



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

Well Name: Wildhorse 16-13L
Location: 16-T9N-R59W Weld County, Colorado
License Number: 05-123-37374
Spud Date: 5/31/2013
Surface Coordinates: Lat.: 40.748569 Long.: -103.990381
Bottom Hole Coordinates: Lat.: 40.748569 Long.: -103.990381
Ground Elevation (ft): 5055 **K.B. Elevation (ft):** 5073
Logged Interval (ft): 1644 **To:** 10060 **Total Depth (ft):** 10060
Formation: Pierre, Hygiene, Niobrara, Bridge Creek, Entrada, Lyons and Cherokee
Type of Drilling Fluid: Water Based Mud
Region: Redtail
Drilling Completed: 7/1/2013
Printed by WellSight Log Manager from WellSight Systems 1-800-447-1534 www.WellSight.com

OPERATOR

Company: Whiting Oil & Gas Corporation
Address: 1700 Broadway Suite 2300
Denver, CO 80290
303-837-1661

GEOLOGIST

Name: Todd Nakata, Craig Dreiling, and Brian Reddick
Company: Acme Geologic Consulting
Address: 108 Berry Street
Little Rock, AR 72205
www.acmegeo.com

Drilling Company

CADE Drilling rig #21

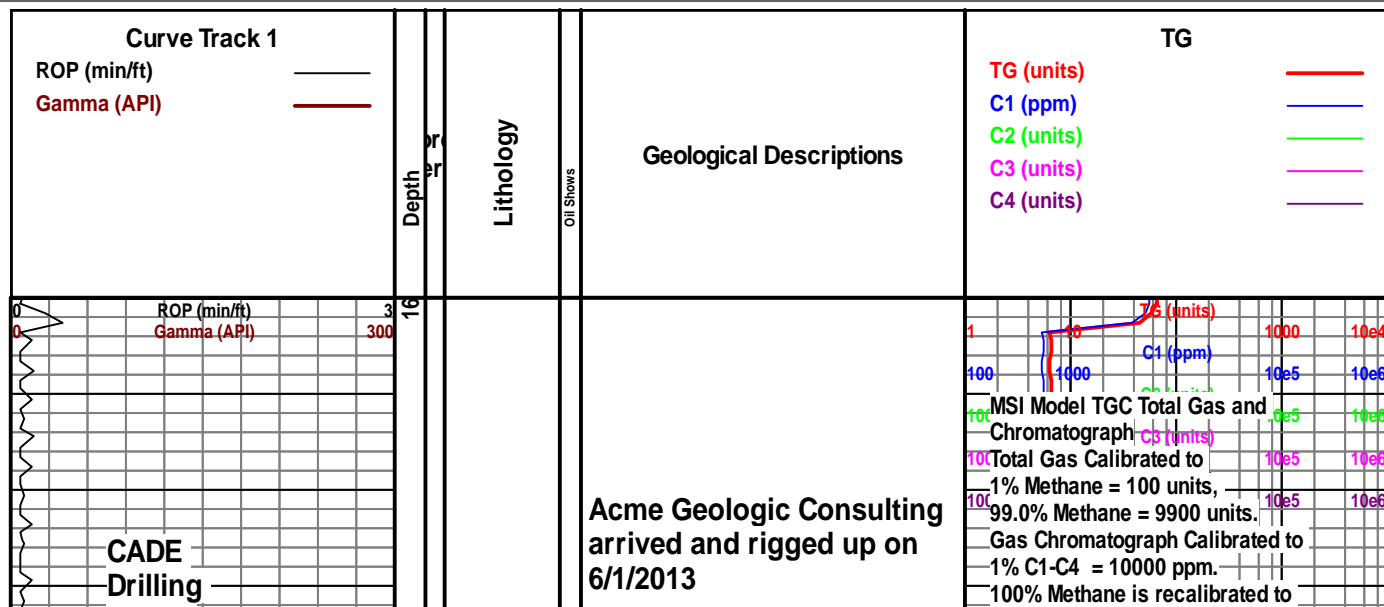
Comments

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.

	Anhy		Congl		Mrlst		Ss
	Bent		Dol		Salt		Till
	Brec		Gyp		Shale		Cyan mrlst
	Cht		Igne		Shcol		Cyan chk
	Clyst		Lmst		Shgy		Grnt wsh
	Coal		Meta		Sltst		

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

POROSITY TYPE	SORTING	OIL SHOWS	Cv-v
Earthy	Well	Good	Cv-c
Fenest	Moderate	Fair	Conductor
Fracture	Poor	Poor	
Inter		Dead	EVENTS
Moldic	ROUNDING		Rft
Organic	Rounded	INTERVALS	Sidewall
Pinpoint	Subrnd	Core	Srfcsg
Vuggy	Subang	Dst	
	Angular	Srfcsg	



Rig#21

1650

1700

1750

1800

1850

Survey 1702'
Inc 2.3
Azm 351.9

ROP (min/ft) 3
Gamma (API) 300

Pierre 1825'

1650-1700 Slst gy-lt brn, sb blk, sft, non calc, grdg to ss, rr Sh lt brn, blk, sft, non calc, nsfoc 95% slst 5% sh

1700-1800 Slst gy-lt gy, s&p ip, sb blk, sft, sl calc, nsfoc 100% slst

1800-1900 Slst gy-lt brn, sb blk, sft, sl calc, rr Sh lt brn, blk, sft, non calc,

85% for visual purpose.

1657'

1689'

1721'

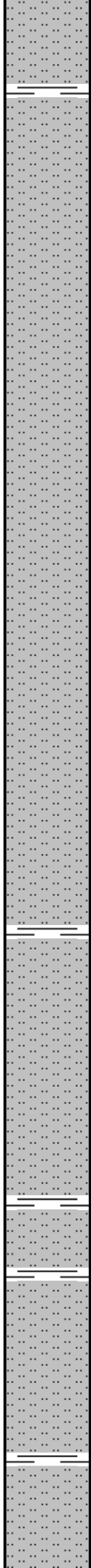
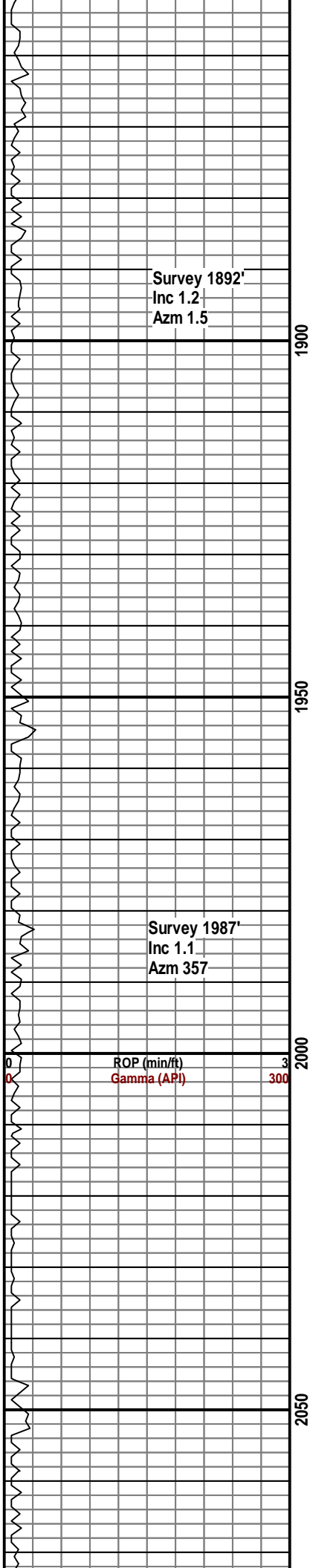
1753'

1785'

1816'

1847'

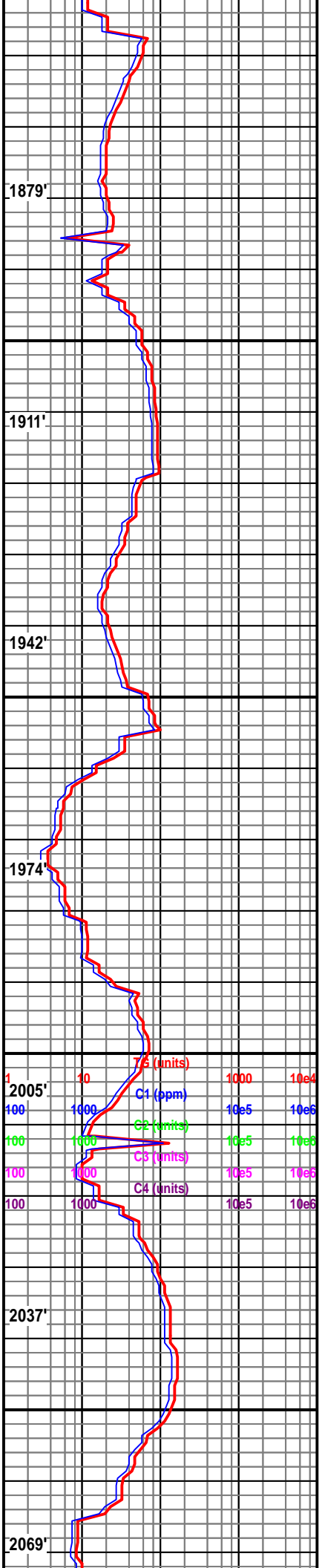
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100	C1 (ppm)	10e5	10e6
100	C2 (units)	10e5	10e6
100	C3 (units)	10e5	10e6
100	C4 (units)	10e5	10e6

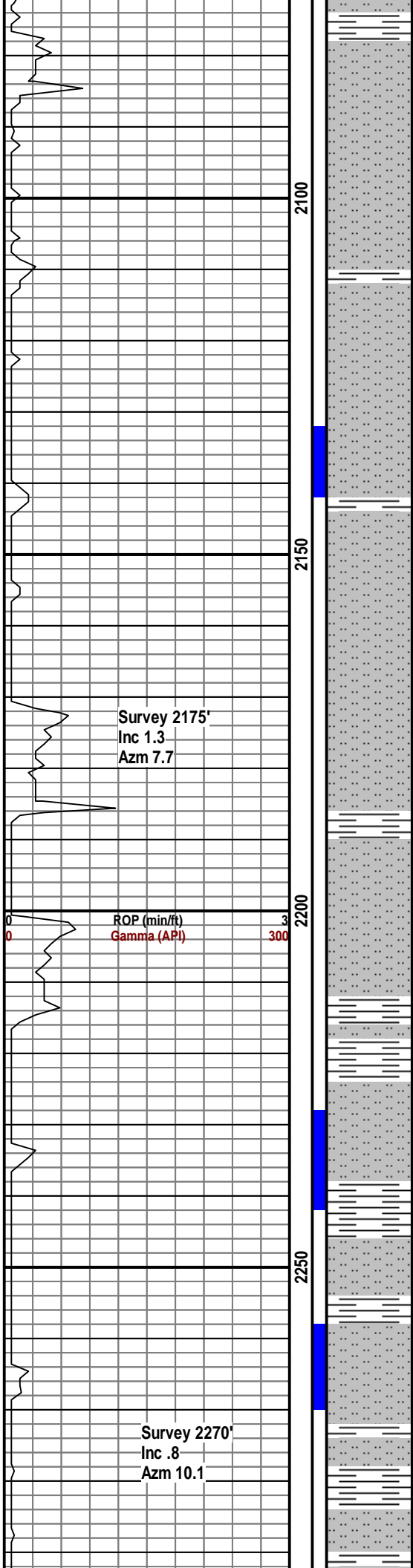


nsfoc 95% sltst 5% sh

1900-2000 Sltst gy, sb blk, sft, sl calc,
nsfoc 100%sltst

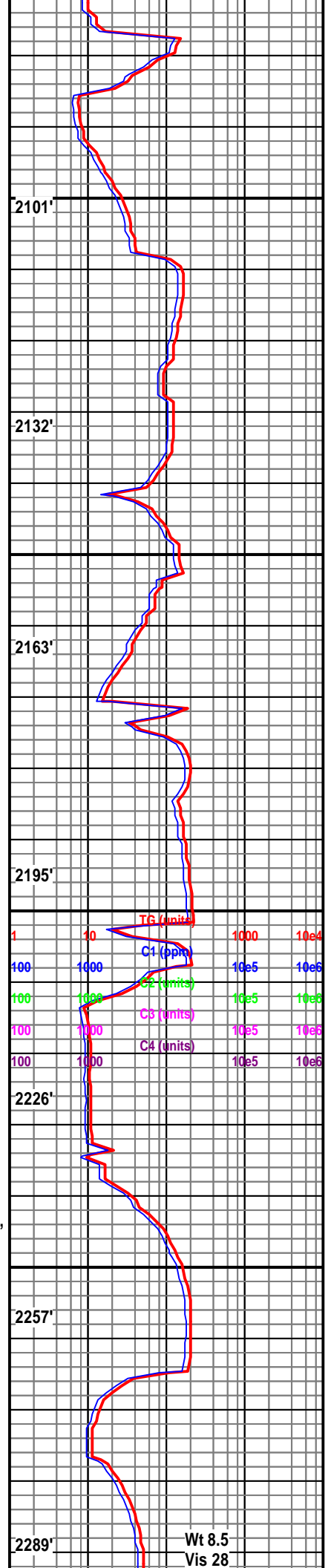
2000-2100 Sltst gy-dk gy, sb blk, sft,
arg, sl calc, rr Sh dk gy, sb blk, sft,
non calc, grdg to sltst ip, nsfoc 90%
sltst 10% sh



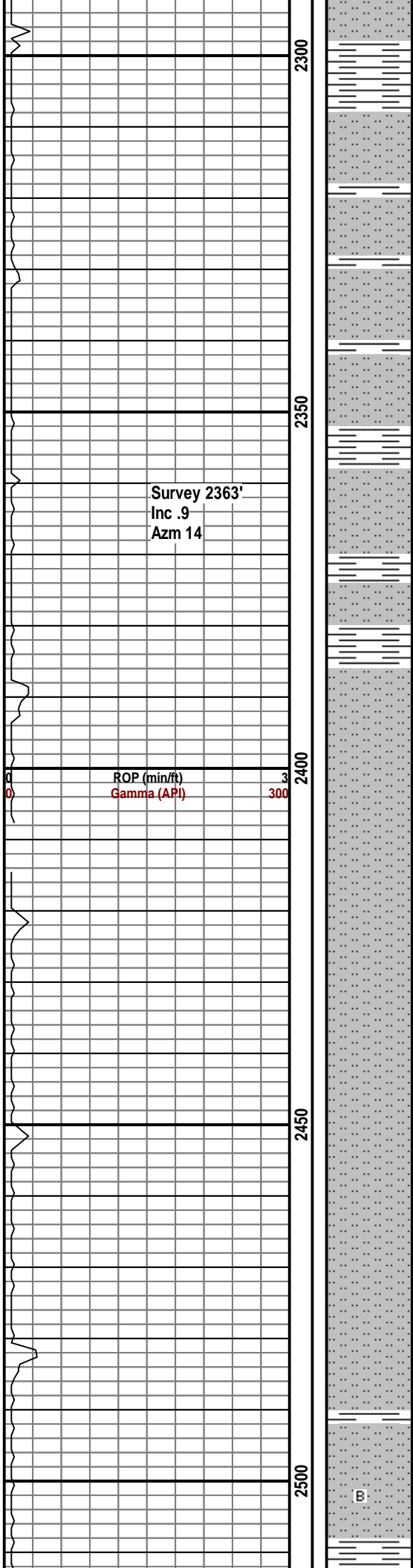


2100-2200 Slstst gy-dk gy, sb blk, sft, arg, sl calc, rr Sh dk gy, sb blk, sft, non calc, grdg to slstst ip, nsfoc 90% slstst 10% sh

2200-2300 Slstst lt gy-dk gy, sb blk, sft, arg, sl calc, abnt Sh dk gy-gy, sb blk, sft, non calc, nsfoc 50% slstst 50% sh

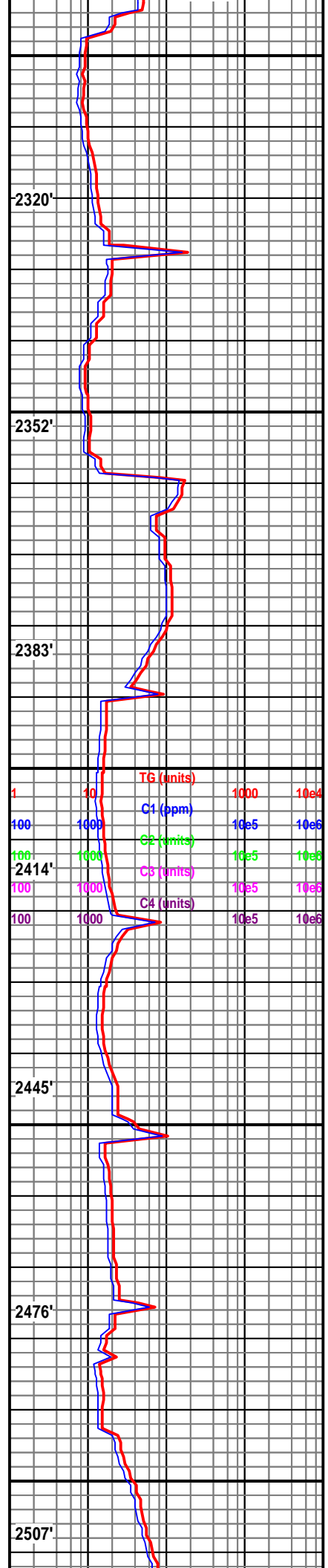


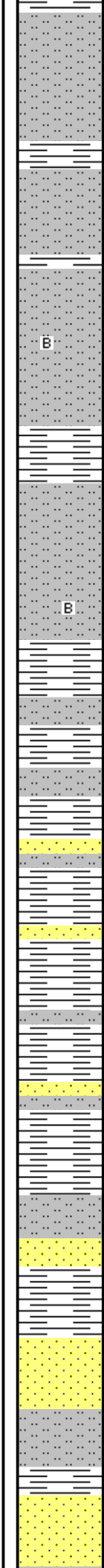
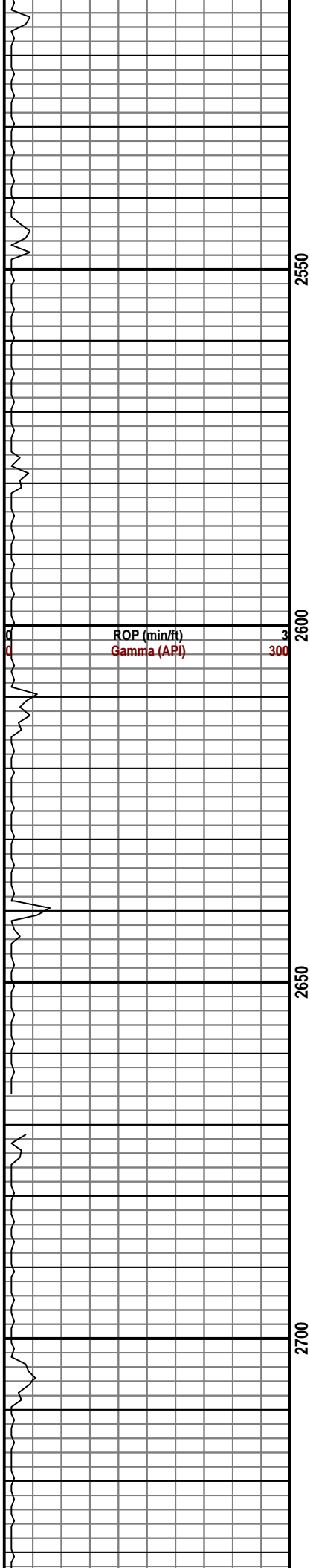
Wt 8.5
Vis 28



2300-2400 Sltst lt gy-dk gy, s&p, sb
blky, sft, arg, sl calc, abnt Sh dk gy-lt
gy, sb blky, sft, non calc, nsfoc 50%
sltst 50% sh

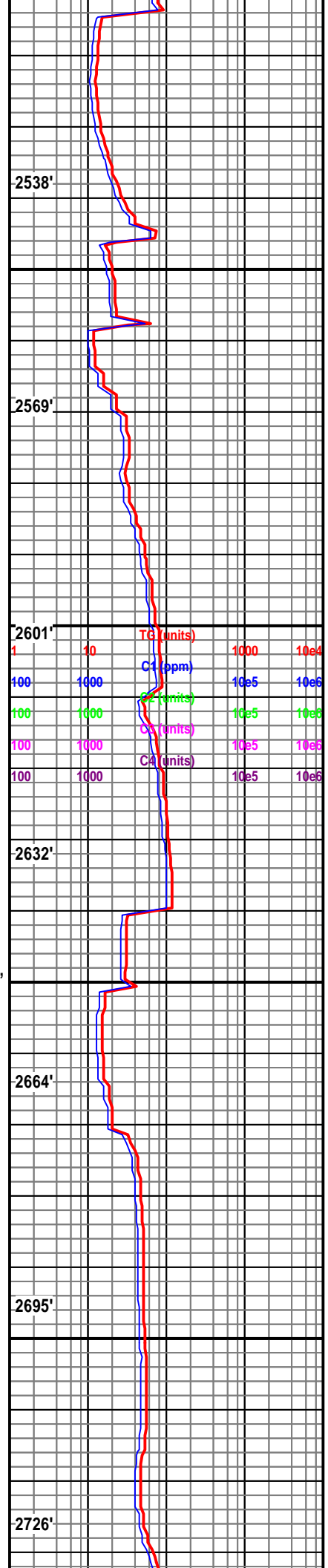
2400-2500 Sltst dk gy-gy, sb blky, sft,
arg, sl calc, nsfoc 100%sltst

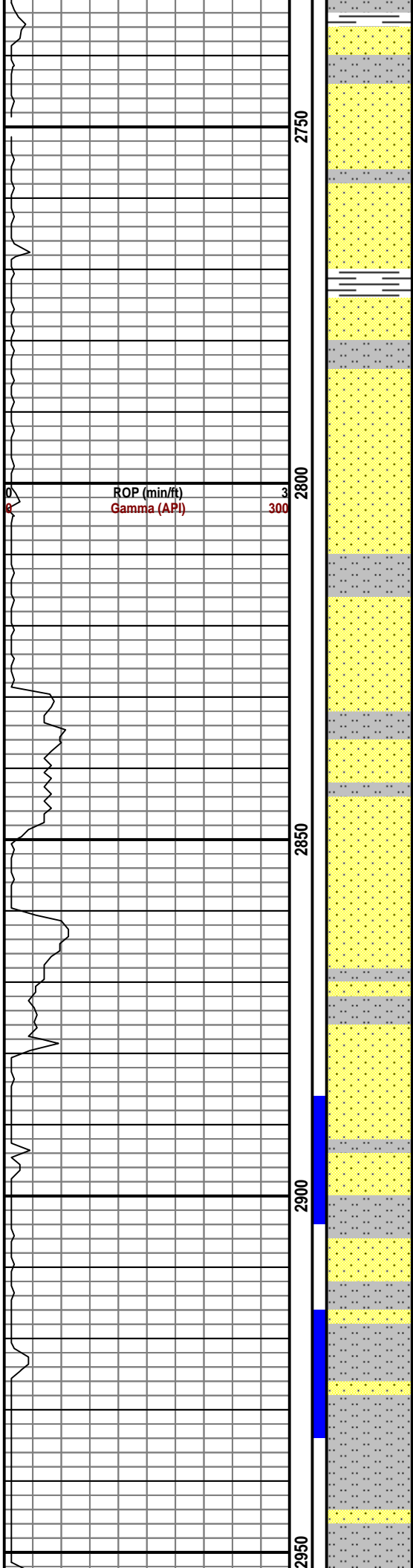




2500-2600 Siltst lt gy-dk gy, s&p, sb
blky, sft, arg, sl calc, occ Sh dk gy-lt
gy, lt brn ip, sb blky, sft, non calc, rr
bent, nsfoc 60% siltst 40% sh

2600-2700 Sh dk gy-lt gy, lt brn ip, sb
blky, sft, non calc, occ Siltst lt gy-dk gy,
s&p, sb blky, sft, arg, sl calc, rr Ss
s&p, sb rd, fri, nsfoc 50% sh 40% siltst
10% Ss

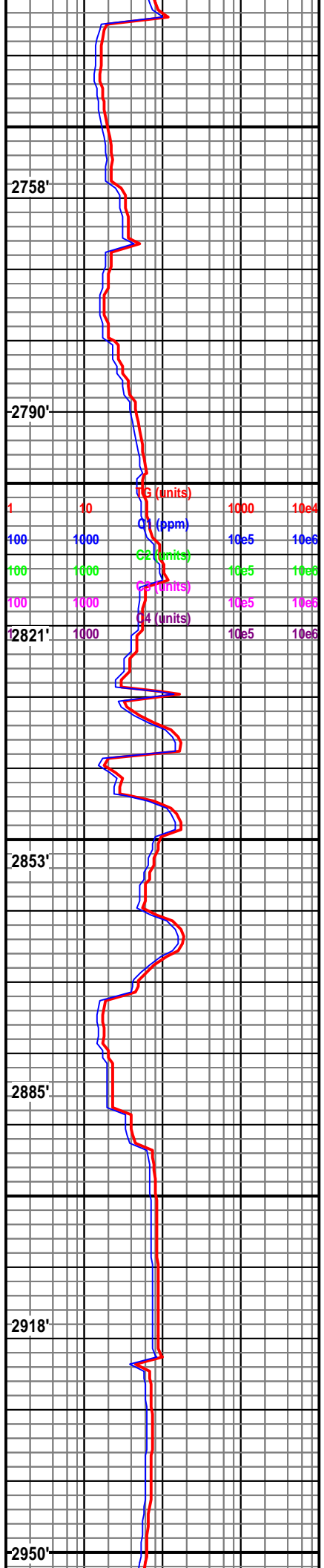


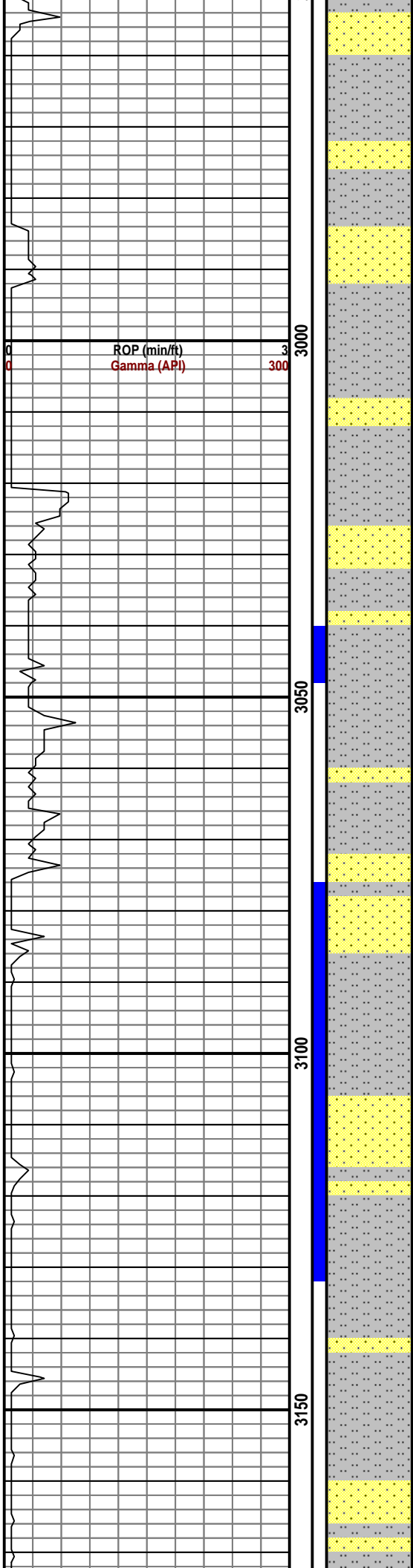


2700-2800 Ss wht-gy, s&p, sb rd, fri-mod frm, sl calc, occ Sltst gy-lt gy, sb blk, fri, sl calc, arg, rr Sh dk gy, sb pty, nsfoc 60% ss 30% sltst 10% sh

2800-2900 Ss wht-gy, s&p, sb rd, fri-mod frm, sl calc, tr Sltst gy-lt gy, sb blk, fri, sl calc, arg, grdg to Ss, nsfoc 70% ss 30% sltst

2900-3000 Sltst lt gy-dk gy, sb blk-sb pty, sft, arg, sl calc, occ Ss wht, s&p, nsfoc 60% ss 30% sltst 10% sh

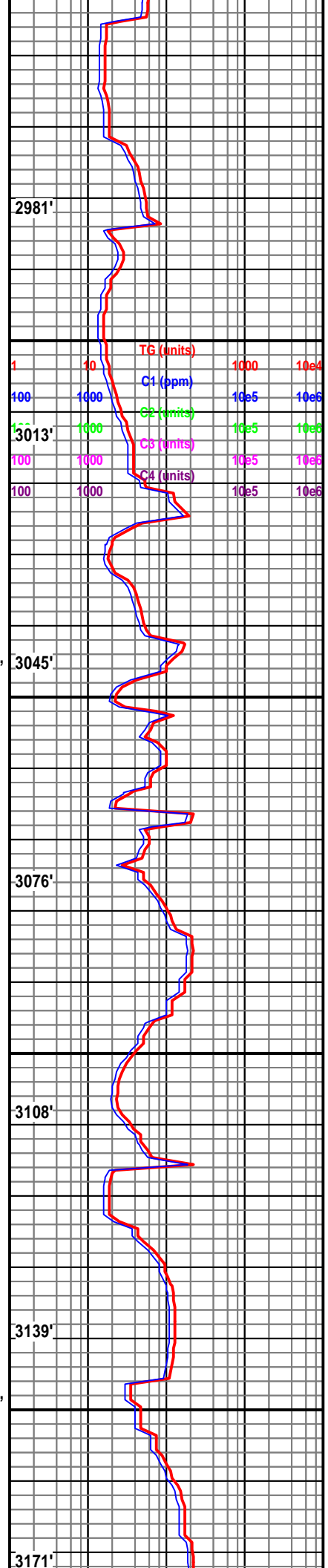


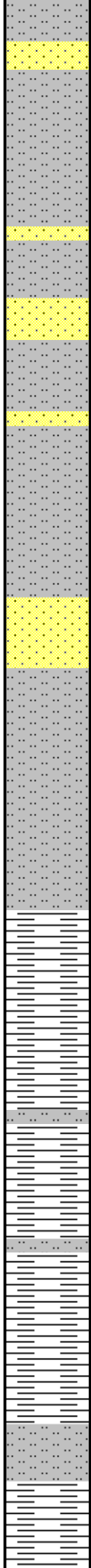
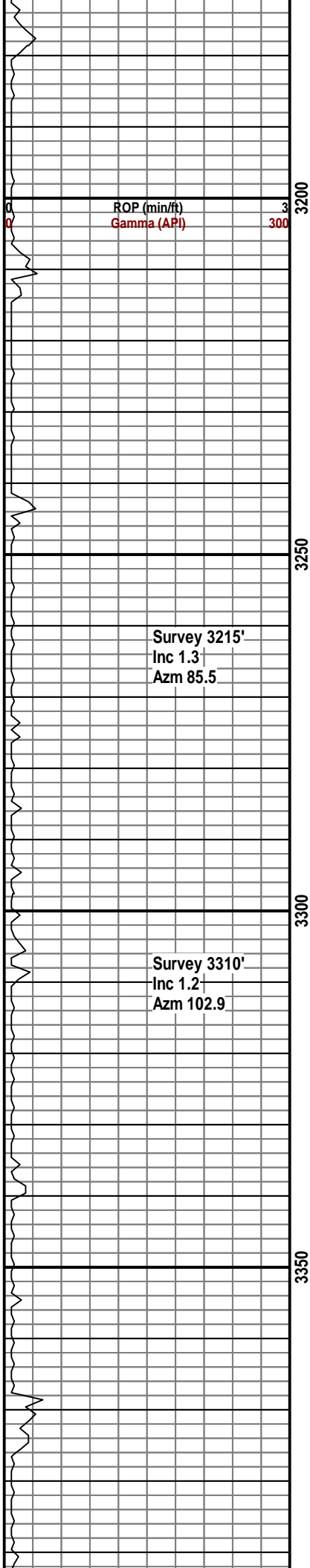


sb rd, fri-mod frm, sl calc, nsfoc 60%
sltst 40% Ss

3000-3100 Sltst lt gy-dk gy, sb blk, sft,
arg, sl calc, occ Ss wht, s&p, sb rd,
fri-mod frm, sl calc, nsfoc 60% sltst
40% Ss

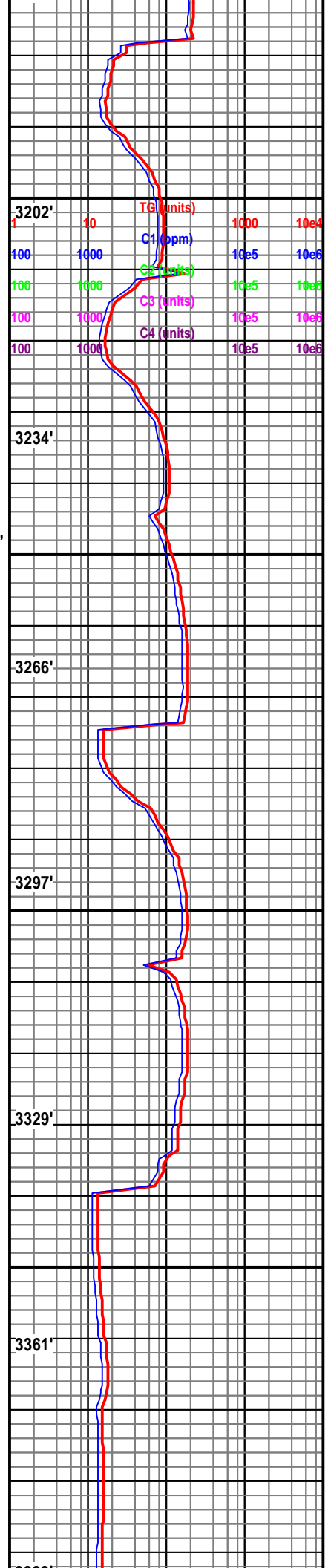
3100-3200 Sltst lt gy-dk gy, sb blk, sft,
arg, sl calc, occ Ss wht, s&p, sb rd,
fri-mod frm, sl calc, nsfoc 60% sltst
40% Ss

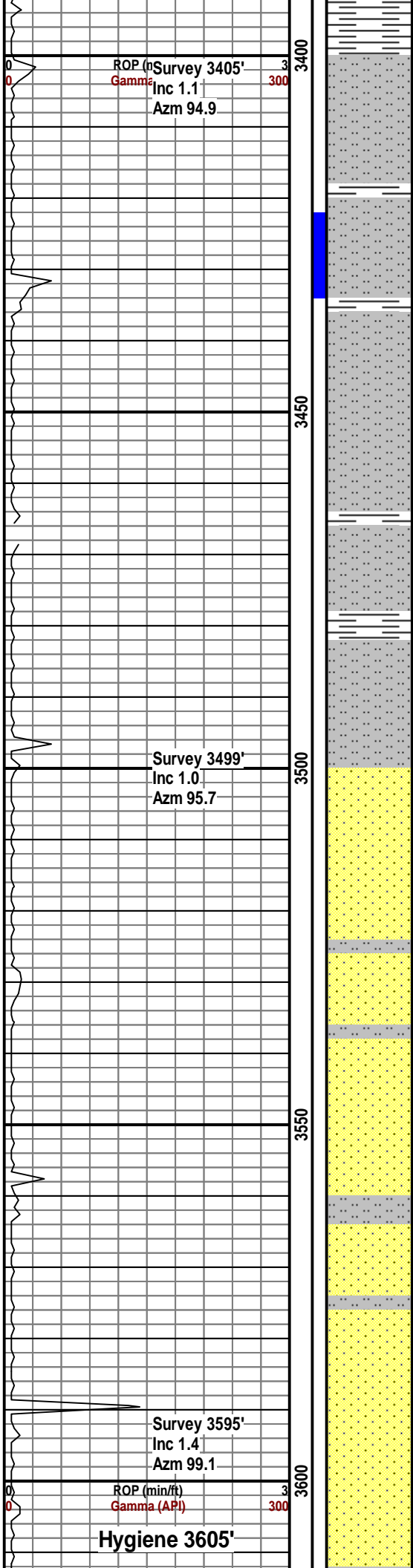




3200-3300 Sltst lt gy-dk gy, sb blk, sft, arg, sl calc, occ Ss wht, s&p, sb rd, fri-mod frm, sl calc, nsfoc 70% sltst 30% Ss

3300-3400 Sh gy-dk gy, plty-blk, sft-mod frm, suc-sb wxy, non calc, occ Sltst gy, sb blk, sl calc, grdg to Sh, nsfoc 90% sh 10% sltst





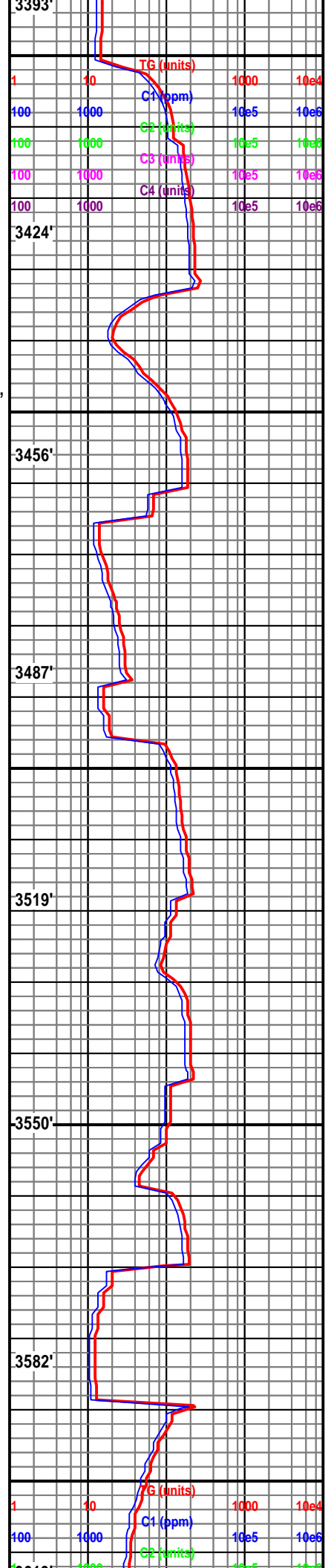
ROP (min/ft)
Gamma (API)
Survey 3405'
Inc 1.1
Azm 94.9

Survey 3499'
Inc 1.0
Azm 95.7

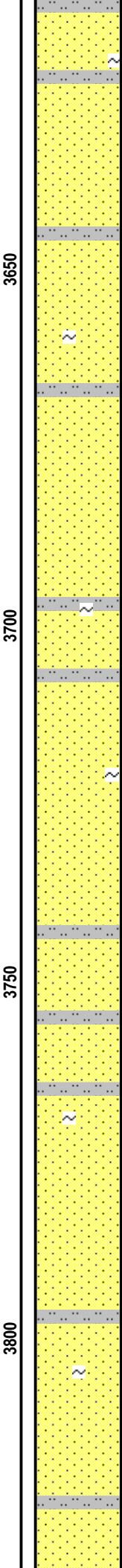
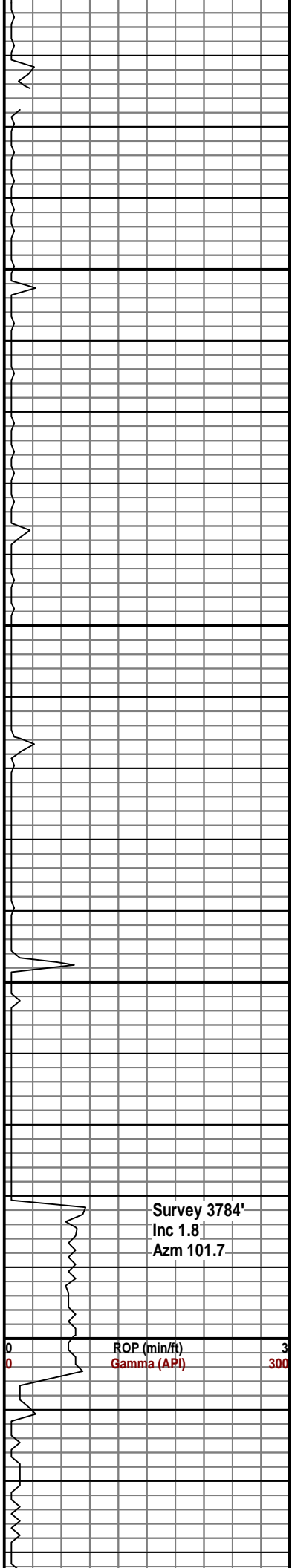
ROP (min/ft)
Gamma (API)
Survey 3595'
Inc 1.4
Azm 99.1
Hygiene 3605'

3400-3500 Sltst lt gy-dk gy, sb blkly, sft, arg, sl calc, rr Sh gy-dk gy, plty-blky, sft-mod frm, suc-sb wxy, non calc, nsfoc 90% sltst 10% sh

3500-3600 Ss s&p-gy, vf-med gr, sb rd-sb ang, calc mtx, rr sltst med gy-lt gy, arg mtx, grd to Ss ip, nsfoc 90% Ss 10% Sltst



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

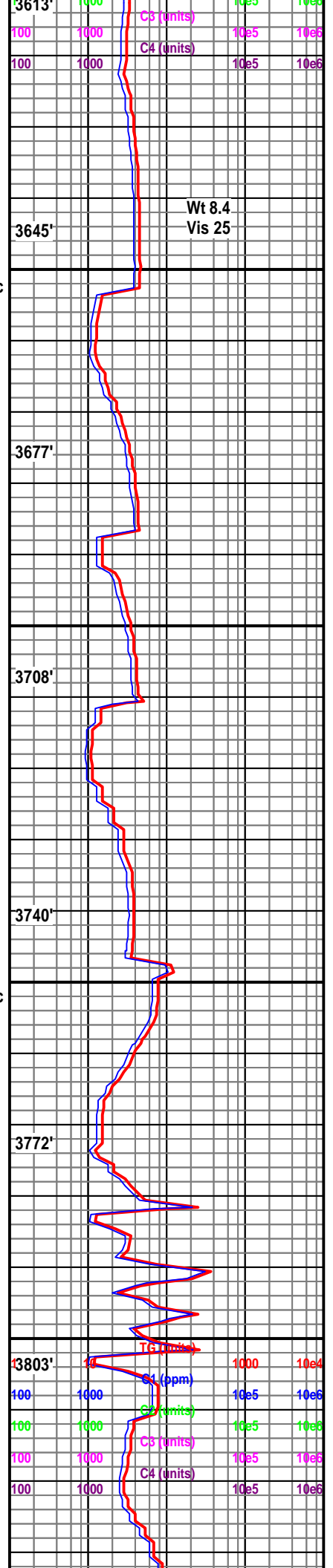


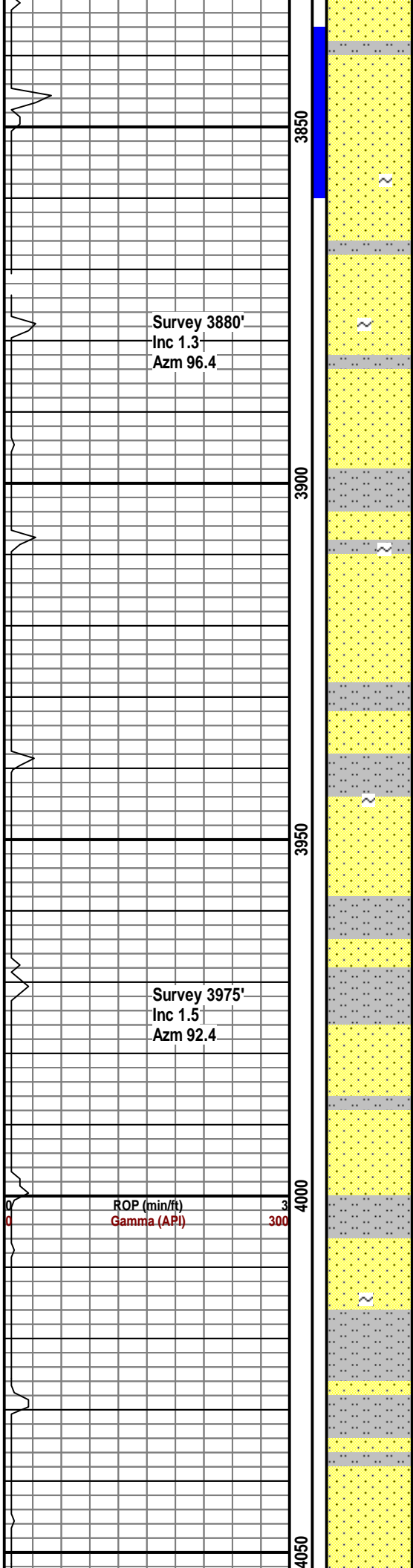
3600-3700 Ss s&p-gy, vf-med gr, sb
rd-sb ang, calc mtx, rr sltst med gy-lt
gy, arg mtx, grdg to Ss ip, tr glau, nsfoc
90% Ss 10% Slst

3700-3800 Ss s&p-gy, vf-med gr, sb
rd-sb ang, calc mtx, rr sltst med gy-lt
gy, arg mtx, grdg to Ss ip, tr glau, nsfoc
90% Ss 10% Slst

Survey 3784'
Inc 1.8'
Azm 101.7

ROP (min/ft)
Gamma (API)

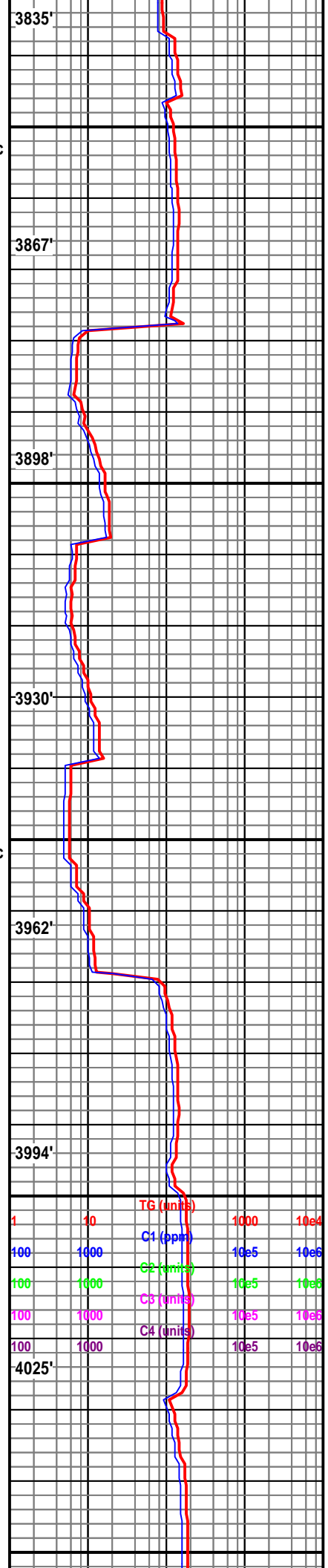


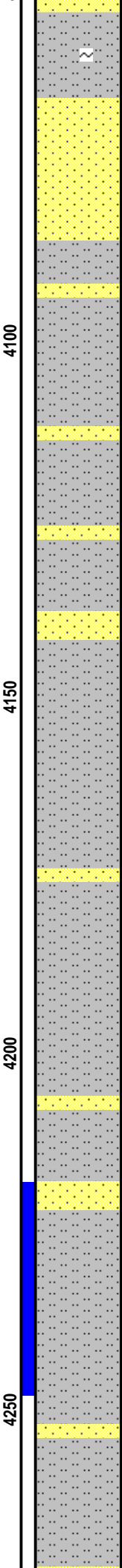
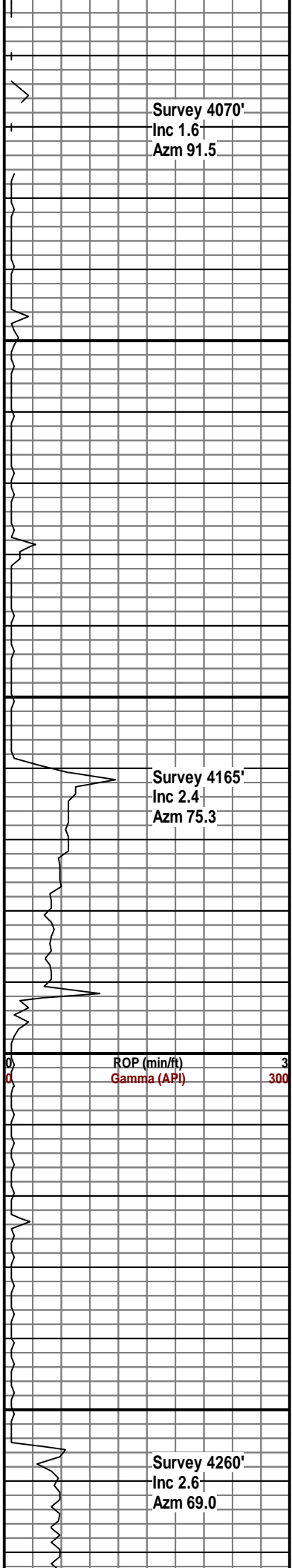


3800-3900 Ss s&p-gy, vf-med gr, sb
rd-sb ang, calc mtx, rr sltst med gy-lt
gy, arg mtx, grdg to Ss ip, tr glau, nsfoc
90% Ss 10% Sltst

3900-4000 Ss s&p-gy, vf-med gr, sb
rd-sb ang, calc mtx, rr sltst med gy-lt
gy, arg mtx, grdg to Ss ip, tr glau, nsfoc
50% Ss 50% Sltst

4000-4100 Ss s&p-gy, vf-med gr, sb
rd-sb ang, calc mtx, rr sltst med gy-lt

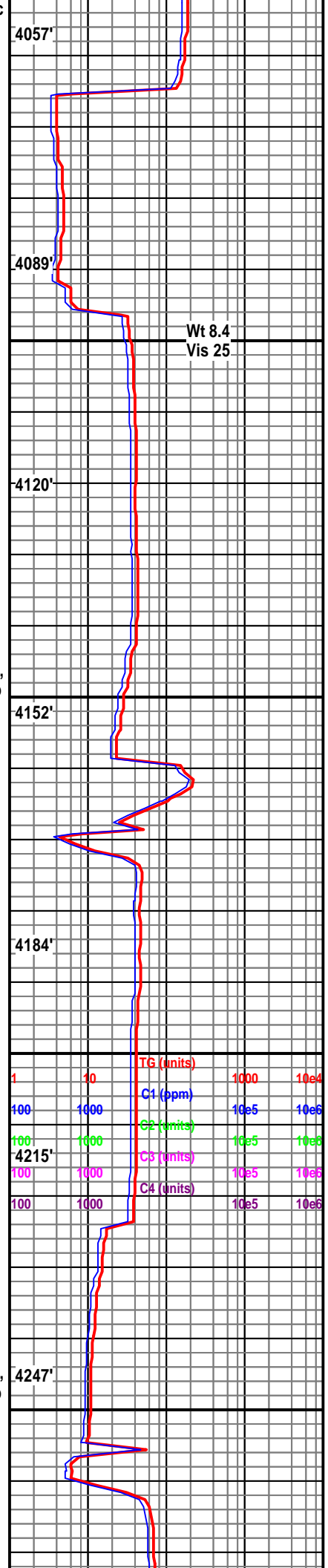


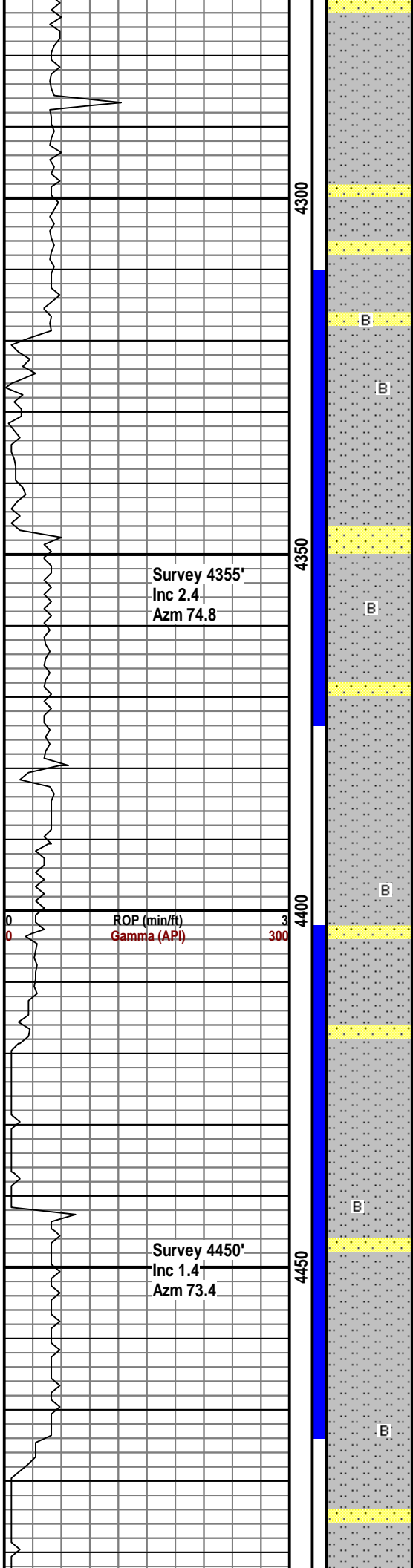


gy, arg mtx, grdg to Ss ip, tr glau, nsfoc
50% Ss 50% Sltst

4100-4200 Sltst lt gy-dk gy, sb blk, sft,
arg, sl calc, rr ss s&p-gy, vf-med gr, sb
rd-sb ang, non calc, nsfoc 90% sltst
10% ss

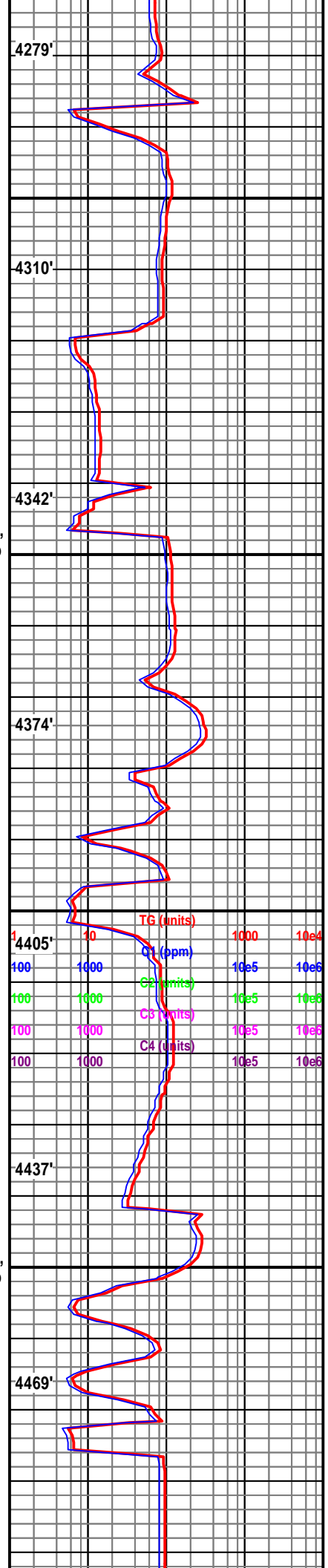
4200-4300 Sltst lt gy-dk gy, sb blk, sft,
arg, sl calc, rr ss s&p-gy, vf-med gr, sb
rd-sb ang, non calc, nsfoc 90% sltst
10% ss

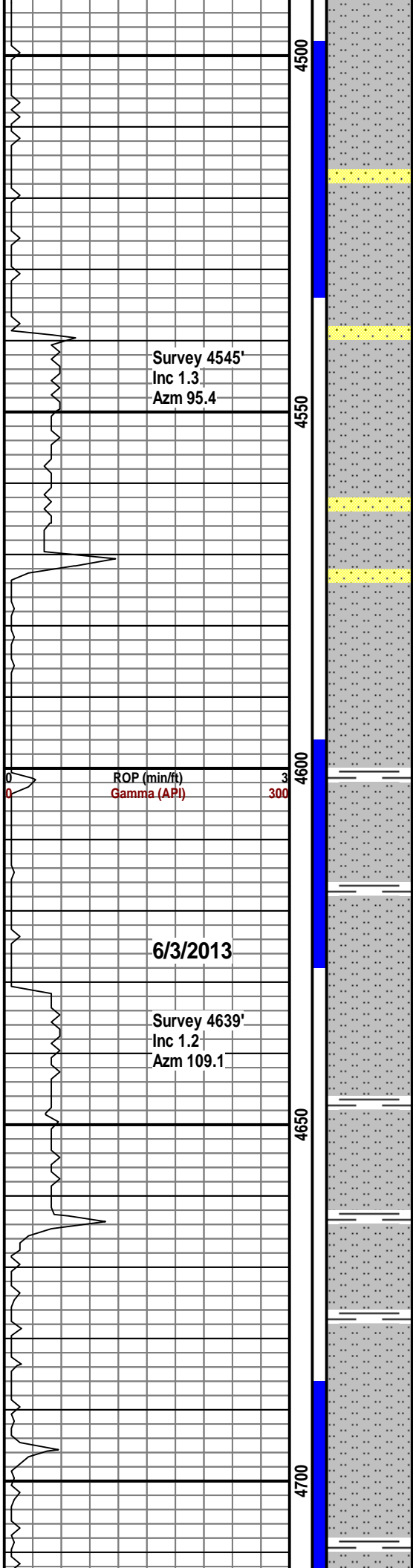




4300-4400 Slitst lt gy-dk gy, sb blk, sft, arg, sl calc, rr ss s&p-gy, vf-med gr, sb rd-sb ang, non calc, rr bent, nsfoc 90% slitst 10% ss

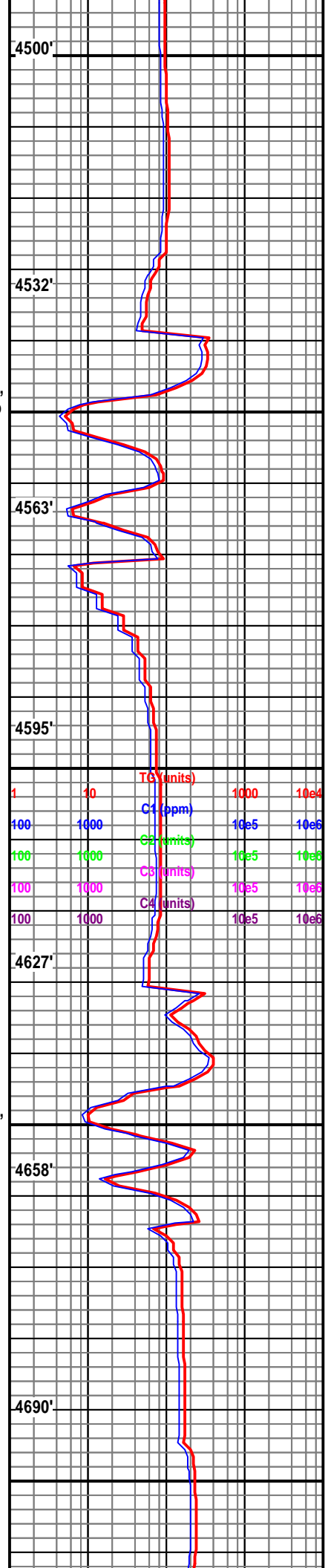
4400-4500 Slitst lt gy-dk gy, sb blk, sft, arg, sl calc, rr ss s&p-gy, vf-med gr, sb rd-sb ang, non calc, rr bent, nsfoc 90% slitst 10% ss



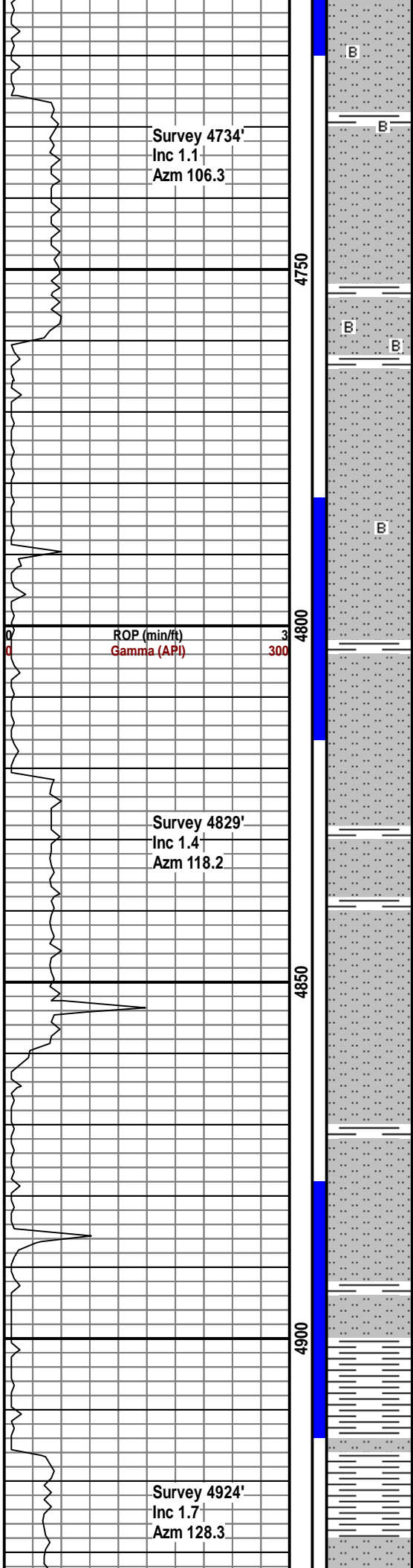


4500-4600 Slstst lt gy-dk gy, sb blkly, sft, arg, sl calc, rr ss s&p-gy, vf-med gr, sb rd-sb ang, non calc, rr bent, nsfoc 90% sltst 10% ss

4600-4700 Slstst lt gy-dk gy, sb blkly, sft, arg, sl calc, rr Sh gy-dk gy, plty-blky, sft-mod frm, suc-sb wxy, non calc, nsfoc 90% sltst 10% sh

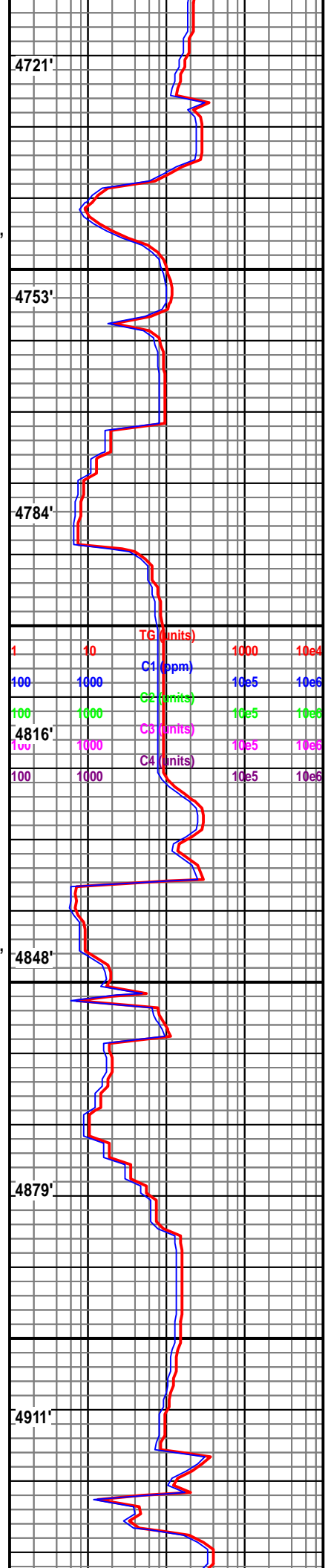


1	10	TC (units)	1000	10e4
100	1000	C1 (ppm)	10e5	10e6
100	1000	C2 (units)	10e5	10e6
100	1000	C3 (units)	10e5	10e6
100	1000	C4 (units)	10e5	10e6

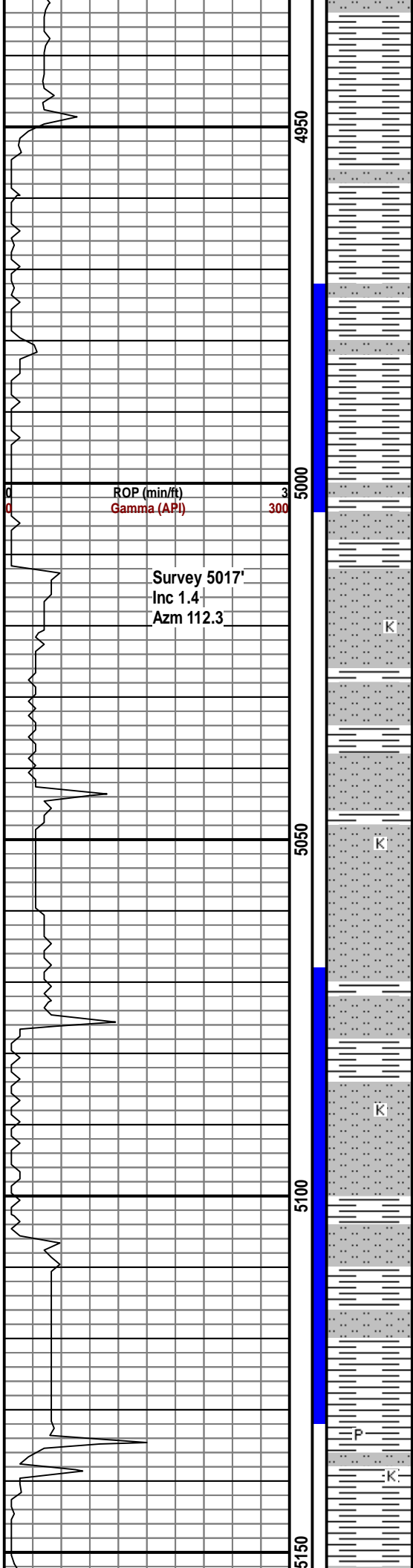


4700-4800 Sltst lt gy-dk gy, sb blk, sft, arg, sl calc, rr Sh gy-dk gy, plty-blky, sft-mod frm, suc-sb wxy, non calc, occ bent, nsfoc 90% sltst 10% sh

4800-4900 Sltst lt gy-dk gy, sb blk, sft, arg, sl calc, rr Sh gy-dk gy, plty-blky, sft-mod frm, suc-sb wxy, non calc, nsfoc 90% sltst 10% sh



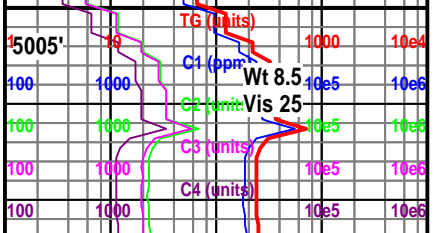
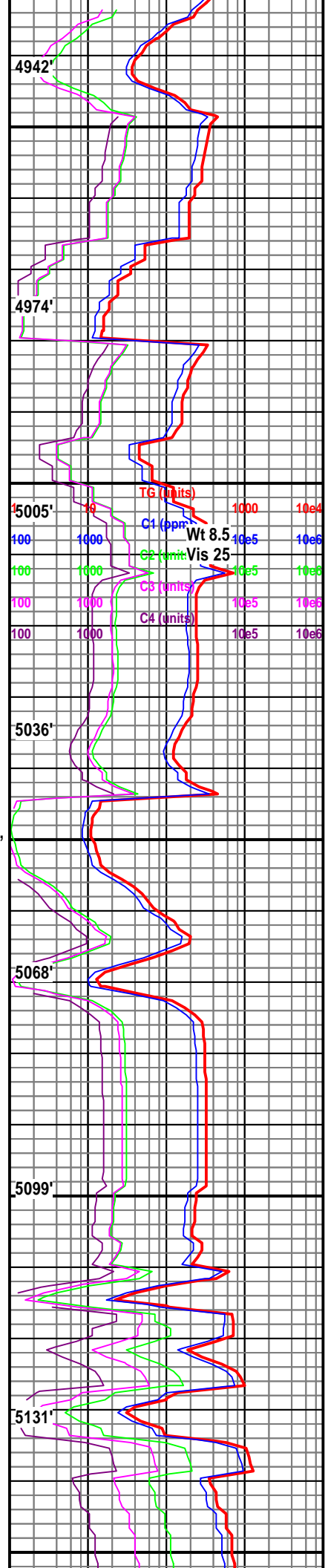
1	10	TG (units)	1000	10e4
100	1000	C1 (ppm)	10e5	10e6
100	1000	C2 (units)	10e5	10e6
100	1000	C3 (units)	10e5	10e6
100	1000	C4 (units)	10e5	10e6

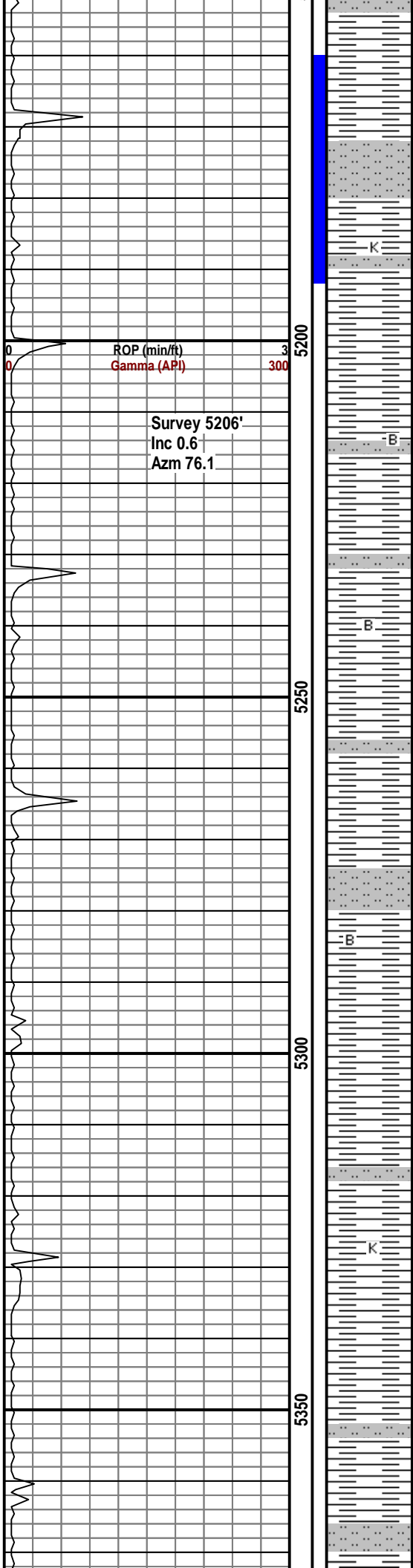


4900-5000 Sh gy-dk gy, plty-blky, sft-mod frm, suc-sb wxy, non calc, rr Slstst gy, sb blky, sl calc, grdg to Sh, nsfoc 90% sh 10% sltst

5000-5100 Slstst lt gy-dk gy, sb blky, sft, arg, sl calc, grdg to sh ip, rr Sh gy-dk gy, blky, mod frm, sl calc, rr kaol, nsfoc 90% sltst 10% sh

5100-5200 Sh gy-dk gy, lt brn ip, plty-sb blky, sft-mod frm, slty, sl calc, rr Slstst qv, sb blky, sl calc, grdg to Sh,

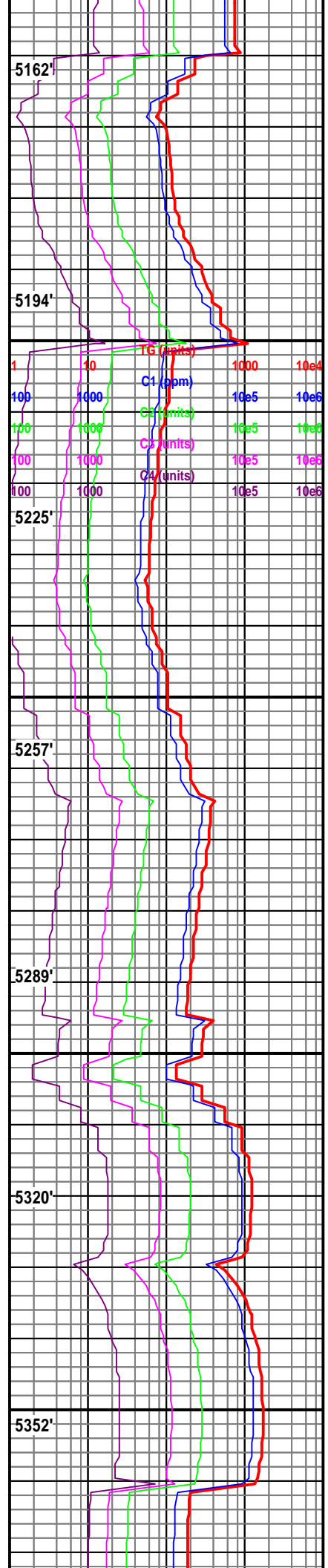


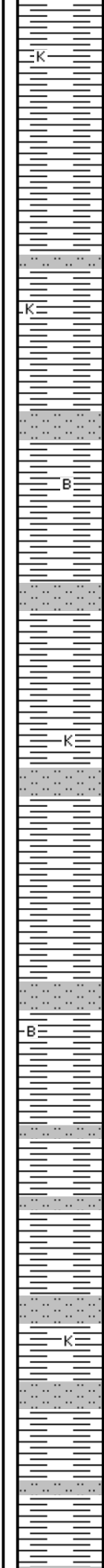
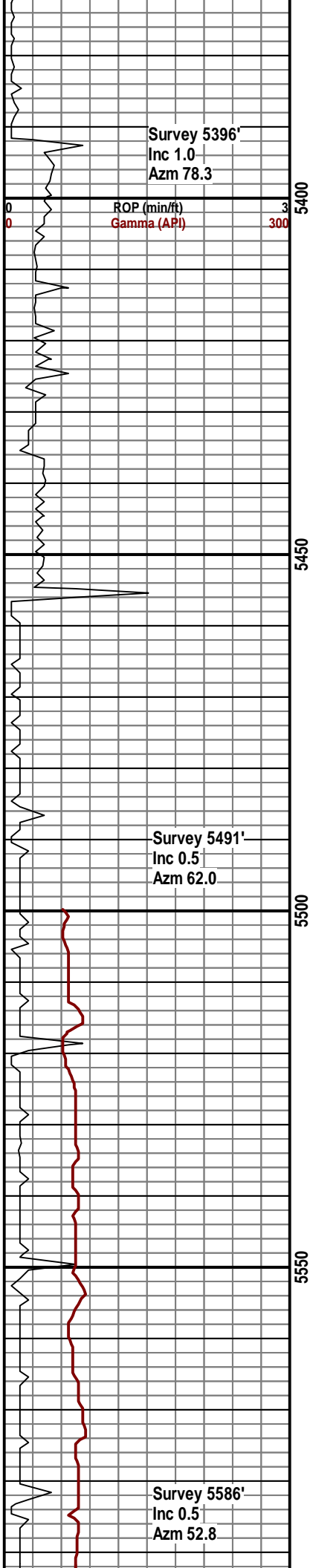


rr kaol, rr pyr, nsfoc 90% sh 10% sltst

5200-5300 Sh dk gy, plty-sb plty, mod frm, slty-suc, non calc, rr Sltst gy, sb blk, sl calc, grdg to Sh, rr bent, nsfoc 90% sh 10% sltst

5300-5400 Sh dk gy, lt brn ip, plty-blky, mod frm-sft, slty-suc, non calc, rr Sltst gy, sb blk, sl calc, grdg to Sh, rr kaol, nsfoc 90% sh 10% sltst

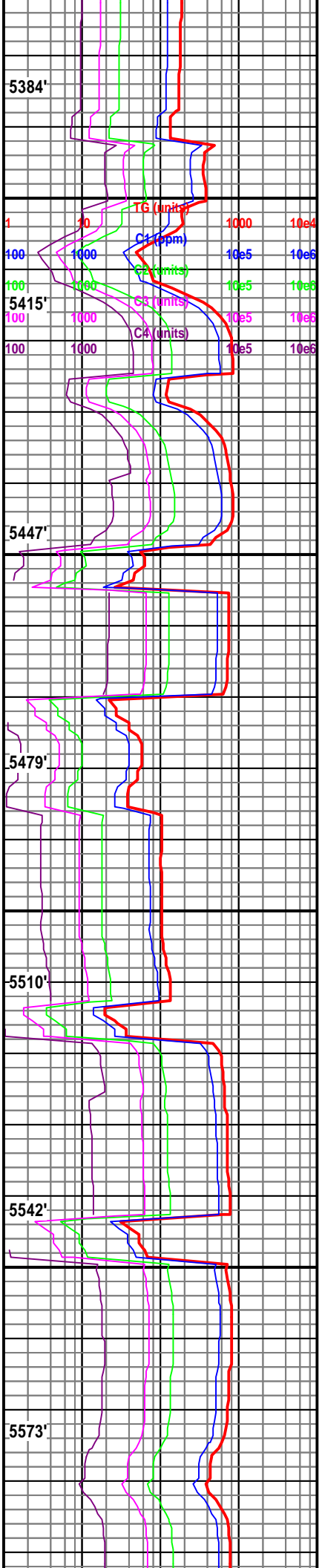


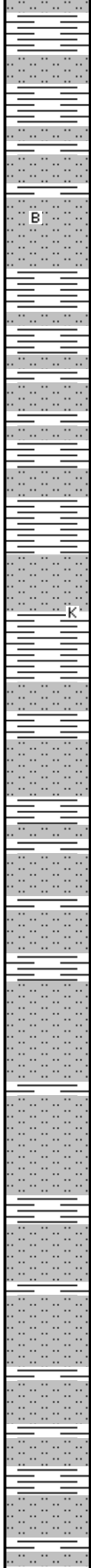
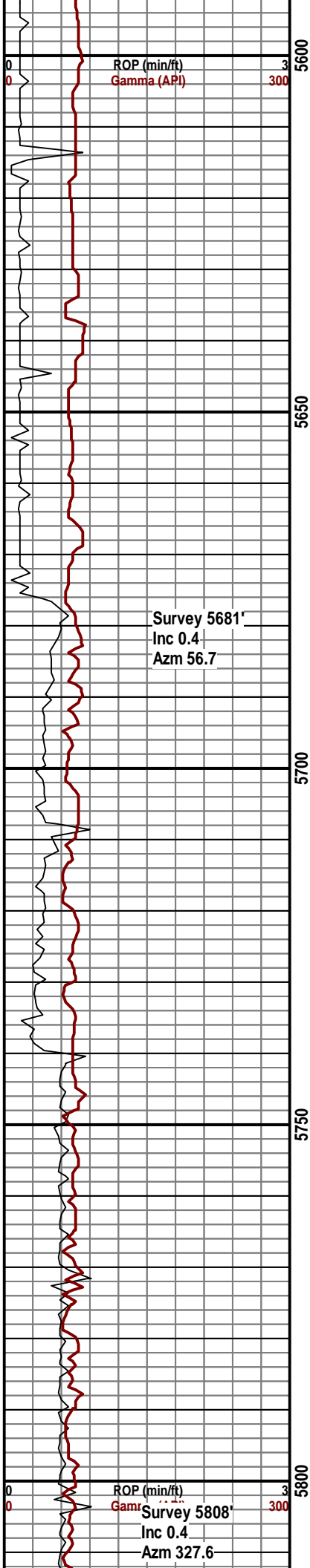


5400-5500 Sh dk gy-gy, plty-blky, sft, arg, slty, non calc, grdg to sltst ip, rr Sltst gy, sb blky, arg, sl calc, rr kaol, rr bent, nsfoc 90% sh 10% sltst

5500-5550 Sh dk gy-gy, plty-blky, mod frm, slty, non calc, grdg to sltst ip, tr Sltst gy, sb blky, arg, sl calc, rr bent, nsfoc 80% sh 20% sltst

5550-5600 Sh dk gy-gy, plty-blky, mod frm, slty, non calc, grdg to sltst ip, occ Sltst gy, sb blky, arg, sl calc, rr kaol, nsfoc 70% sh 30% sltst



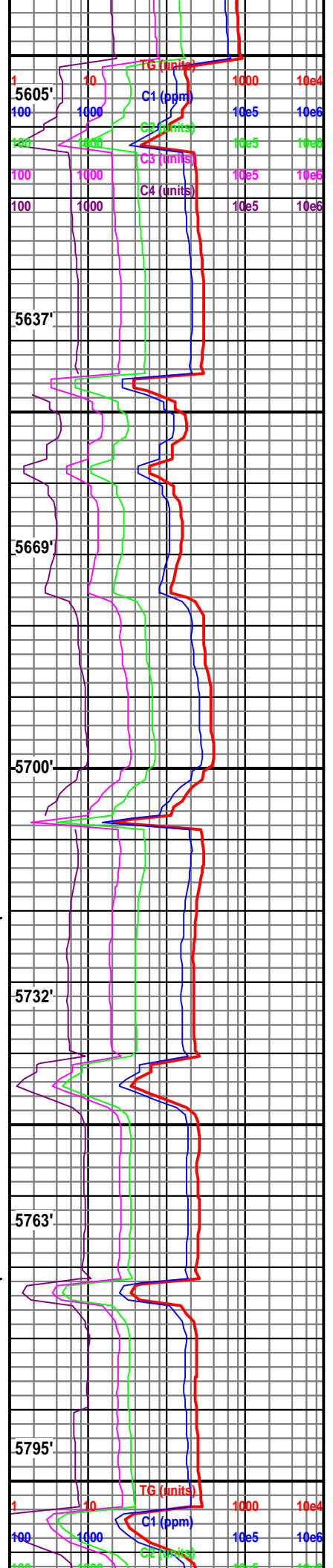


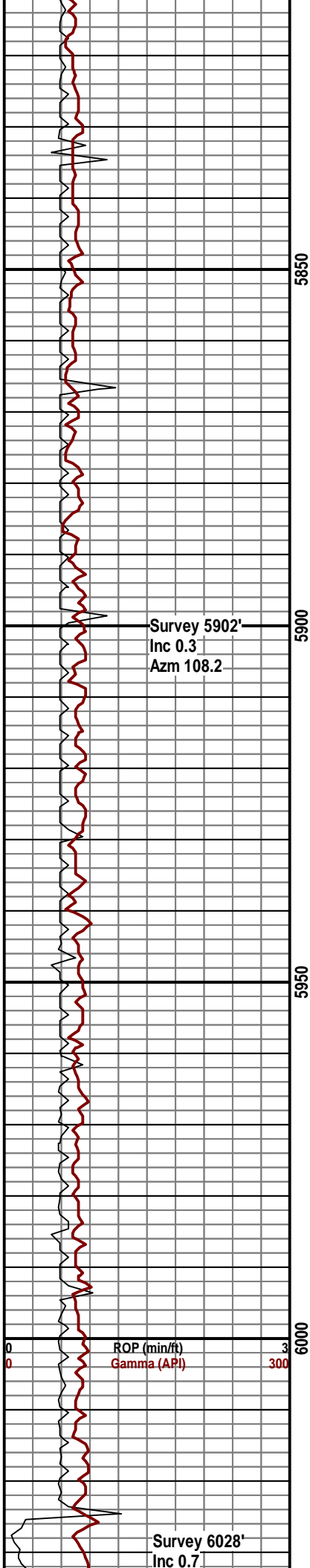
5600-5650 Sltst gy, sb blkly, arg, sl calc, occ Sh dk gy-gy, lt brn ip, plty-blky, mod frm, slty, non calc, grdg to sltst ip, rr bent, nsfoc 70% sltst 30% sh

5650-5700 Sh dk gy-gy, plty-blky, mod frm, slty, sl calc, occ Sltst gy, sb blkly, arg, grdg to sh, sl calc, rr kaol, nsfoc 70% sh 30% sltst

5700-5750 Sltst gy, sb blkly-blky, arg, tr Sh dk gy-gy, plty-blky, mod frm, slty, sl calc, nsfoc 70% sltst 30% sh

5750-5800 Sltst gy, sb blkly-blky, arg, tr Sh dk gy-gy, plty-blky, mod frm, slty, sl calc, nsfoc 80% sltst 20% sh





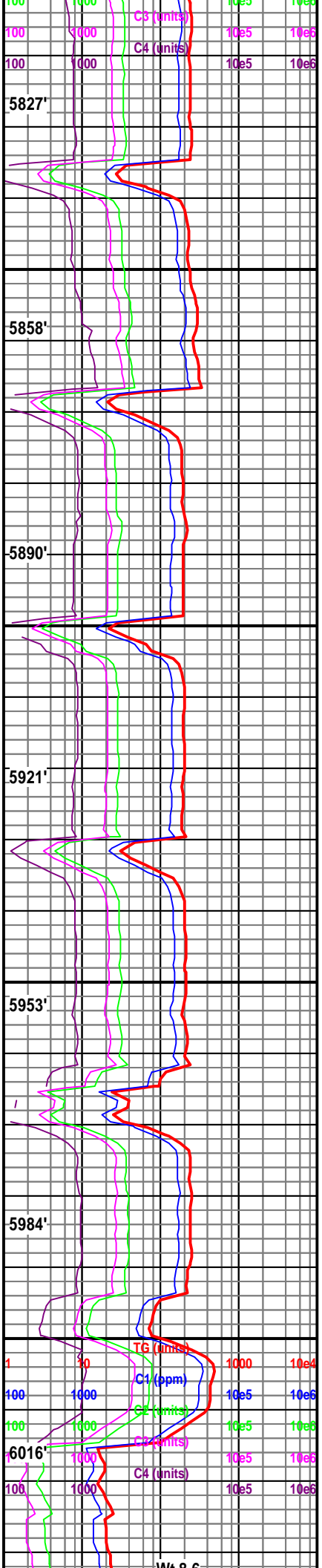
5800-5850 Sh dk gy-gy, plty-sb blk, mod frm, slty, suc ip, sl calc, occ Sltst gy, sb blk, arg, grdg to sh, sl calc, nsfoc 70% sh 30% sltst

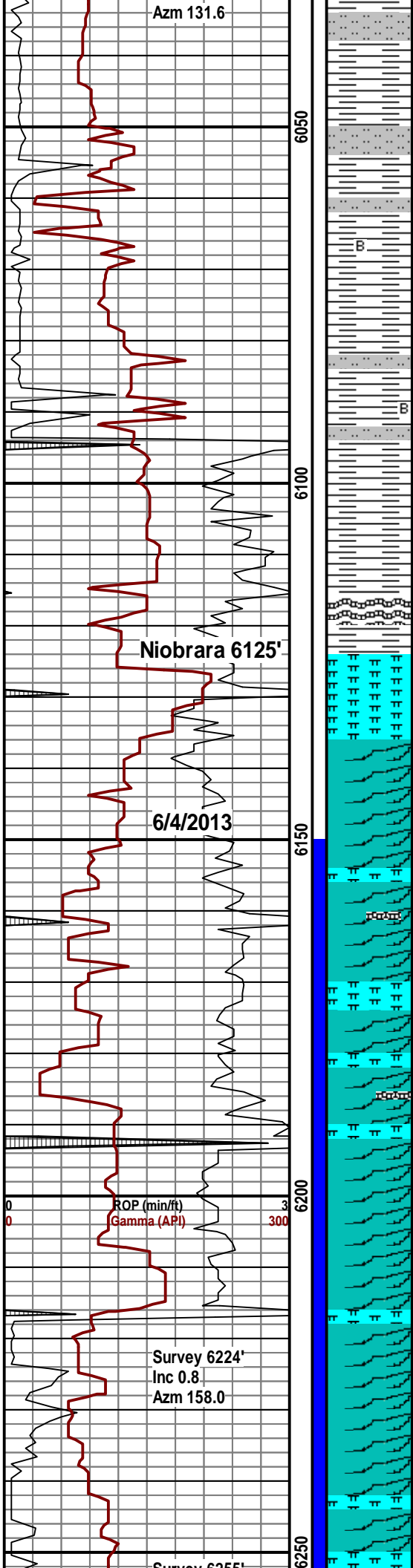
5850-5900 Sh dk gy-gy, plty-sb blk, mod frm, slty, suc, sl calc, tr Sltst gy, sb blk, arg, grdg to sh, sl calc, rr pyr, nsfoc 80% sh 20% sltst

5900-5950 Sh dk gy-gy, plty-sb blk, mod frm, slty, suc, non calc, tr Sltst gy, sb blk, arg, sl calc, nsfoc 80% sh 20% sltst

5950-6000 Sh dk gy-gy, plty-sb blk, sft, slty, suc, arg, non calc, grdg to sltst ip, tr Sltst gy, sb blk, arg, sl calc, rr bent, nsfoc 80% sh 20% sltst

6000-6050 Sh dk gy-gy, plty-sb blk, sft, slty, suc, arg, non calc, grdg to sltst ip, tr Sltst gy, sb blk, arg, sl calc, nsfoc 80% sh 20% sltst



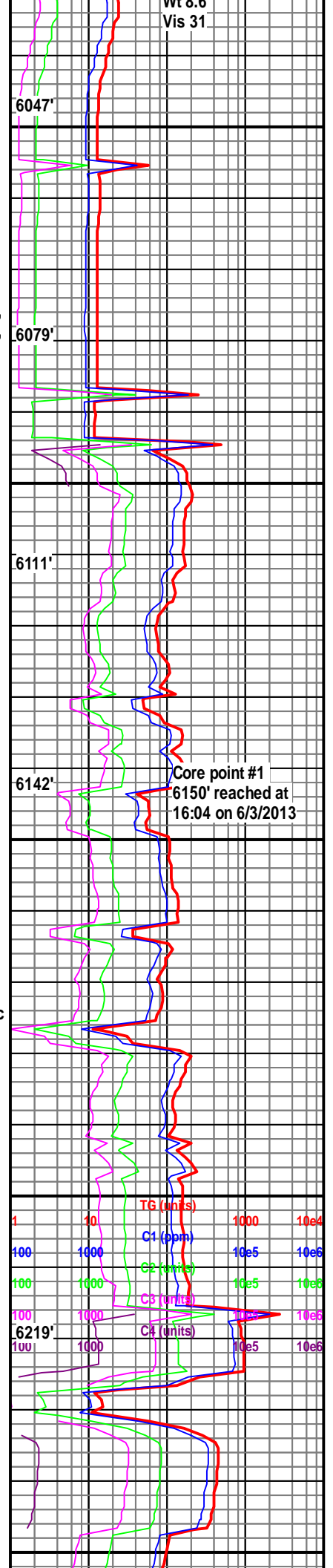


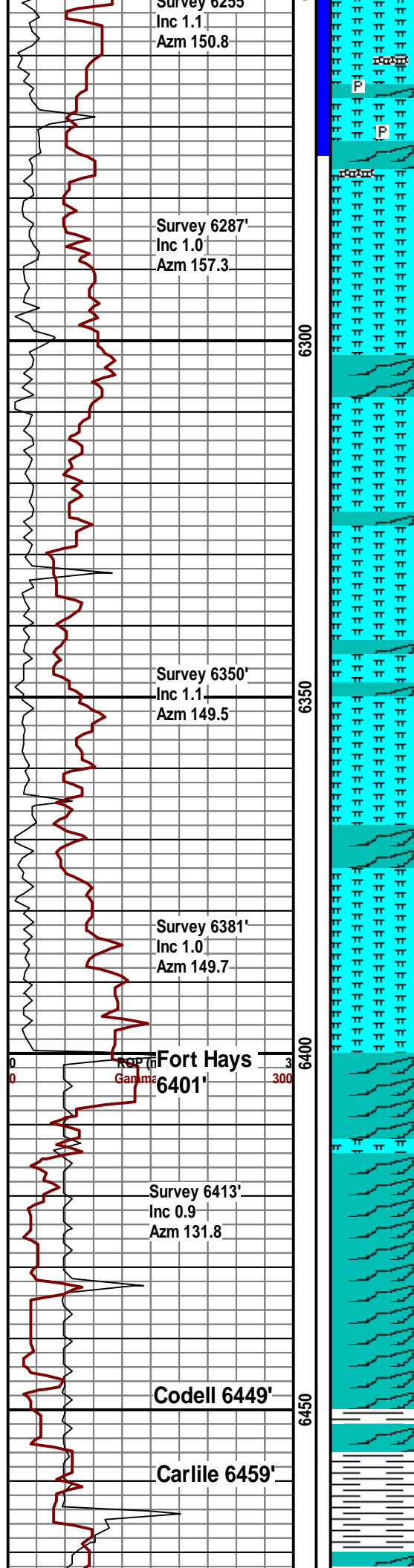
6050-6100 Sh dk gy-gy, sb blk, sft, slty, suc, arg, non calc, grdg to sltst ip, tr Sltst gy, sb blk, arg, sl calc, rr bent, nsfoc 80% sh 20% sltst

6100-6150 Mrlst dk gy, blk, sft, suc, occ Sh dk gy-gy, sb blk, sft, slty, suc, arg, rr Chk gy, blk, occ bent, nsfoc 60% mrlst 30% sh 5% bent 5% chk

6150-6200 Chk gy-dk gy, blk, sft, tr Mrlst dk gy, blk, sft, suc, tr bent, nsfoc 70% chk 30% mrlst

6200-6250 Chk gy-lt gy, blk, sft, tr Mrlst dk gy, blk, sft, suc, rr bent, nsfoc 80% chk 20% mrlst





6250-6300 Mrlst dk gy, blkly, sft, suc, rr
Chk gy-lt gy, blkly, sft, occ bent, rr pyr,
nsfoc 80% mrlst 20% chk

6300-6350 Mrlst dk gy, blkly, sft, suc, rr
Chk gy-lt gy, blkly, sft, rr bent, nsfoc
80% mrlst 20% chk

6350-6400 Mrlst dk gy, blkly, sft, suc, rr
Chk gy-lt gy, blkly, sft, occ bent, nsfoc
80% mrlst 20% chk

6400-6410 Chk lt gy-wt, blkly, v sft, rr
Mrlst dk gy, blkly, sft, suc, rr bent, rr
pyr, nsfoc 90% chk 10% mrlst

6410-6420 Chk lt gy-wt, blkly, v sft, rr
Mrlst dk gy, blkly, sft, suc, rr bent, rr
pyr, nsfoc 90% chk 10% mrlst

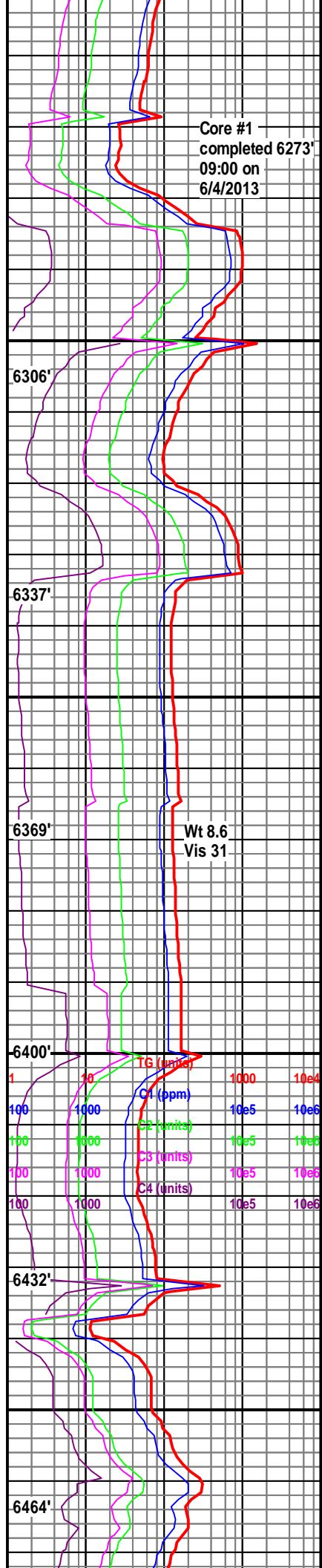
6420-6430 Chk lt gy-wt, blkly, v sft, rr
Mrlst dk gy, blkly, sft, suc, rr bent, rr
pyr, nsfoc 90% chk 10% mrlst

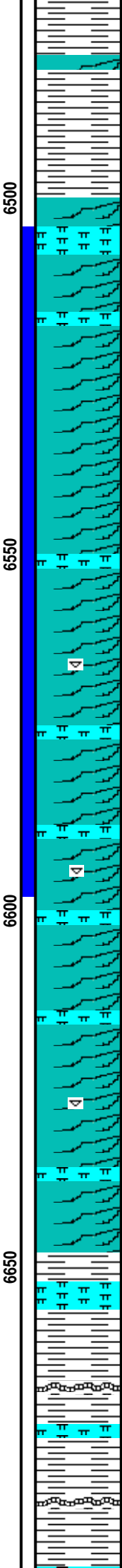
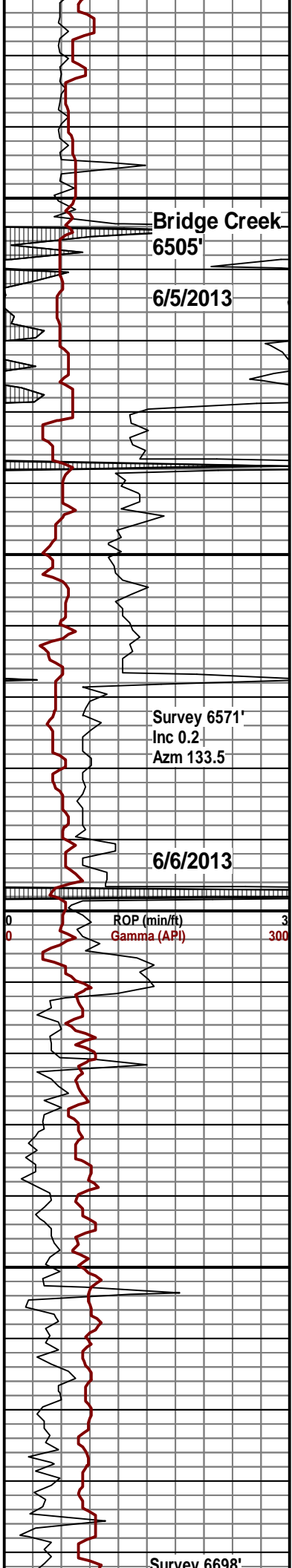
6430-6440 Chk lt gy-wt, blkly, v sft, rr
Mrlst dk gy, blkly, sft, suc, rr bent, rr
pyr, nsfoc 80% chk 20% mrlst

6440-6450 Chk lt gy-wt, blkly, v sft, rr
sh dk gy, blkly, sft, suc, rr bent, rr pyr,
nsfoc 70% chk 30% sh

6450-6460 Sh dk gy, blkly, sft, suc, sl
sfty, rr Chk lt gy-wt, blkly, v sft, rr bent,
nsfoc 80% sh 20% chk

6460-6470 Sh dk gy, blkly, sft, suc, sl
sfty, rr Chk lt gy-wt, blkly, v sft, rr bent,
nsfoc 80% sh 20% chk





6470-6480 Sh dk gy, blk, sft, suc, sl
sfty, rr Chk lt gy-wt, blk, v sft, rr bent,
nsfoc 90% sh 10% chk

6490-6490 Sh dk gy, blk, sft, suc, sl
sfty, rr Chk lt gy-wt, blk, v sft, rr bent,
nsfoc 90% sh 10% chk

6490-6504 Sh dk gy, blk, sft, suc, sl
sfty, rr Chk lt gy-wt, blk, v sft, rr bent,
nsfoc 90% sh 10% chk

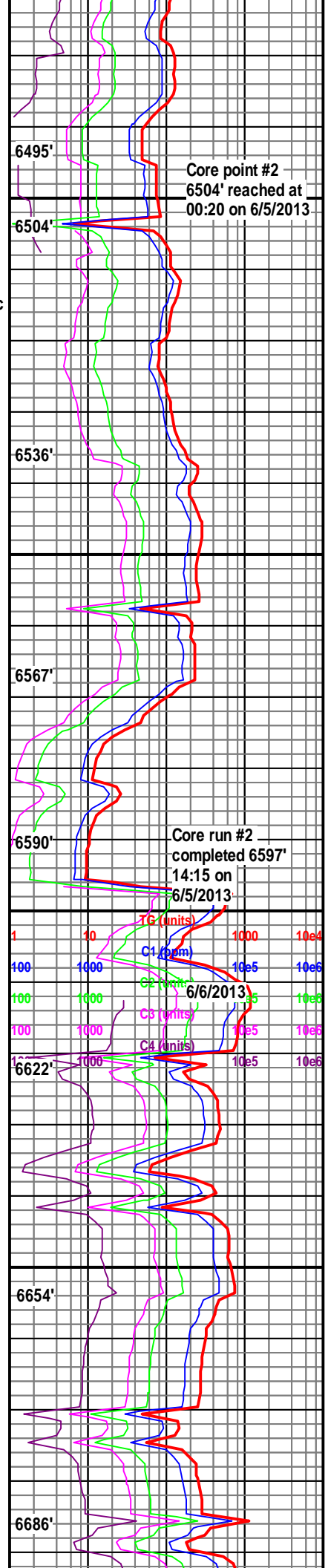
6500-6525 Chk dk gy, wht ip, plty, sft,
sfty, occ Mrlst dk gy, blk, sft, slty, calc
mtx, nsfoc 60% chk 40% mrlst

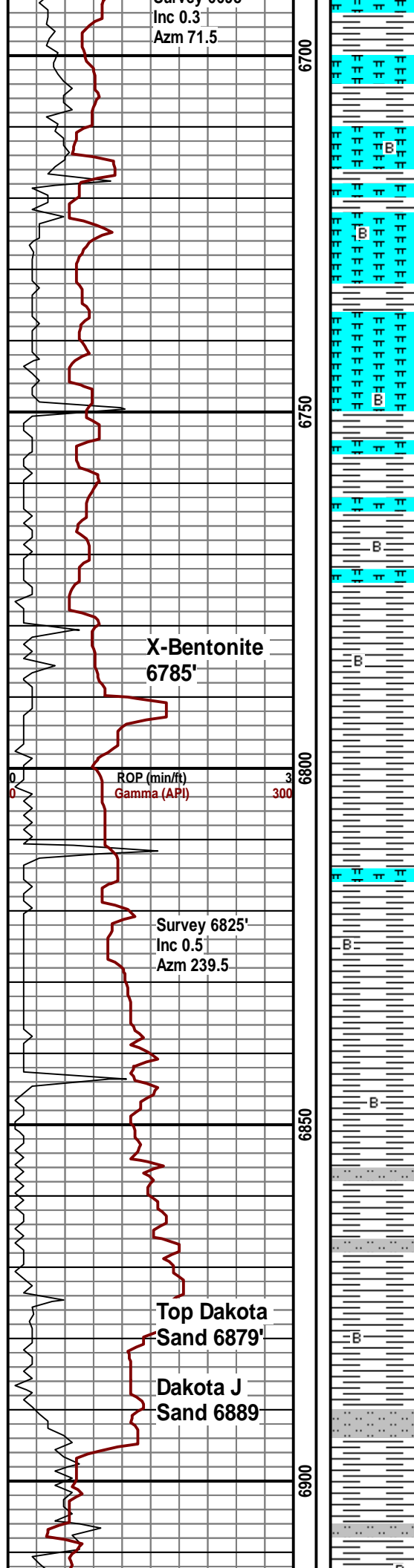
6525-6550 Chk dk gy, wht ip, plty, sft,
sfty, tr Mrlst dk gy, blk, sft, slty, calc
mtx, nsfoc 70% chk 30% mrlst

6550-6597 Chk dk gy-gy, plty, sft, slty,
tr Mrlst dk gy, blk, sft, slty, calc mtx,
rr inoc, nsfoc 70% chk 30% mrlst

6597-6650 Mrlst dk gy, blk-sb blk,
sfty, sft, tr Chk dk gy, sb blk, sft, rr
inoc nsfoc 80% mrlst 20% chk

6650-6700 Sh dk gy plty, sft, suc, v
calc, occ Mrlst dk gy, blk-plty, slty,
occ bent lt brn-grn, sft, nsfoc 70% sh
20% mrlst 10% bent



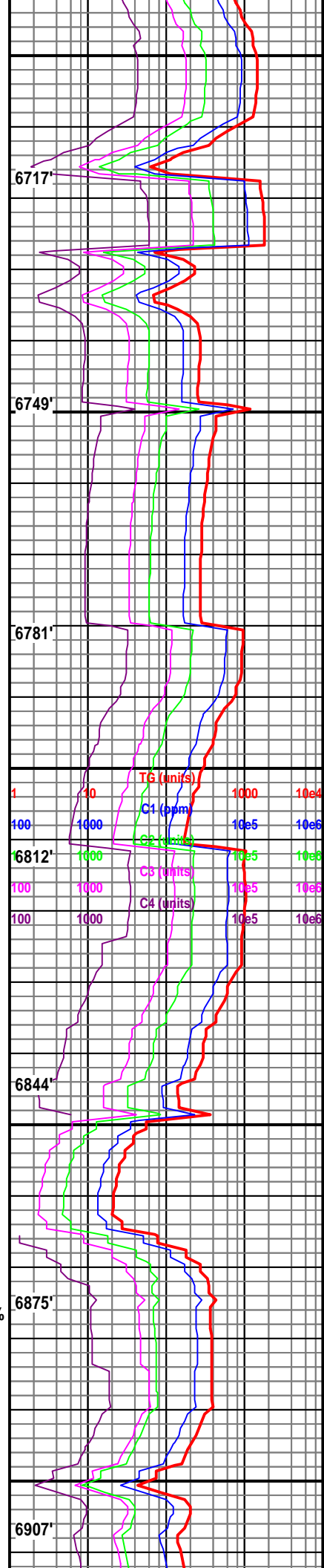


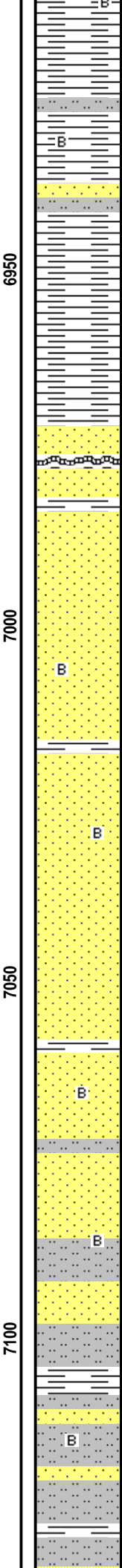
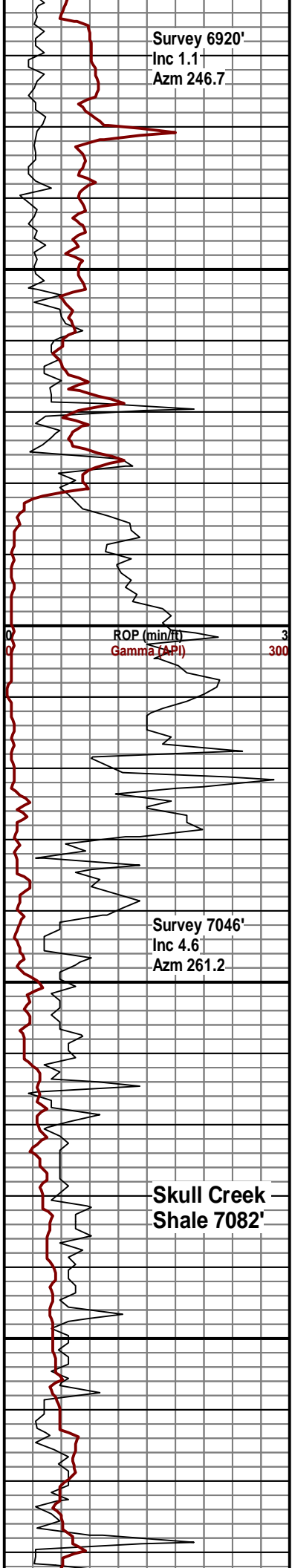
6700-6750 Mrlst dk gy, blkly-plty, slty,
occ Sh dk gy plty, sft, suc, v calc, tr
bent lt brn-grn, sft, nsfoc 70% mrlst
25% sh 5% bent

6750-6800 Sh dk gy plty, sft, suc, calc,
rr Mrlst dk gy, blkly-plty, slty, tr bent lt
brn-grn, sft, nsfoc 85% sh 10% mrlst
5% bent

6800-6850 Sh dk gy plty-blky, sft, suc,
arg, non calc, rr Mrlst dk gy, blkly, rr
bent lt brn-grn, sft, nsfoc 90% sh 10%
mrlst

6850-6900 Sh dk gy plty-blky, sft, suc,
arg, non calc, tr Slstt gy, sb blkly, frm,
non calc, grdg to ss, rr bent, nsfoc 80%
sh 20% slstt





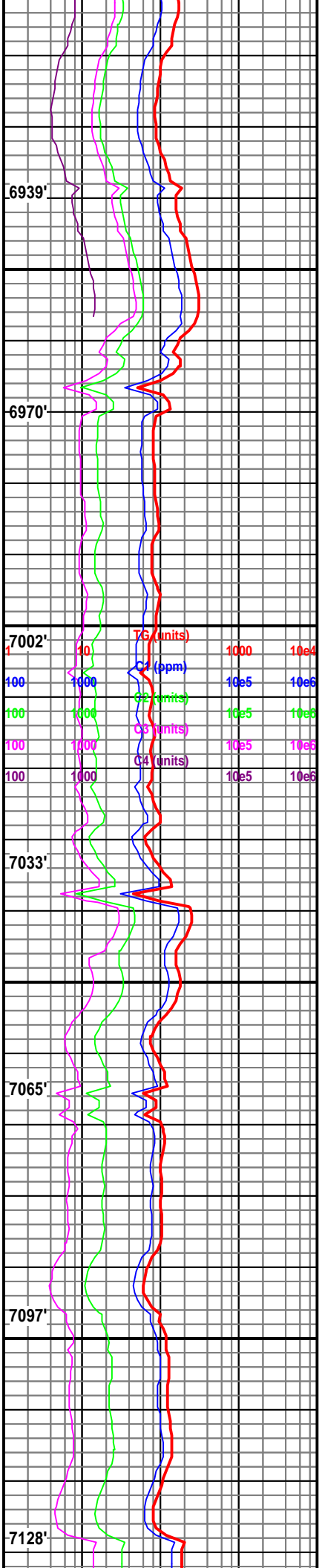
6900-6950 Sh dk gy plty-blky, sft, suc, arg, non calc, tr Sltst gy, sb blky, frm, non calc, grdg to ss, rr Ss trnsi-gy, sb rd, non calc, rr bent, nsfoc 80% sh 15% sltst 5% Ss

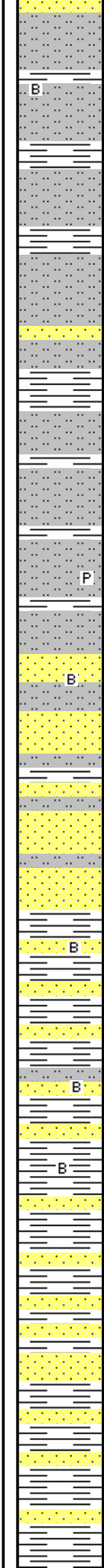
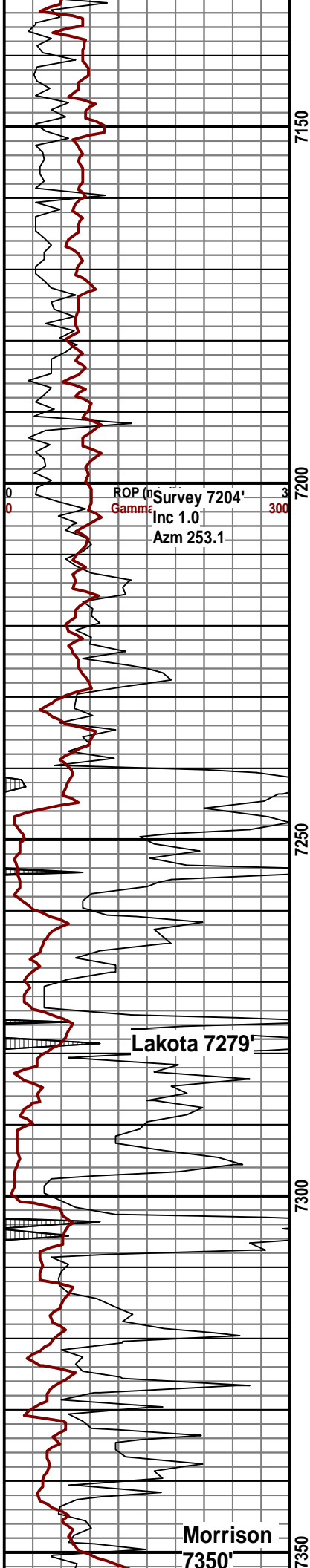
6950-7000 Ss trnsi-wht, gy ip, sb rd, hd, uncons, tr Sh dk gy, blky, sft, non calc, occ bent, nsfoc 90% ss 5% sh 5% bent

7000-7050 Ss trnsi-wht, s&p, sb rd, hd, uncons-fri, rr Sh dk gy, blky, sft, non calc, rr bent, nsfoc 95% ss 5% sh

7050-7100 Ss trnsi-wht, s&p, sb rd, hd, uncons-fri, tr Sltst gy-dk gy, blky, sft, non calc, rr Sh dk gy, blky, rr bent, nsfoc 75% ss 20% sltst 5% sh

7100-7150 Sltst gy-dk gy, blky, sft, calc, tr Ss trnsi-wht, s&p, sb rd, hd, uncons-fri, tr Sh dk gy, blky, rr bent, nsfoc 60% ss 20% sltst 20% sh





7150-7200 Sltst gy-dk gy, blk, sft, arg, calc, tr Sh dk gy, blk, sft, Ss trnsi-wht, s&p, sb rd, hd, unconfs-fri, nsfoc 70% siltst 20% sh 10%ss

7200-7210 Sltst gy-dk gy, blk, sft, arg, calc, tr Sh dk gy, blk, sft, grdg to siltst nsfoc

7210-7220 Sltst gy-dk gy, blk, sft, arg, calc, tr Sh dk gy, blk, sft, grdg to siltst, rr pyr, nsfoc

7220-7230 Sltst gy-dk gy, blk, sft, arg, calc, abnt Ss trnsi-gy, s&p, sb rd, frm-hd, calc, rr bent, nsfoc

7230-7240 Ss trnsi-gy, sb rd, frm, sl calc, abnt Sltst gy-dk gy, blk, arg, calc, tr Sh dk gy, plty, nsfoc

7240-7250 Ss trnsi-wht, sb rd, frm-sft, non calc, abnt Sltst gy-dk gy, blk, arg, calc, rr Sh dk gy, plty, nsfoc

7250-7260 Ss trnsi-wht, sb rd, v sft, wht cly cmt, non calc, tr Sltst gy-dk gy, arg, rr Sh dk gy, plty, nsfoc

7260-7270 Sh wht plty, dk gy ip, v sft, non calc, rr Ss gy-trnsi, fri-hd, rr bent, nsfoc

7270-7280 Sh wht plty, dk gy ip, v sft, non calc, occ Ss gy-trnsi, fri-hd, rr bent, nsfoc

7280-7290 Sh wht-dk gy plty, v sft-frm, non calc, occ Sltst gy, sb blk, frm, non calc occ Ss trnsi, hd non calc rr bent, nsfoc

7290-7300 Sh wht plty, dk gy ip, v sft, non calc, tr Ss gy-trnsi, fri-hd, non calc, rr bent, nsfoc

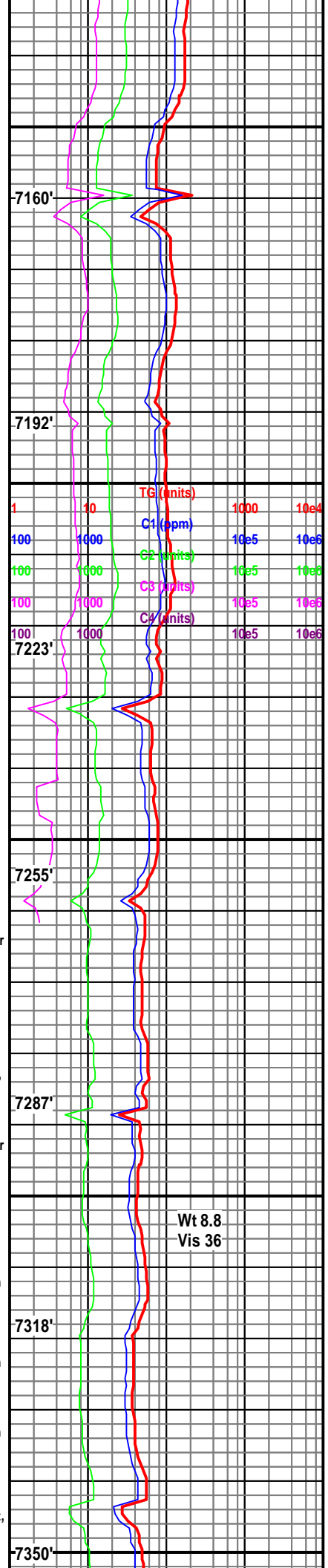
7300-7310 Sh wht plty, dk gy ip, v sft, non calc, occ Ss gy-trnsi, wht ip, fri-hd, non calc, rr bent, nsfoc

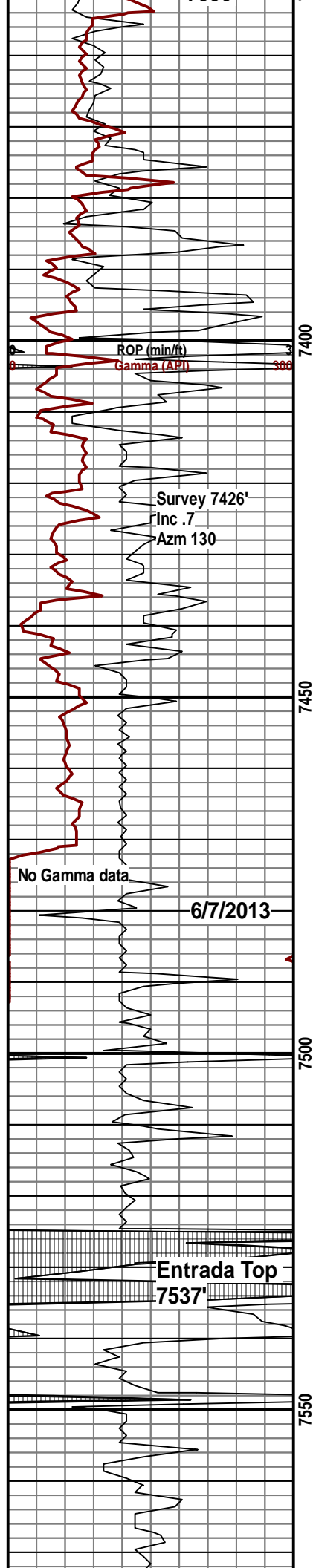
7310-7320 Sh wht, dk gy ip, sb blk-plty, sft, non calc, occ Ss red-trnsi, gy ip, wht ip, fri-hd, non calc, rr bent, nsfoc

7320-7330 Sh wht, dk gy ip, sb blk-plty, sft, non calc, abnt Ss red-trnsi, gy ip, wht ip, fri-hd, non calc, rr bent, nsfoc

7330-7340 Sh wht, dk gy ip, sb blk-plty, sft, non calc, occ Ss red-trnsi, gy ip, wht ip, fri-hd, non calc, rr bent, nsfoc

7340-7350 Sh gy-wht-lt gn, sb blk-plty, sft, non calc, tr Ss trnsi-gy, red ip, fri-hd, non calc, rr bent, nsfoc





7400

7450

7500

7550

7350-7360 Sh gn-wht-lt red, sb blkly-sb plty, sft, non calc, nsfoc

7360-7370 Sh gn-wht, sb blkly-sb plty, sft, non calc, nsfoc

7370-7380 Sh gn-wht, dk gy ip, sb blkly-sb plty, sft, non calc, nsfoc

7380-7390 Sh gn-wht, dk gy ip, sb blkly-sb plty, sft, non calc, nsfoc

7390-7400 Sh gn-wht, dk gy ip, sb blkly-sb plty, sft, non calc, abnt lmstn gy-wht, hd nsfoc

7400-7410 lmstn gy-wht, hd, abnt Sh gn-wht, dk gy ip, sb blkly-sb plty, sft, non calc, nsfoc

7410-7420 lmstn gy-wht, hd, abnt Sh gn-wht, dk gy ip, sb blkly-sb plty, sft, sl calc, nsfoc

7420-7430 lmstn gy-wht, hd, abnt Sh gn-wht, dk gy ip, sb blkly-sb plty, sft, sl calc, nsfoc

7430-7440 lmstn gy-wht, hd, abnt Sh gn-wht, dk gy ip, sb blkly-sb plty, sft, non calc, rr Ss red-gy, fri-sft, nsfoc

7440-7450 lmstn gy-wht, hd, abnt Sh gn-wht, dk gy ip, sb blkly-sb plty, sft, non calc, tr Ss red-gy, fri-sft, tr bent, nsfoc

7450-7460 Sh red-gy, blkly-plty, v sft, calc, occ lmstn gy, blkly, sft, tr bent, nsfoc

7450-7460 Sh red-gy, blkly-plty, v sft, calc, occ lmstn gy, blkly, sft, rr bent, nsfoc

7460-7470 Sh red-gy, blkly-plty, v sft, calc, tr lmstn gy, blkly, sft, nsfoc

7470-7480 Sh gy, red ip, blkly-plty, v sft, calc, tr lmstn gy, blkly, sft, nsfoc

7480-7490 Sh gy-dk gy, blkly-plty, v sft, calc, tr lmstn gy, blkly, sft, nsfoc

7490-7500 Sh gy-dk gy, blkly-plty, v sft, calc, tr lmstn gy, blkly, sft, nsfoc

7500-7510 Sh gy-dk gy, blkly-plty, v sft, calc, tr lmstn gy, blkly, sft, nsfoc

7510-7520 Sh gy-dk gy, blkly-plty, v sft, calc, tr lmstn gy, blkly, sft, rr kaol, nsfoc

7520-7525 Sh gy-dk gy, blkly-plty, v sft, calc, tr lmstn gy, blkly, sft, tr anhyd, nsfoc

7525-7535 Sh gy-dk gy, blkly-plty, v sft, calc, tr lmstn gy, blkly, sft, tr anhyd, nsfoc

7535-7545 Sh gy-dk gy, blkly-plty, v sft, calc, tr ss lt gy, uncons, sb rnd, frm, rr anhyd, nsfoc

7545-7555 Ss lt gy, uncons, rnd, frm, tr Sh gy-dk gy, blkly-plty, v sft, calc, rr anhyd, nsfoc

7555-7565 Ss lt gy, uncons, rnd, frm, tr Sh gy-dk gy, blkly-plty, v sft, calc, rr anhyd, nsfoc

7565-7575 Ss lt gy, orng, uncons, rnd, frm, tr Sh gy-dk gy, blkly-plty, v sft, calc, rr anhyd, nsfoc

7382'

7413'

7445'

7477'

7508'

Core point #3
7525' reached at
03:30 on 6/7/2013

Wt 8.8
Vis 40

		ITG (units)	1000	10e4
1	10	C1 (ppm)	10e5	10e6
100	1000	C2 (units)	10e5	10e6
1000	10000	C3 (units)	10e5	10e6
10000	100000	C4 (units)	10e5	10e6

6/8/2013

ROP (min/ft)
Gamma (API)

Survey 7615'
Inc 2
Azm 139.7

7600

7650

7700

7750

7575-7585 Ss lt gy, orng, uncon, rnd, frm, tr Sh
gy-dk gy, blk-pty, v sft, calc, rr anhyd, nsfoc

7585-7600 Ss lt gy-orng, sb rd, fri-uncons, non
calc, occ Sh gy-dk gy, blk-pty, v sft, calc, grdg
to sltst, rr anhyd, rr bent, nsfoc

7600-7650 Sltst orng-red, sb blk, v sft,
arg, non calc, grdg to sh, rr Sh dk gy,
blk, slty, non calc, rr anhy, nsfoc 90%
sltst 10% sh

7650-7700 Sh orng-red, sb blk, v sft,
arg, non calc, rr Sltst gy, blk, non
calc, rr anhy, nsfoc 90% sh 10% sltst

7700-7750 Sh orng-red, sb blk, v sft,
arg, non calc, rr Sltst gy, blk, non
calc, rr anhy, nsfoc 90% sh 10% sltst

7750-7800 Sh orng-red, blk-sb blk, v
sft, arg, non calc, rr Sltst dk gy, blk,
non calc, tr anhy, nsfoc 90% sh 10%
sltst

Core run #3
completed 7586'
20:05 on 6/7/2013

7603'	10	G (units)	1000	10e4
100	1000	C1 (ppm)	10e5	10e6
100	1000	C2 (units)	10e5	10e6
100	1000	C3 (units)	10e5	10e6
100	1000	C4 (units)	10e5	10e6

7634'

7666'

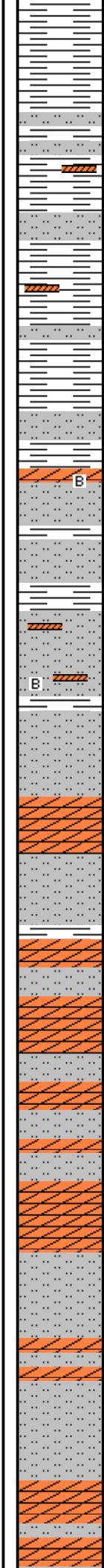
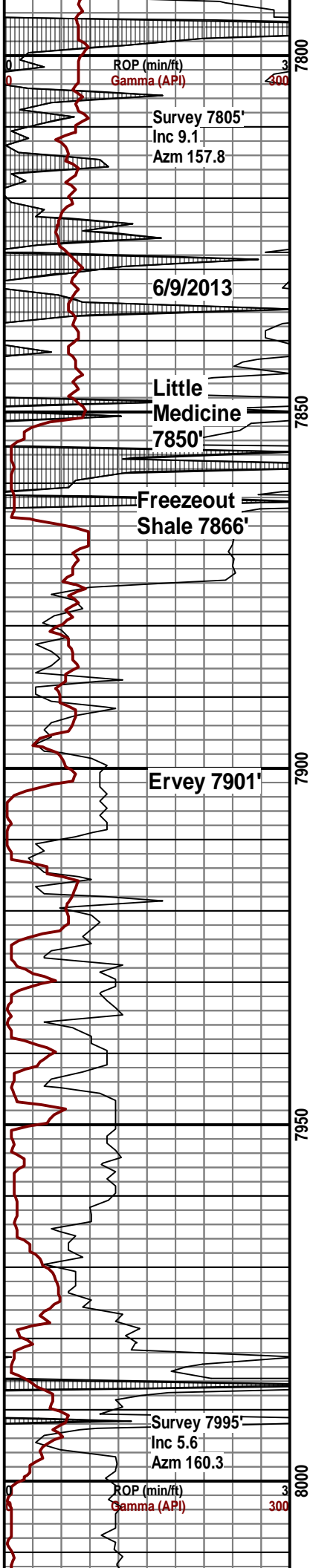
7697'

7729'

7761'

Wt 8.8
Vis 39

TOOH for MWD
tool and BHA at



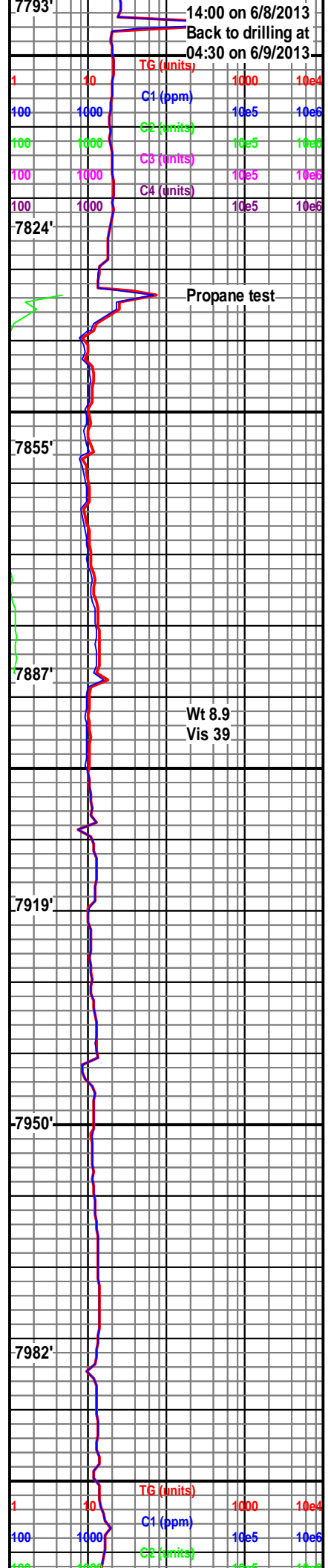
7800-7850 Sh orng-red, blk-y-sb blk-y, v sft, arg, non calc, rr Slstst orng-red-dk gy, blk-y, non calc, frm, rr anhy, nsfoc 70% sh 30% sltst

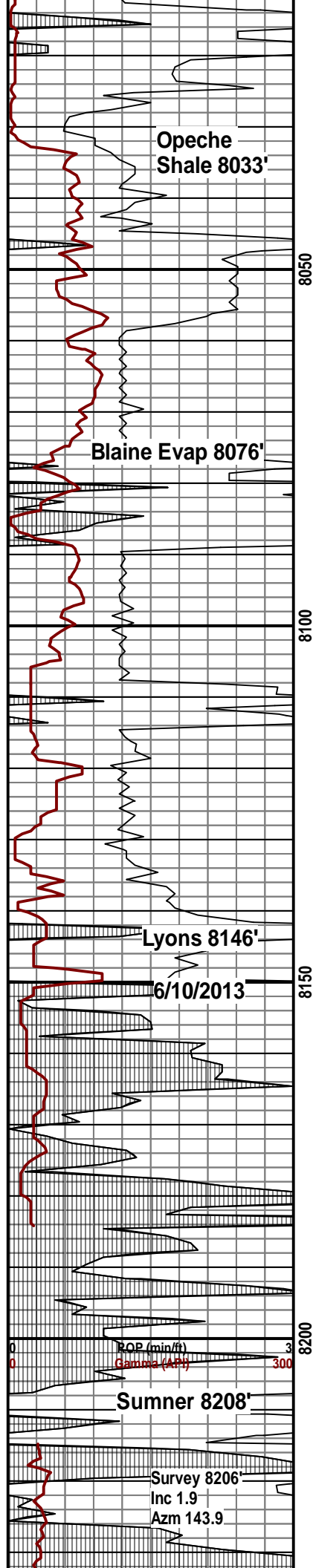
7850-7900 Slstst orng-red-dk gy, sb blk-y-blk-y, non calc, frm, tr Sh orng-red, sb blk-y, v sft, arg, non calc, tr anhy, rr bent, nsfoc 70% sltst 30% sh

7900-7950 Anhy wht, sb blk-y, v sft, Occ Slstst orng-red-dk gy, sb blk-y-blk-y, non calc, frm, 70% anhy 30% sltst

7950-8000 Slstst orng-red-dk gy, sb blk-y-blk-y, non calc, frm, rr Sh orng-dk gy, plty-sb blk-y, sft, tr anhy, rr bent, nsfoc 70% sltst 30% sh

8000-8010 Anhy wht, sb blk-y, v sft, tr Slstst orng-red-dk gy, sb blk-y-blk-y, non calc, frm, 70% anhy 30% sltst





8050-8060 Anhy wht, sb blkly, v sft, tr Sltst
org-red-dk gy, sb blkly-blky, non calc, frm, 90%
anhy 10% sltst

8060-8070 Sltst org-red-dk gy, sb blkly-blky,
non calc, arg, sft, tr anhy, nsfoc 90% sltst 10%
anhy

8070-8080 Sltst org-red-dk gy, sb blkly-blky,
non calc, frm, tr anhy, nsfoc 85% sltst 15% anhy

8080-8090 Sltst red brn-org, sb blkly-blky, non
calc, tr anhyd, nsfoc 80% sltst 20% anhyd

8090-8100 Sltst red brn-org, sb blkly-blky, arg,
grdg to slty sh ip, non calc, tr anhyd, nsfoc 80%
sltst 20% anhyd

8100-8110 Sltst red brn-org, sb blkly-blky, arg,
grdg to slty sh ip, non calc, tr anhyd, nsfoc 80%
sltst 20% anhy

8110-8120 Sltst red brn-org, sb blkly-blky, arg,
grdg to slty sh ip, non calc, occ anhyd, nsfoc
60% sltst 40% anhyd

8120-8130 Sltst red brn-org, sb blkly-blky, arg,
grdg to slty sh ip, non calc, occ anhyd, nsfoc
60% sltst 40% anhyd

8130-8140 Sh dk red brn-brick, sb blkly-plty,
frm-sft, slty ip, abnt sltst a/a, g tr anhyd, nsfoc,
Sltst 50%, Sh 30%, anhy 20%

8140-8150 Ss off wh-pale org, vf-f gr, sb
ang-rd, w srt, mod cmt-uncns, non calc, g tr
uncns sd, nsfoc, 60% ss, 30% sltst, 10% anhyd

8150-8160 Sh red-org-dk gy, sb blkly-plty,
frm-sft, slty ip, occ sltst a/a, rr anhyd, nsfoc,
60% sh 30% sltst 10% anhy

8160-8170 Ss trns-org-wh, gy ip, sb rd-sb ang,
med-f gr, uncon-sfrm, non calc, occ Sltst org,
sb blkly, arg, rr anhy wht, nsfoc 60% ss 30% sltst
10% anhy

8170-8180 Ss trns-org-wh, gy ip, sb rd-sb ang,
med-f gr, uncon-sfrm, non calc, occ Sltst org,
sb blkly, arg, rr anhy wht, nsfoc 60% ss 30% sltst
10% anhy

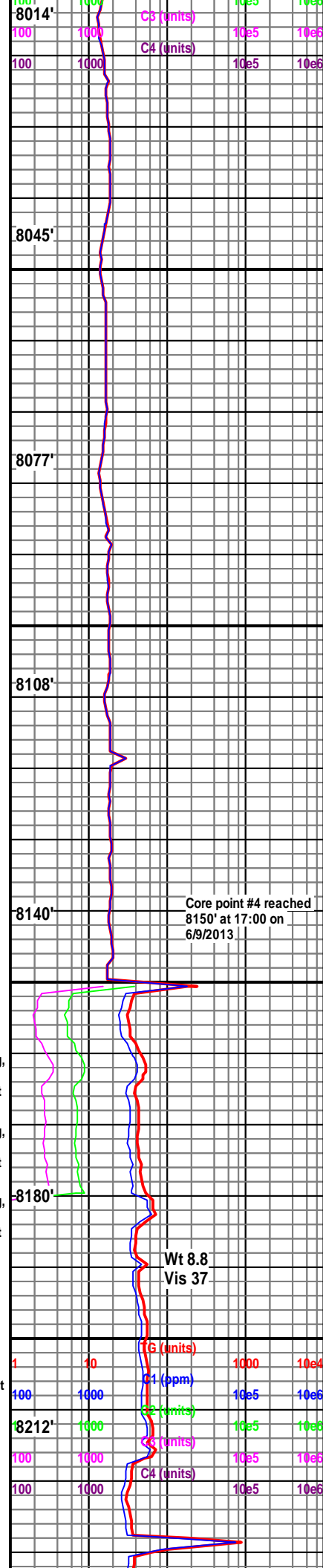
8180-8190 Ss trns-org-wh, gy ip, sb rd-sb ang,
med-f gr, uncon-sfrm, non calc, occ Sltst org,
sb blkly, arg, rr anhy wht, nsfoc 60% ss 30% sltst
10% anhy

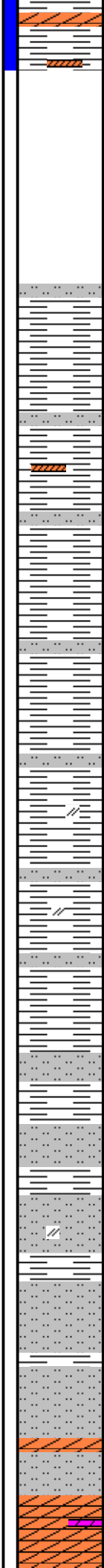
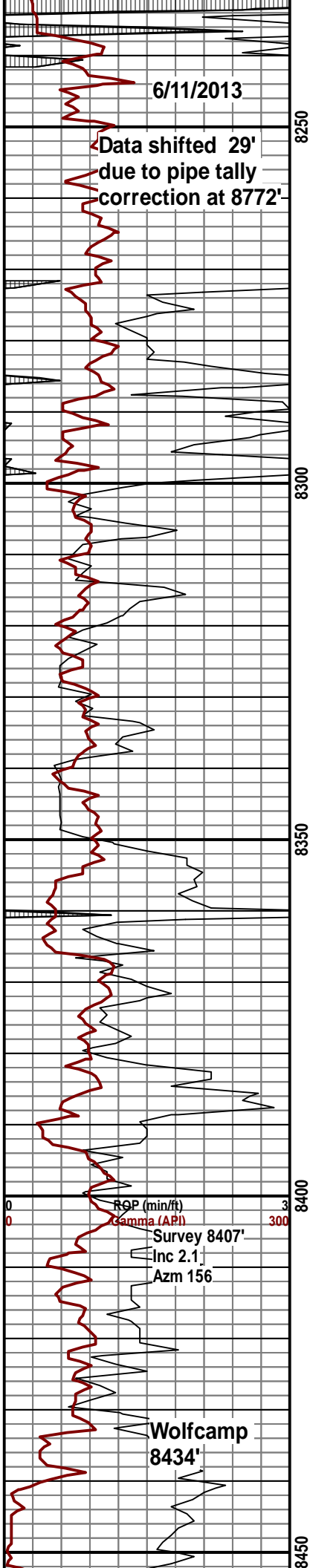
8190-8200 Ss trns-org-gy, sb rd-sb ang, f gr,
uncon-sfrm, non calc, tr Sltst org, sb blkly, arg,
rr anhy wht, nsfoc 70% ss 30% sltst

8200-8210 Ss trns-org-gy, sb rd-sb ang, med-f
gr, p srt, uncon-sfri, non calc, rr Sltst org, sb
blkly, arg, rr anhy, rr bent, nsfoc 85% ss 15% sltst

8210-8220 Ss trns-org-gy, sb rd-sb ang, med-f
gr, p srt, uncon, non calc, rr Sltst org, sb blkly,
arg, rr anhy, rr bent, nsfoc 90% ss 10% sltst

8220-8230 Anhy wht, blkly-sb blkly, sft, tr Ss
trns-org-gy, sb rd-sb ang, med-f gr, p srt,
uncon, non calc, nsfoc 80% anhy 20%ss





8230-8243 Sh orng, sb blkly-plty, v sft, slty ip, occ anhyd, rr sltst blkly grdg to sh ip, nsfoc, 60% Sh 30% anhy 10% sltst

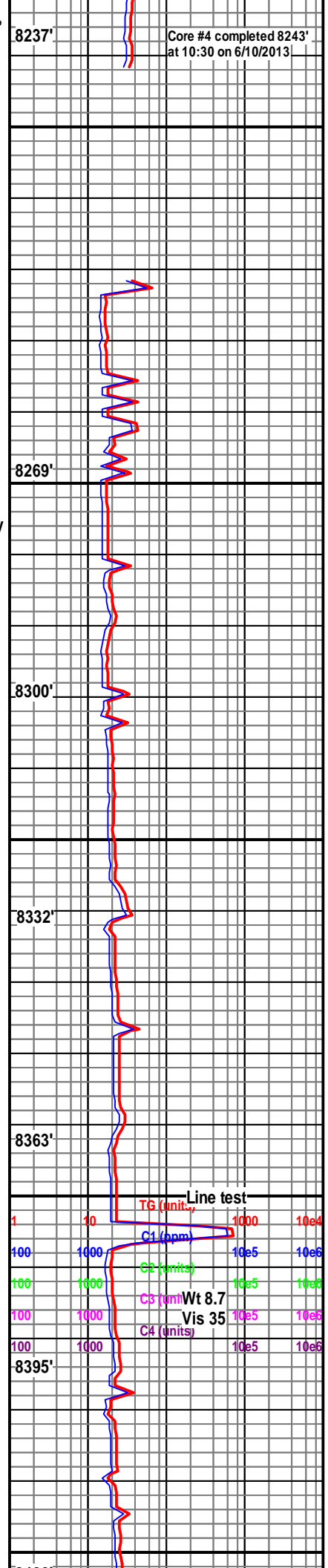
8243-8250 Sh orng, sb blkly-plty, v sft, slty ip, tr sltst blkly grdg to sh ip, rr anhy, nsfoc, 80% Sh 15% sltst 5% anhy

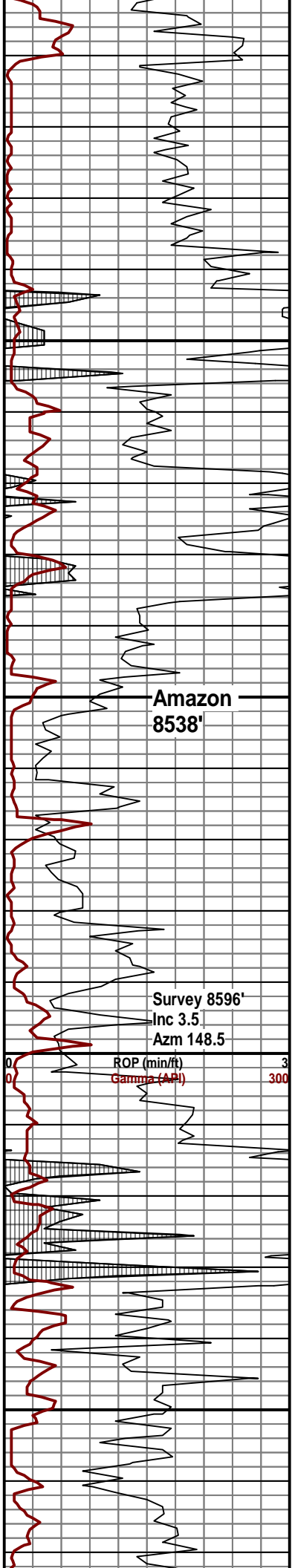
8280-8330 Sh orng, sb blkly-sb plty, v sft, slty ip, tr Sltst blkly grdg to sh ip, rr anhy, nsfoc, 80% Sh 15% sltst 5% anhy

8330-8380 Sh orng, sb blkly-sb plty, v sft, slty ip, occ Sltst blkly, sft, calc, rr anhy, nsfoc, 70% Sh 30% sltst

8380-8430 Sltst orng, blkly, sft, calc, occ Sh orng, sb blkly-sb plty, v sft, slty ip, rr anhy, nsfoc, 70% Sltst 30% sh

8430-8480 Anhydrite wh-pnk, v sft-sl frm. non calc. q tr red-orng sltst cont





8426'
8457'
8489'
8520'
8552'
8584'
8615'
8650'

a/a, rr orng vf gr ss, 1 pc med gy dol with bri yel flor, nsoc 50% anhyd, 45% sltst, 5% sh

8480-8530 Anhydrite wh-pnk-off wh, v sft, non calc, occ lt gy-tan dol, tr red brn sltst a/a, tr pale yel min flor, nsoc, 90% anhyd 10% dol

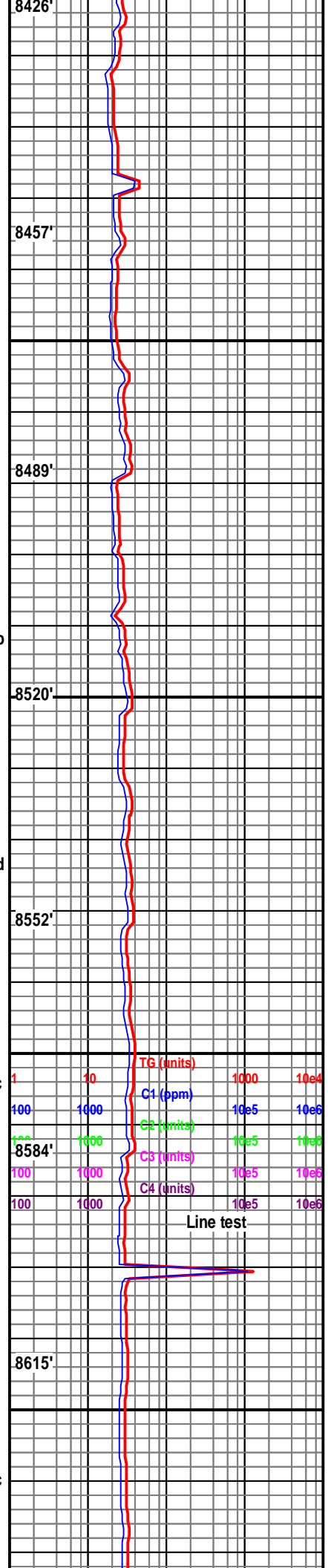
8530-8560 Dol off wh-gy, vf suc, frm, sb blk, cln, abnt anhyd a/a, abnt pale yel min flor, nsoc 60% dol, 40% anhyd

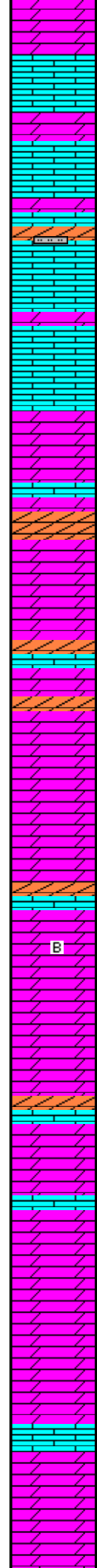
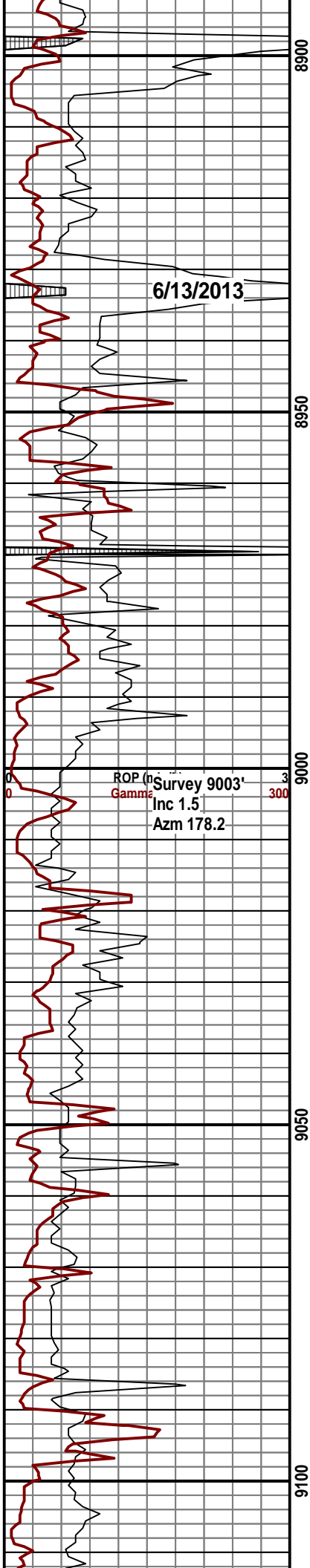
8560-8590 Dol off wh-lt gy-tan, vf suc-micxln, sb blk-pty, cln, g tr anhyd a/a, g tr pale yel flor, nsoc 90% dol, 10% anhyd

8590-8620 Dol off wh-lt gy-tan, vf suc, cln, g tr anhyd a/a, tr pale yel flor, nsoc 80% dol, 20% anhyd

8620-8650 Dol off wh-lt gy-tan, vf suc, cln, g occ anhyd a/a, tr pale yel flor, nsoc 70% dol, 30% anhyd

8650-8680 Dol off wh-lt gy-tan, vf suc, cln, g tr anhyd a/a, tr pale yel flor, nsoc 80% dol, 20% anhyd



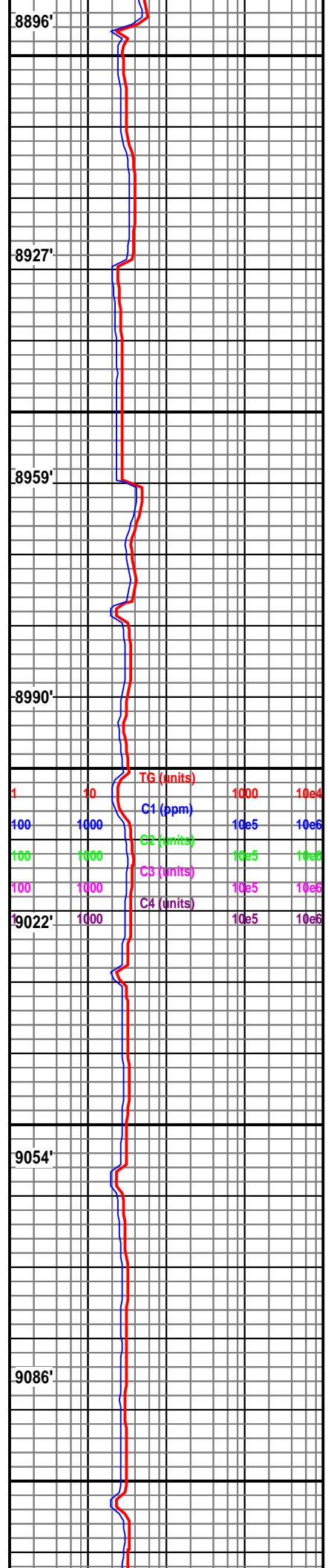


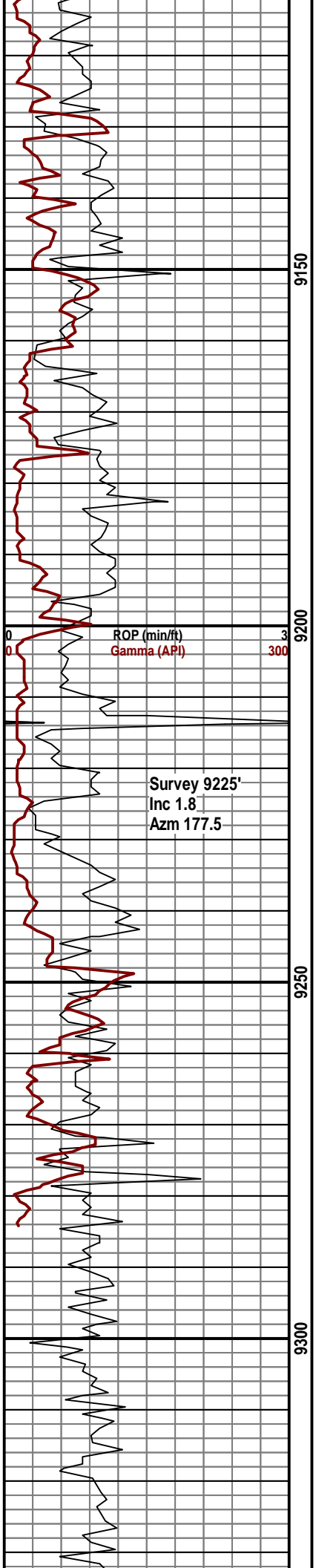
8900-8950 Lmst lt brn-gy-lt grn, blkly, frm, occ Dol off wh-lt gy-tan, vf suc, cln, rr anhyd a/a, nsoc 70% lmst, 20% dol, 10% anhyd

8950-9000 Dol off wh-lt gy-tan, vf suc, cln, occ anhyd a/a, rr lmst, grn-gy, blkly, frm, nsoc 60% dol, 30% anhyd, 10% lmst

9000-9050 Dol wht-off wh, blkly, v sft, suc, rr Anhy wht-gy, plty non calc, rr lmst, grn-gy, blkly, frm, rr bent pale yel, nsoc, 80% dol 10% anhy 10% lmst

9050-9100 Dol wht-off wh, blkly, v sft, suc, rr lmst, grn-gy, blkly, frm, rr bent pale yel, nsoc, 80% dol 20% lmst





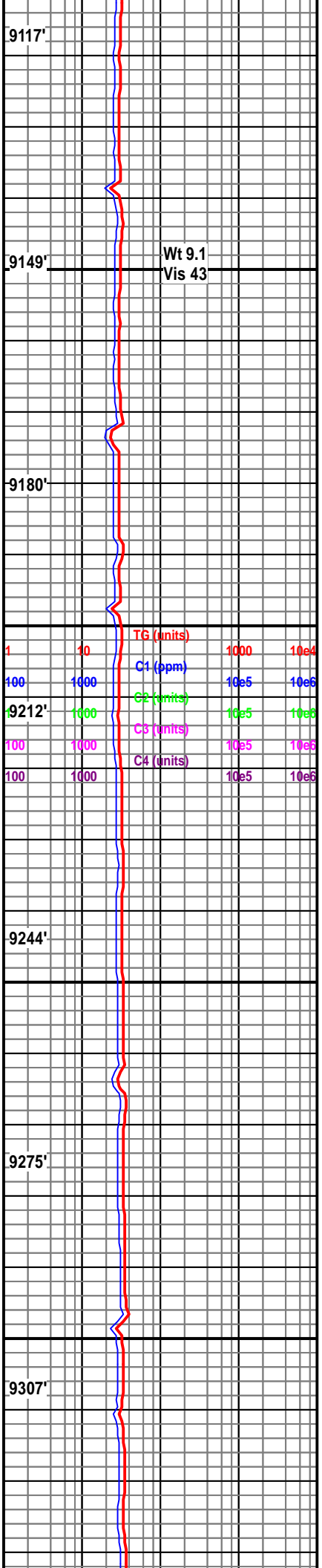
9100-9150 Dol wht-off wh, blk, v sft, suc, rr lmst, grn-gy, blk, frm, rr Slst grn, sb blk, frm, non calc, rr bent pale yel, nsoc, 80% dol 20% lmst

9150-9200 Dol wht-off wh, blk, v sft, suc, rr lmst, grn-gy, blk, frm, rr Slst grn, sb blk, frm, non calc, rr bent pale yel, nsoc, 80% dol 20% lmst

9200-9250 Dol wht-off wh, blk, v sft, suc, tr lmst, grn-gy, blk, frm, rr Slst grn, sb blk, frm, non calc, nsoc, 70% dol 30% lmst

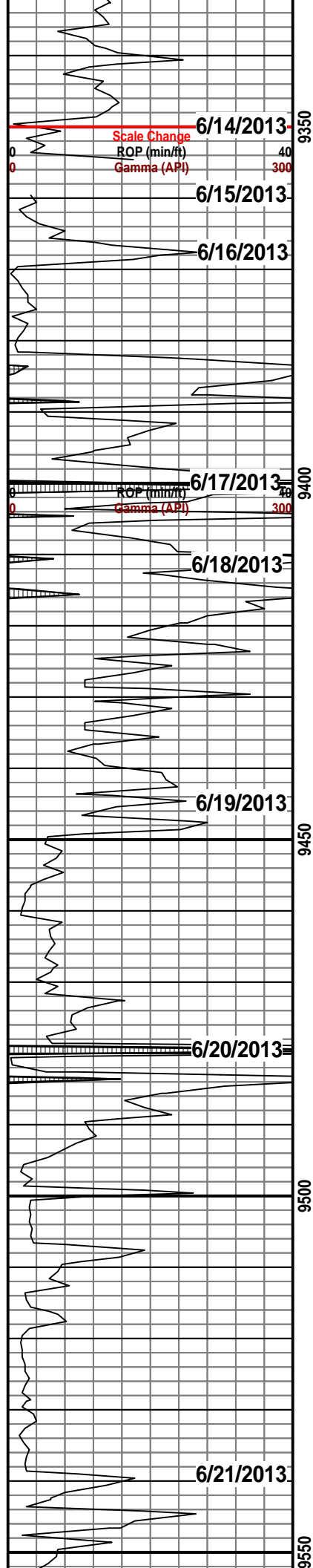
9250-9300 Dol wht-off wh, blk, v sft, suc, occ lmst, grn-gy, blk, hd-frm, yel fluorescence, rr Slst grn, sb blk, frm, non calc, nsoc, 60% dol 40% lmst

9300-9350 Dol wht-off wh, blk, v sft, suc-smooth, occ lmst, grn-gy, blk, hd-frm, yel fluorescence, rr calc, nsoc, 60% dol 40% lmst



Wt 9.1
Vis 43

1	10	TG (units)	1000	10e4
100	1000	C1 (ppm)	10e5	10e6
100	1000	C2 (units)	10e5	10e6
100	1000	C3 (units)	10e5	10e6
100	1000	C4 (units)	10e5	10e6



9350-9360 Dol wht-off wh, blkly, v sft, suc-smooth, Poor sample 90% cavings, sh bl, rd, sltst dk gy, rr inoc, nsfoc

9360-9370 Lmst wht-off wh, blkly, v sft, suc-smooth, Poor sample 90% cavings, nsfoc

9370-9380 Lmst wht-off wh, blkly, v sft, suc-smooth, Poor sample 90% cavings, sh dk gy, plty, slt st org, tr bent, nsfoc

9380-9390 Lmst wht-off wh, blkly, v sft, suc-smooth, Poor sample 90% cavings, sh dk gy-blk, plty, slt st org, tr bent, nsfoc

9390-9400 Lmst wht-off wh, blkly, v sft, suc-smooth, Poor sample 90% cavings, sh dk gy-blk, plty, ss wt, org, tr bent, nsfoc

9400-9410 Lmst wht-off wh, blkly, sl frm, suc-smooth, occ dol wht-off wh, v sft, rr sh dk gy-blk, plty, sltst rd org, nsfoc 75% lmst, 20% dol, 5% sh

9410-9420 Ls off wh-lt gy, sb blkly-plty, v sft-frm, occ lt gy dol, tr dk gy sh, g tr cavings, nsfoc 75% ls, 20% dol, 5% sh

9420-9430 Ls off wh-lt gy, sb blkly-blky, v sft-frm, tr sh dk gy, tr lt gy dol, nsfoc 80% ls, 10% dol, 10% sh

9430-9440 Poor sample collected while reaming, Ls off wh-lt gy, dol lt gy-lt bro, sh dk gy, sltst rd, nsfoc

9440-9450 Dol wht-off wh, blkly, v sft, suc-smooth, occ ls off wh-lt gy, sb blkly-plty, frm, rr sh dk gy-blk, plty, nsfoc, 80% dol, 10% ls, 10% sh

9450-9460 Ls off wh-lt gy, sb blkly-blky, frm, occ sh dk rd-dk gy-gy, tr lt gy dol, nsfoc 60% ls, 30% sh 10% dol

9460-9470 Ls off wh-lt gy, sb blkly-blky, frm, tr lt gy dol, tr sh dk rd-dk gy, nsfoc 80% ls, 10% dol 10% sh

9470-9480 Ls wht-off wh, blkly, v sft, suc-smooth, Poor sample 90% cavings, sh dk gy-blk, plty, slt st org, rr bent, nsfoc

9480-9490 Ls off wh-wht, sb blkly-blky, frm-sft, rr lt gy dol, rr sh dk gy, rd ip, sb blkly sl calc nsfoc 80% ls, 10% dol 10% sh

9490-9500 Ls off wh-wht, sb blkly-blky, frm-sft, occ sltst rd-grn, sb blkly, sft, calc, nsfoc 60% ls 40% sltst

9500-9510 Slstst rd, grn ip, sb blkly, sft, calc, occ Ls off wh-wht, sb blkly-blky, frm-sft, nsfoc 60% sltst 40% ls

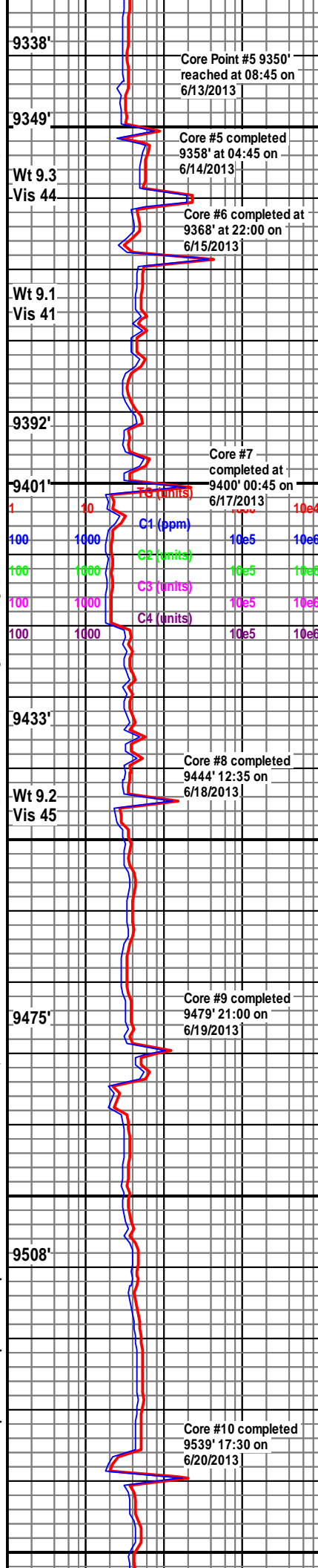
9510-9520 Ls off wh-wht lt gr, sb blkly-blky, sft, rr Slstst rd-grn, sb blkly, sft, nsfoc 90% ls, 10% sltst

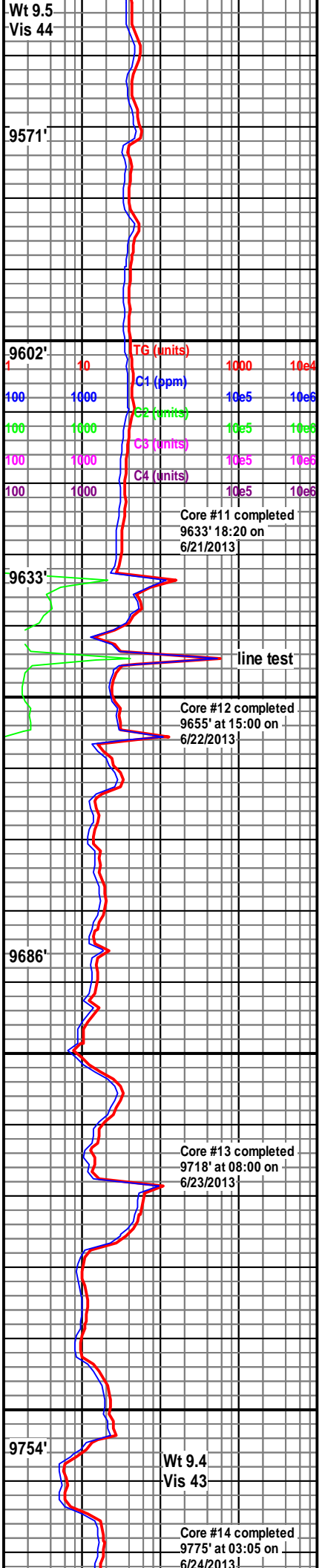
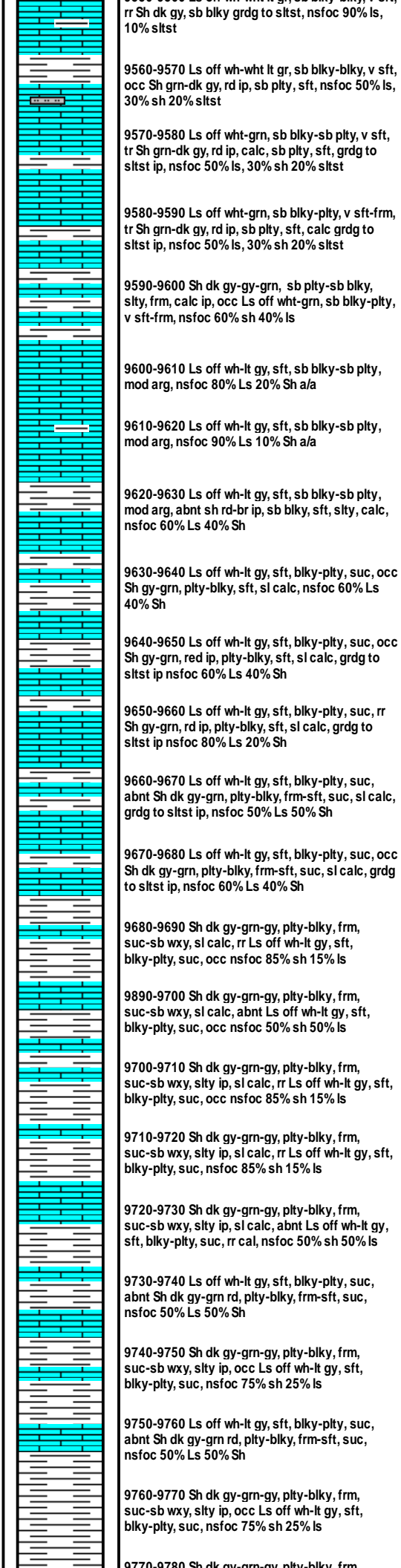
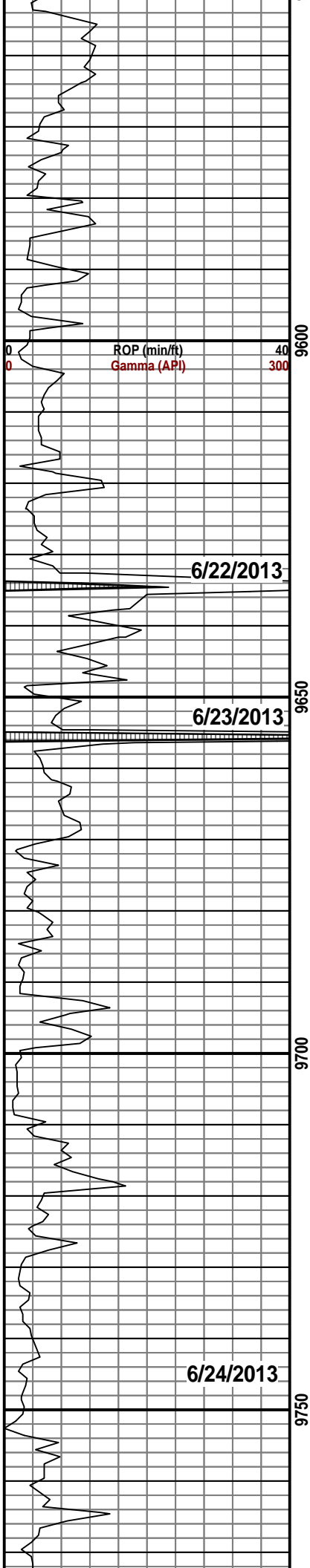
9520-9530 Ls off wh-wht lt gr, sb blkly-blky, sft, rr Slstst rd-grn, sb blkly, sft, nsfoc 90% ls, 10% sltst

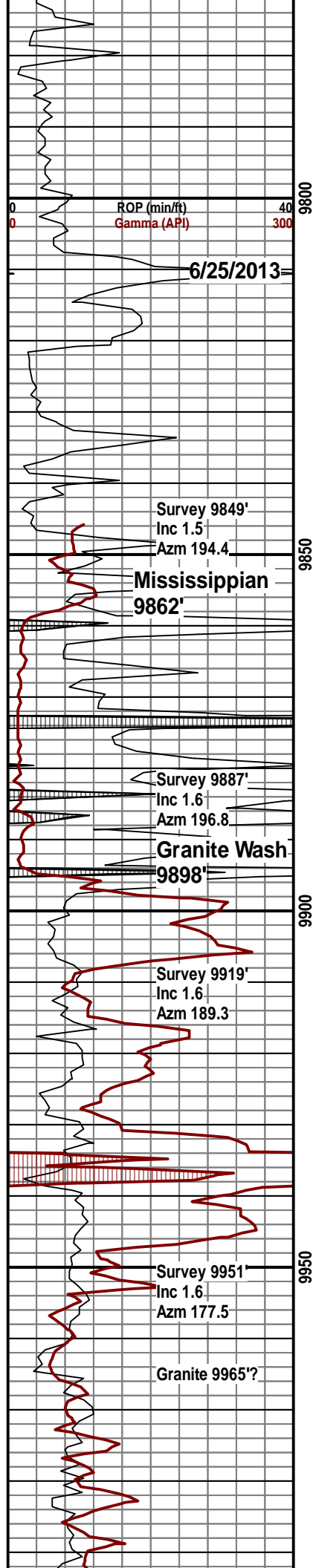
9530-9540 Ls off wh-wht lt gr, sb blkly-blky, sft, rr Slstst rd-grn, sb blkly, sft, nsfoc 90% ls, 10% sltst

9540-9550 Ls wht-off wh, blkly, v sft, abnt Slstst rd, blkly, sft, calc, Poor sample 90% cavings, sh dk gy-blk, plty, nsfoc

9550-9560 Ls off wh-wht lt gr, sb blkly-blky, v sft,







9770-9780 Sh dk gy-grn-gy, pty-blky, frm, suc-sb wxy, slty ip, rr Ls off wh-lt gy, sft, blkly-pty, suc, nsfoc 90% sh 10% ls

9780-9790 Sh rd-grn-gy, pty-blky, frm, suc-sb wxy, slty ip, rr Ls off wh-lt gy, sft, blkly-pty, suc, nsfoc 90% sh 10% ls

9790-9800 Sh rd-grn-gy, pty-blky, frm, suc-sb wxy, slty ip, rr Ls off wh-lt gy, sft, blkly-pty, suc, nsfoc 90% sh 10% ls

9800-9810 Sh rd-bro-grn-gy, pty-blky, frm, suc-sb wxy, slty ip, rr Ls off wh-lt gy, sft, blkly-pty, suc, nsfoc 80% sh 20% ls

9810-9820 Ls off wh-lt gy, sft, blkly-pty, suc, abnt Sh dk gy-grn rd, pty-blky, frm-sft, suc, nsfoc 50% Ls 50% Sh

9820-9830 Sh rd-bro-grn-gy, pty-blky, frm, suc-sb wxy, slty ip, rr Ls off wh-lt gy, sft, blkly-pty, suc, nsfoc 80% sh 20% ls

9830-9840 Sh rd-bro-grn-gy, pty-blky, frm, suc-sb wxy, slty ip, rr Ls off wh-lt gy, sft, blkly-pty, suc, nsfoc 75% sh 25% ls

9840-9850 Sh rd-bro-grn-gy, pty-blky, frm, suc-sb wxy, slty ip, rr Ls off wh-lt gy, sft, blkly-pty, suc, nsfoc 80% sh 20% ls

9850-9860 Sh rd-bro-grn-gy, pty-blky, frm, suc-sb wxy, slty ip, rr Ls off wh-lt gy, sft, blkly-pty, suc, nsfoc 90% sh 10% ls

9860-9870 Ls off wh-lt gy, sft, blkly-pty, suc, occ Sh dk gy-grn rd, pty-blky, frm-sft, suc, nsfoc 80% Ls 20% Sh

9870-9880 Sh gy-grn-dk gy, pty-blky, frm, sb wxy-slty, grdg to sltst ip, tr pyr, tr Ls off wh-lt gy, sft, blkly-pty, rr pyr, abnt cavings, nsfoc 70% sh 30% ls

9880-9890 Sh med gy-grn-dk gy, rd-v col, sb blkly-pty, sl slty, tr pyr, g tr ls a/a, nsfoc 90% sh, 10% ls

9890-9900 Ss off wh, vf-med gr, ang-sb rnd, p srt, uncns, pred qtz, occ brn biotite mica, abnt cavings, nsfoc 10% ss, 90% cavigs

9900-9910 Ss off wh, grn, vf-med gr, ang-sb rnd, p srt, uncns, pred qtz, occ granite pbbles, brn biotite mica, abnt cavings, nsfoc 25% ss, 75% cavigs

9910-9920 Ss off wh, grn, vf-med gr, ang-sb rnd, p srt, uncns, pred qtz, brn biotite mica, abnt cavings, nsfoc 25% ss, 75% cavigs

9920-9930 Ss off wh, grn, vf-med gr, ang-sb rnd, p srt, uncns, pred qtz, brn biotite mica, abnt cavings, nsfoc 25% ss, 75% cavigs

9930-9940 Ss off wh, grn, vf-med gr, ang-sb rnd, p srt, uncns, pred qtz, brn biotite mica, off wt anhydt, abnt cavings, nsfoc 25% ss, 75% cavigs

9940-9950 Ss off wh, grn, vf-med gr, ang-sb rnd, p srt, uncns, pred qtz, brn biotite mica, off wt anhydt, abnt cavings, nsfoc 25% ss, 75% cavigs

9950-9960 Ss trns-l-wh, f-med gr, sb ang-ang, mod srt, uncons, abnt anhy wh-trns-l, sft, occ mica, gn-brn, abnt cav, nsfoc 70% Ss 20% anhy 10% mica

9960-9970 Ss off wh, f-med gr, sb ang-ang, mod srt, uncns, abnt mica, abnt cavings nsfoc 80% ss 20% cavings

9970-9980 Ss off wh-gy, mottled, med gr, pred ang granite clasts, up to pebble, ang, abnt mica, nsfoc 80% ss 20% cavings

9980-9990 Ss trns-l-off wh, f-lg gr, sb ang-sb rd, p srt, uncons, abnt mica, occ cavings nsfoc 80% ss 20% cavings

9990-10000 Ss trns-l-off wh, f-med gr, ang-sb

