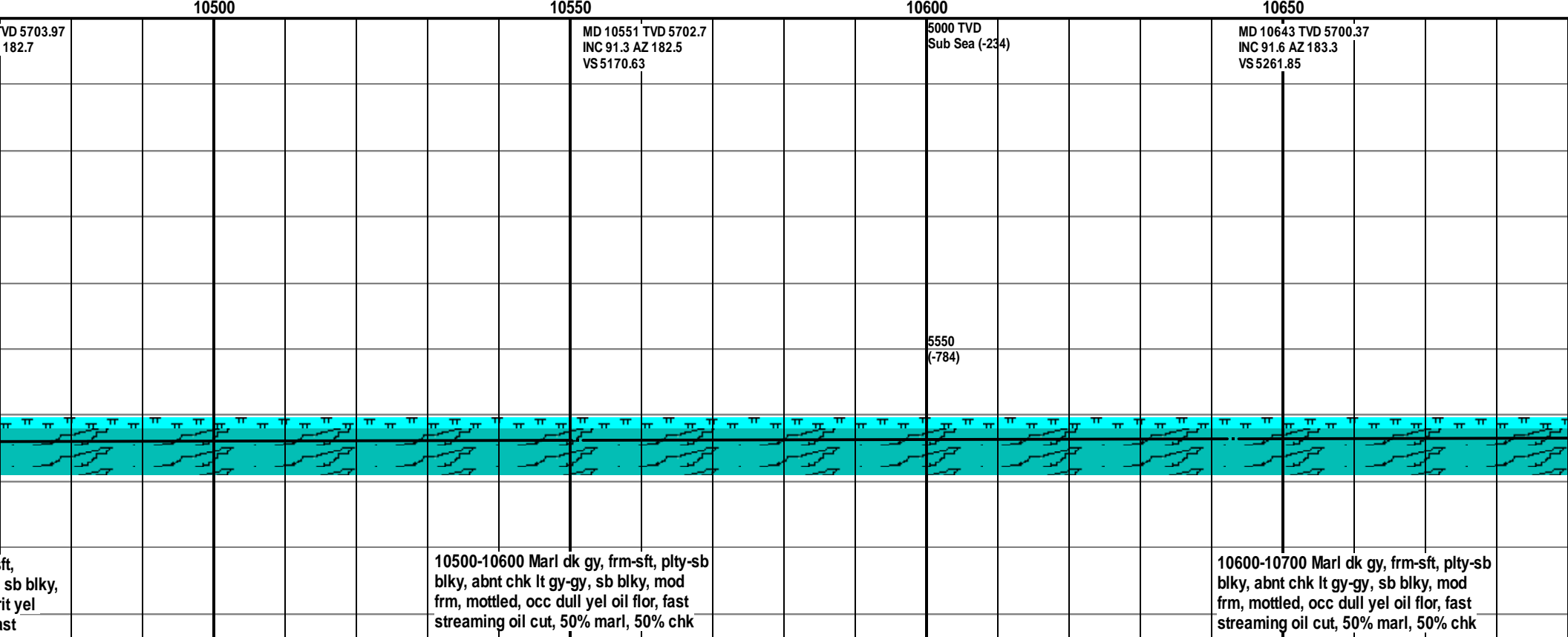
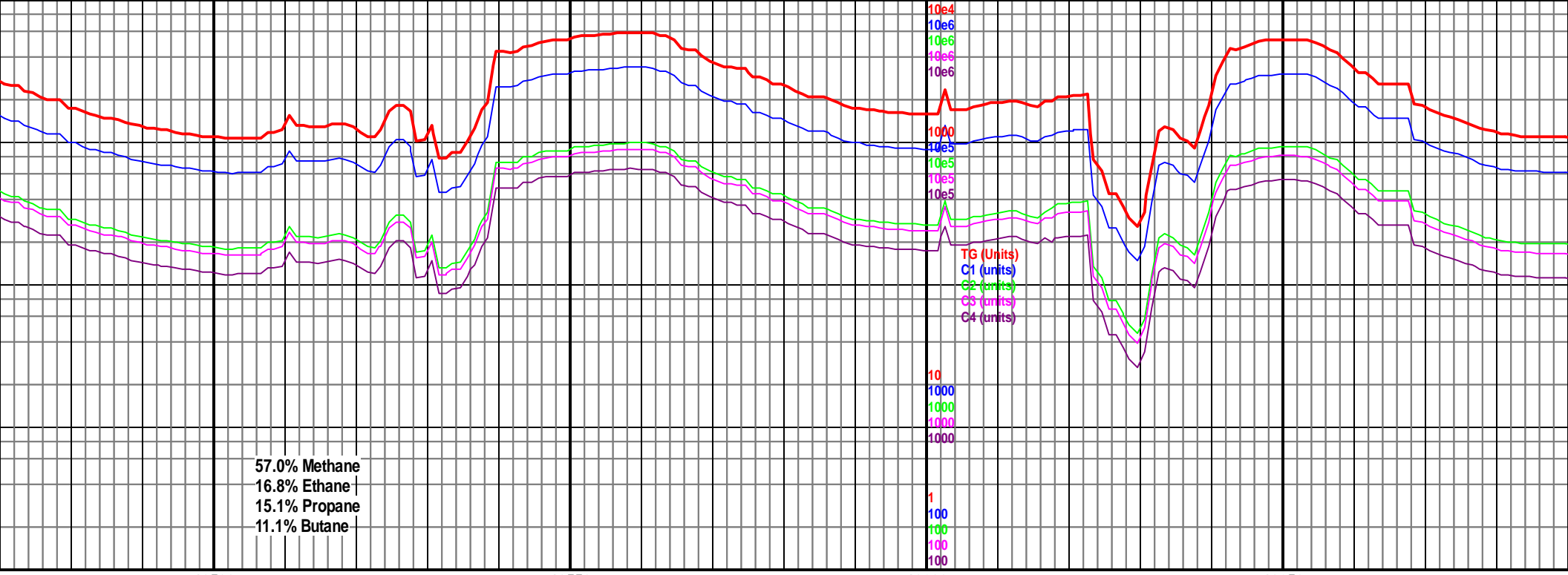
MD 10460 TVD 5704.29  
INC 90.3 AZ 180.9  
VS 5080.33

5550  
(-784)

300 Chk lt gy-gy, sb blkly-blky,  
mottled, occ marl dk gy, frm,  
r bent, tr brit yel min flor, abnt  
il flor, slow streaming oil cut,

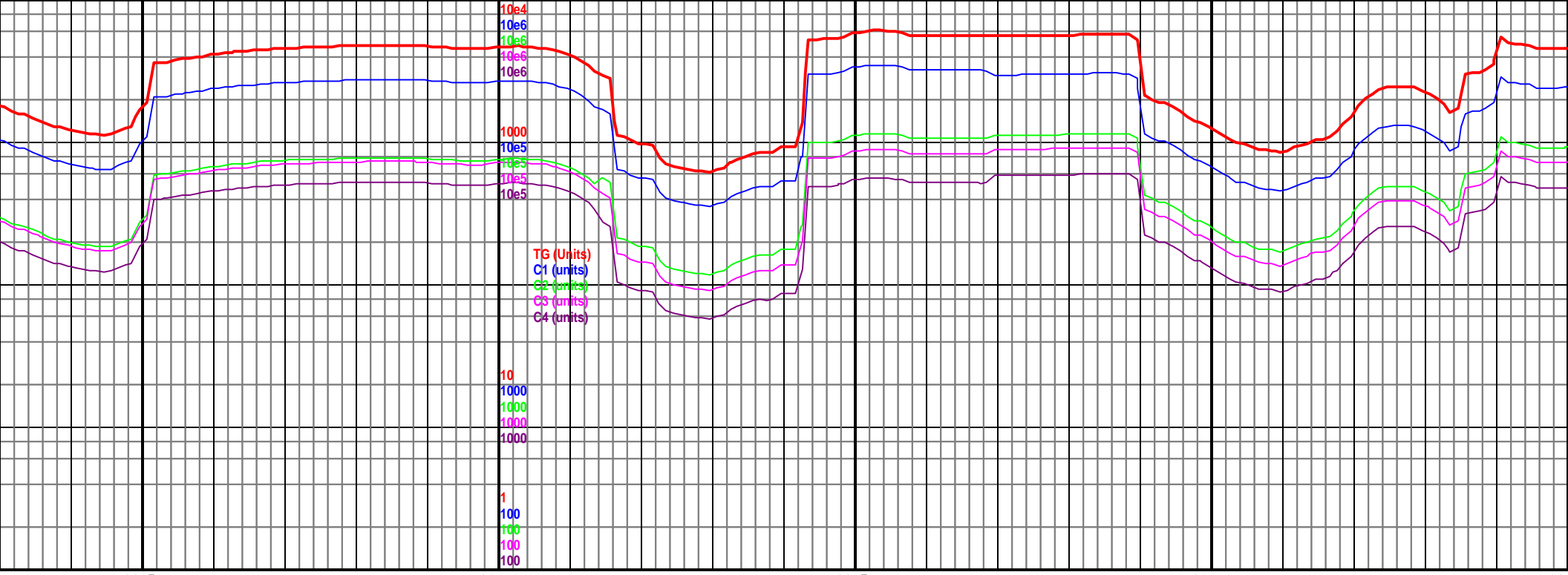
10300-10400 Marl dk gy, frm-sft, plty-sb  
blkly, abnt chk lt gy-gy, sb blkly, mod  
frm, mottled, rr bent, rr brit yel min flor,  
occ dull yel oil flor, slow streaming oil

10400-10500 Marl dk gy, frm-s  
plty-sb blkly, abnt chk lt gy-gy,  
mod frm, mottled, rr bent, rr br  
min flor, occ dull yel oil flor, fa









11150

11200

11250

11300

11350

MD 11192 TVD 5701.41  
INC 89.3 AZ 180.5 (-Z34)  
VS 5807.31

MD 11284 TVD 5703.58  
INC 88 AZ 177.6  
VS 5899.1

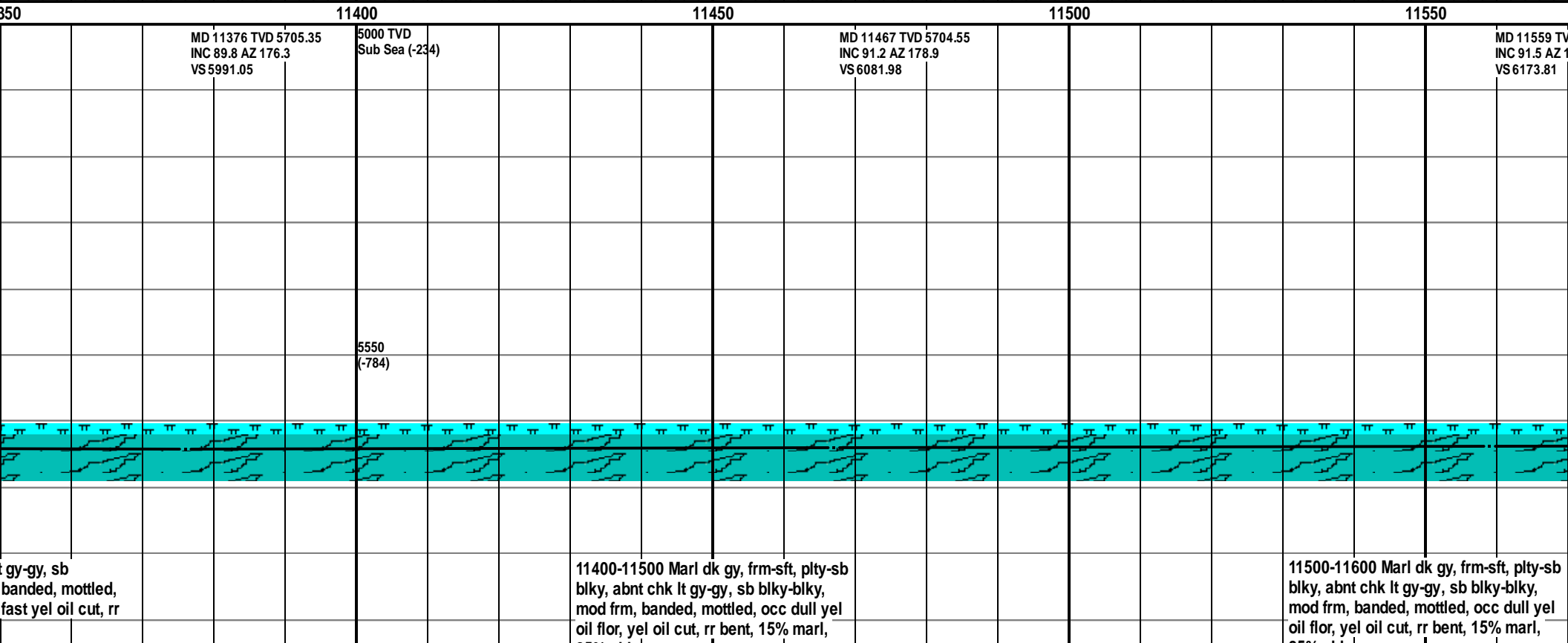
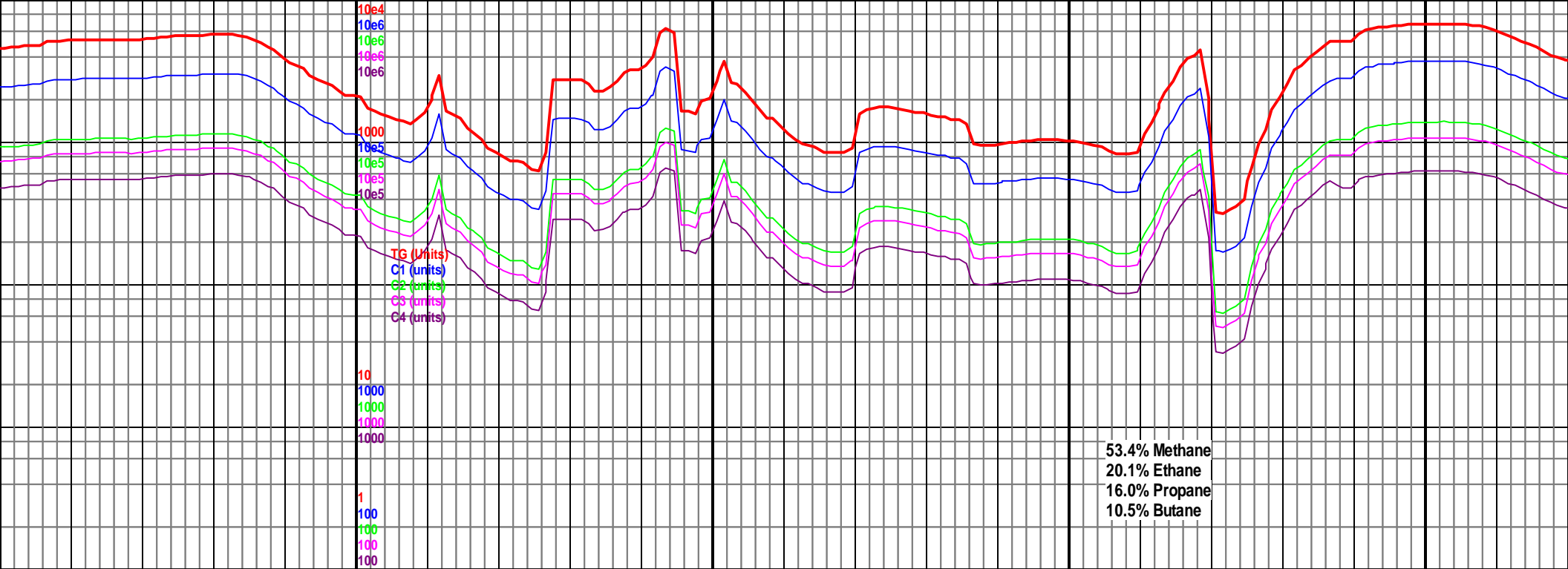
5550  
(-784)

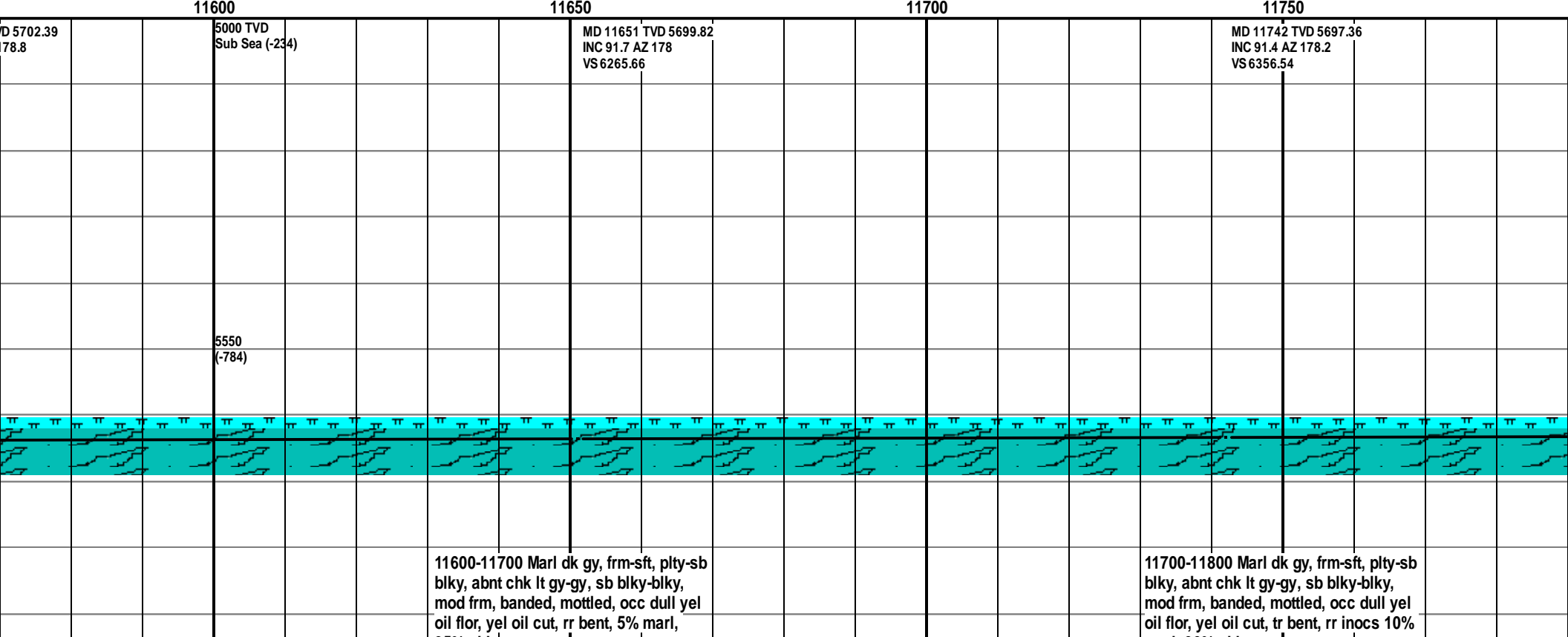
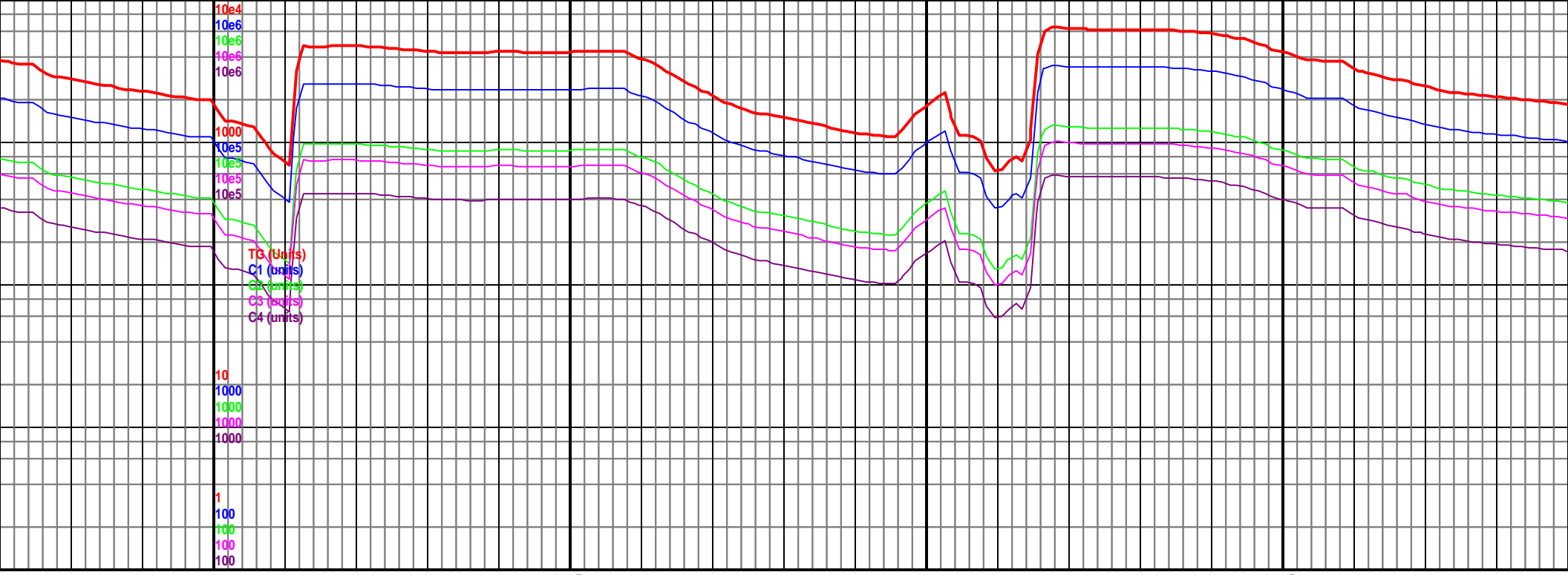
11100-11200 Chlk lt gy-gy, sb  
blky-blky, mod frm, banded, mottled,  
occ dull yel oil flr, yel oil cut, tr bent,  
100% chlk

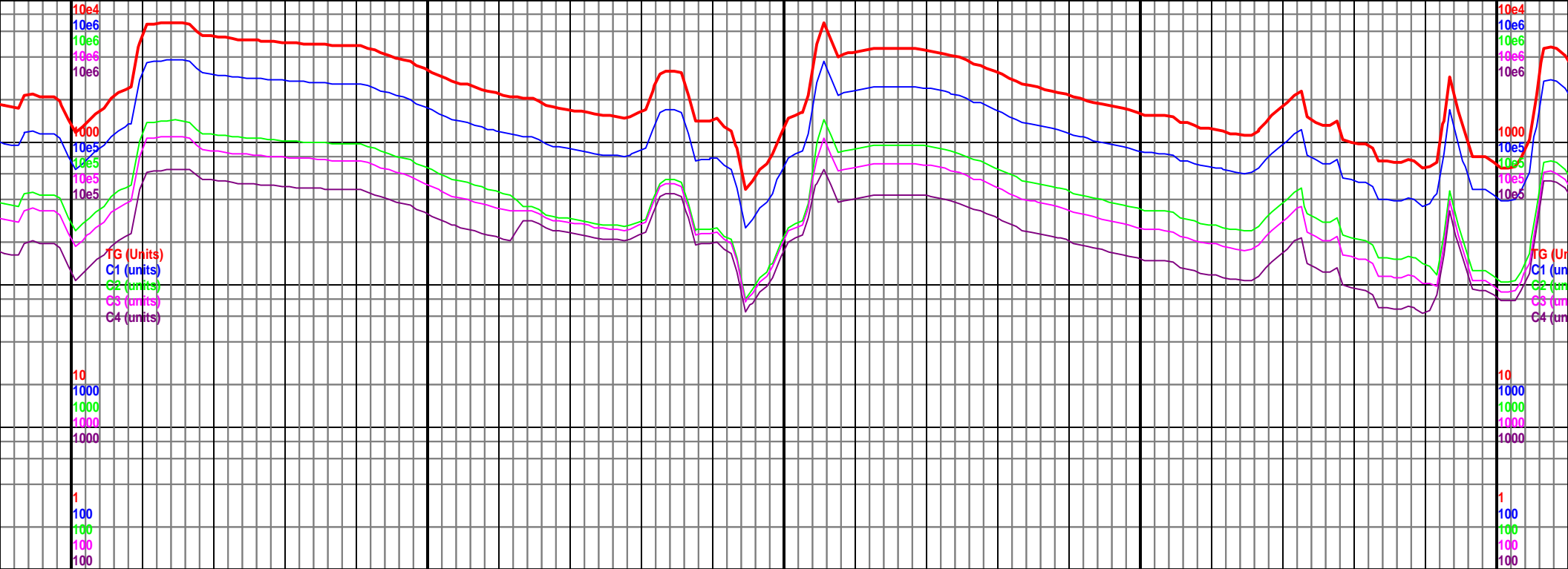
11200-11300 Chlk lt gy-gy, sb  
blky-blky, mod frm, banded, mottled,  
occ dull yel oil flr, yel oil cut, rr bent,  
100% chlk

11300-11400 Chlk lt gy-gy, sb  
blky-blky, mod frm, banded, mottled,  
occ dull yel oil flr, yel oil cut, rr bent,  
100% chlk





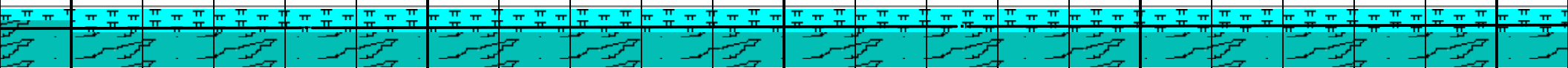




11800 11850 11900 11950 12000

5000 TVD Sub Sea (-234)	MD 11833 TVD 5694.82 INC 91.8 AZ 177.5 VS 6447.43	MD 11925 TVD 5691.93 INC 91.8 AZ 177.4 VS 6539.34	5000 TVD Sub Sea (-234)
----------------------------	---	---	----------------------------

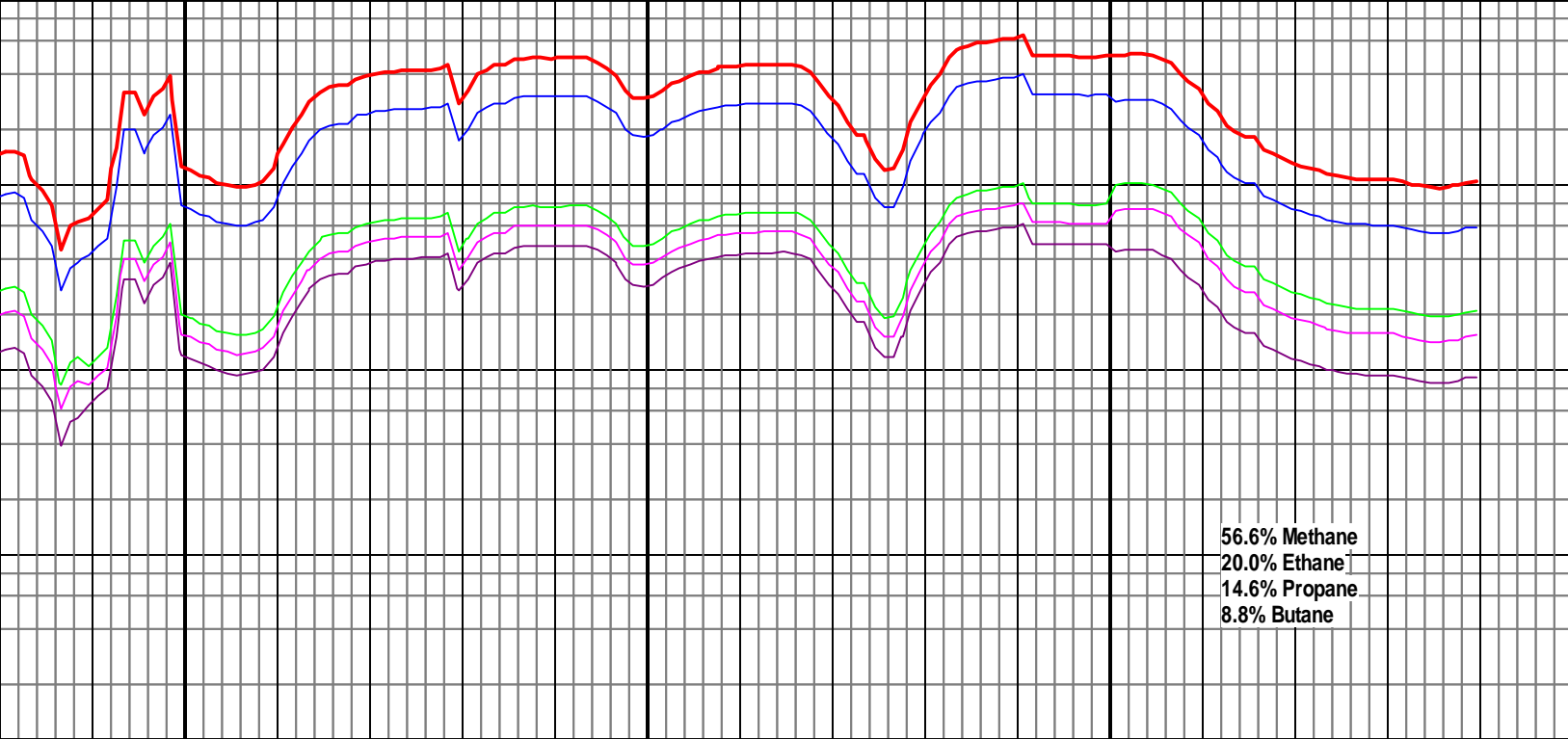
5550 (-784)			5550 (-784)
----------------	--	--	----------------



11800-11900 Marl dk gy, sft frm, plty-sb  
blky, abnt chk lt gy-gy, sft, sb blky,  
mottled, tr inoc frags, tr bent, occ brit  
yel min flor, fast streaming oil cut, 50%

11900-12000 Marl dk gy, sft frm, plty-sb  
blky, abnt chk lt gy-gy, sft, sb blky,  
mottled, tr inoc frags, tr bent, occ brit  
yel min flor, slow oil cut, 50% marl,





56.6% Methane  
20.0% Ethane  
14.6% Propane  
8.8% Butane

12250

12300

12350

12390

MD 12290 TVD 5690.9  
INC 89.1 AZ 179.4  
VS 6904.09

MD 12340 TVD 5691.81  
INC 88.8 AZ 179.2  
VS 6953.97

MD 12390 TVD 5691.81  
INC 88.8 AZ 179.2  
VS 7003.95

12390' TD reached at 16:00  
on 9/13/2013



12200-12300 Marl dk gy, sft-sl frm, sb blk, tr chk lt gy-gy, sft, sb blk, rr pyr, tr bent, occ brit yel min flr, slow oil cut, 80% marl, 20% chk

12300-12390 Mrlst med-dk gy, frm, sb blk, sb blk, g tr med gy chk, sft-frm, sb blk, tr bent, occ inoc frags, slow oil cut, 80% mrlst, 20% chk