



# GEOSEARCH LOGGING INC.

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

Well Name: Zogol 2213H  
 Location: Marion Co., West Virginia  
 License Number: 47-049-02084  
 Spud Date: 3/5/2011  
 Surface Coordinates: Lat: 39.48549  
 Long: -80.34958  
 Bottom Hole Coordinates: Lat: 39.486607  
 Long: -80.337395  
 Ground Elevation (ft): 1,233'      K.B. Elevation (ft): 1,248'  
 Logged Interval (ft): 3,000'      To: 10,462'      Total Depth (ft): 10,462'  
 Formation: Marcellus  
 Type of Drilling Fluid: Air drilling, Oil Based Mud

Region: APPALACHIA  
Drilling Completed: 3/23/2011

Printed by MUD.LOG from WellSight Systems 1-800-447-1534 www.WellSight.com

## OPERATOR

Company: XTO ENERGY  
 Address: 600 E. Exchange Ave.  
 Fort Worth, TX 76164

## GEOLOGIST

Name: Kelley Hartley & Daniel Blake  
 Company: Geosearch Logging Inc.,  
 Address: P.O. Box 6005  
 Edmond, OK 73083-6005  
 (405) 340-5545

## Comments

2 Manned Logging Service  
 Start Logging Date: 3/10/2011  
 OBM: 3/15/2011  
 Released Logging Date: 3/23/2011  
 Drilling Contractor: UDI# 209  
 PC 194,ML 334,IBall 0096, HASP V15A, H22

## ROCK TYPES

Anhy  
 Bent  
 Brec  
 Cht  
 Clyst  
 Coal  
 Congl

Dol  
 Gyp  
 Igne  
 Lmst  
 Meta  
 Mrlst  
 Salt

Shale  
 Shcol  
 Shgy  
 Sltst  
 Ss  
 Till  
 Sandstn

Siltstn  
 Granwash  
 Dolowash  
 Cement  
 Granite  
 Hotshale

### ACCESSORIES

- MINERAL**
- Anhy
  - Arggrn
  - Arg
  - Bent
  - Bit
  - Breclfrag
  - Calc
  - Carb
  - Chtdk
  - Chtit
  - 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

### OTHER SYMBOLS

- POROSITY TYPE**
- Earthy
  - Fenest
  - Fracture
  - Inter
  - Moldic
  - Organic
  - Pinpoint
  - Vuggy

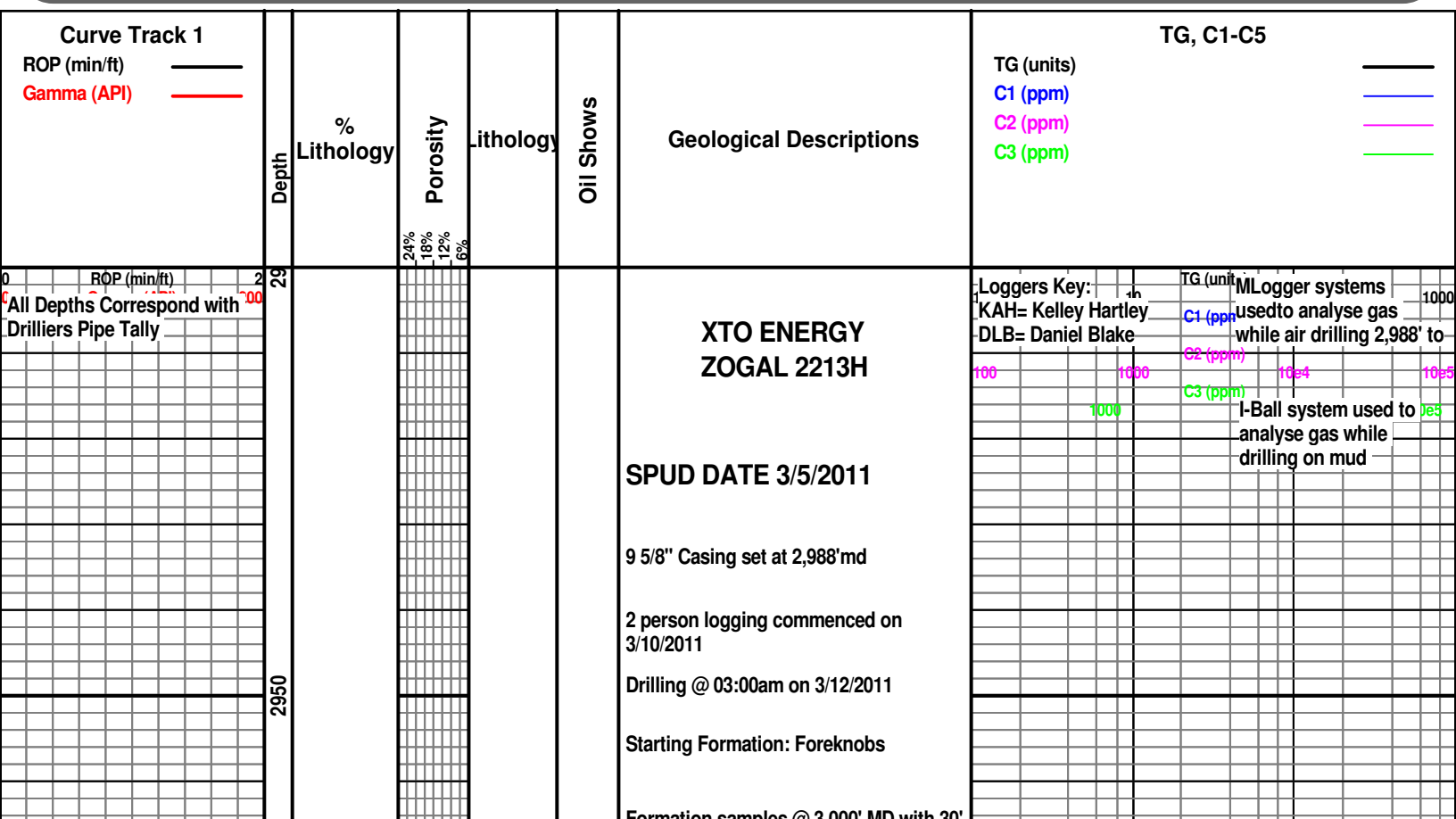
- SORTING**
- Well
  - Moderate
  - Poor

- ROUNDING**
- Rounded
  - Subrnd
  - Subang
  - Angular

- OIL SHOWS**
- Even
  - Spotted
  - Ques
  - Dead
  - Poor
  - Fair
  - Good
  - Excelent
  - Csgshoe

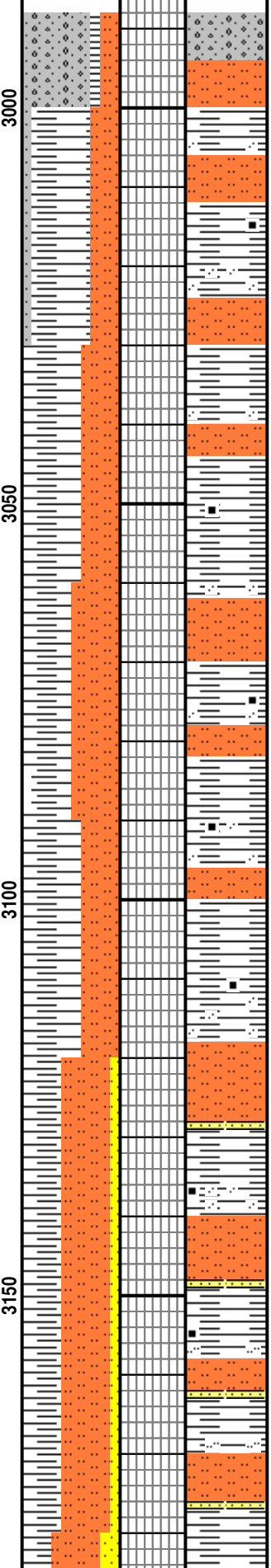
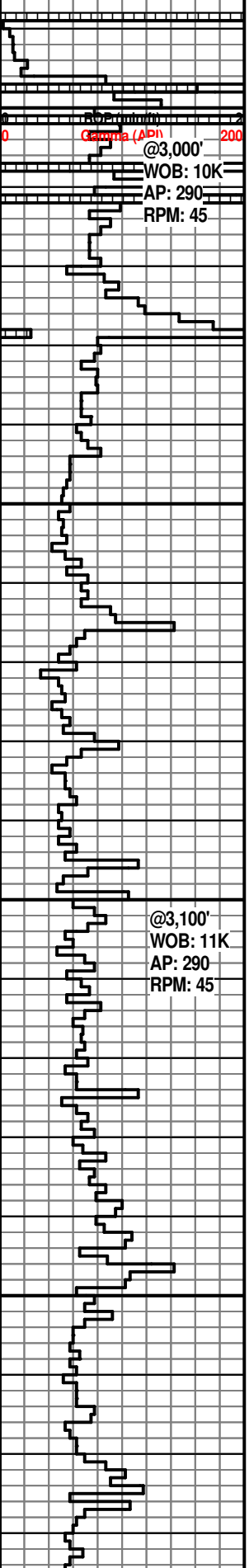
- INTERVALS**
- Core
  - Dst

- EVENTS**
- Rft
  - Sidewall



NB #4, Smith,  
 Tri-cone @ 2,988'  
 Serial# PS4166.  
 Type: F47YA

3/12/2011@2,988'



Formation samples @ 3,000' MD with 50 spot samples

SH: lt- m gy, f- m tex, sl hd, n calc, blk- pty, sity ip grdng to sltst, micmica, vf carb incl

SLTST: lt- m gy, slt gr in lt- m gy arg mtx, grdng to sity sh, blk- pty, micmica, vf carb incl; SH: lt- m gy, f- m tex, sl hd, n calc, blk- pty, sity ip grdng to sltst, micmica, vf carb incl

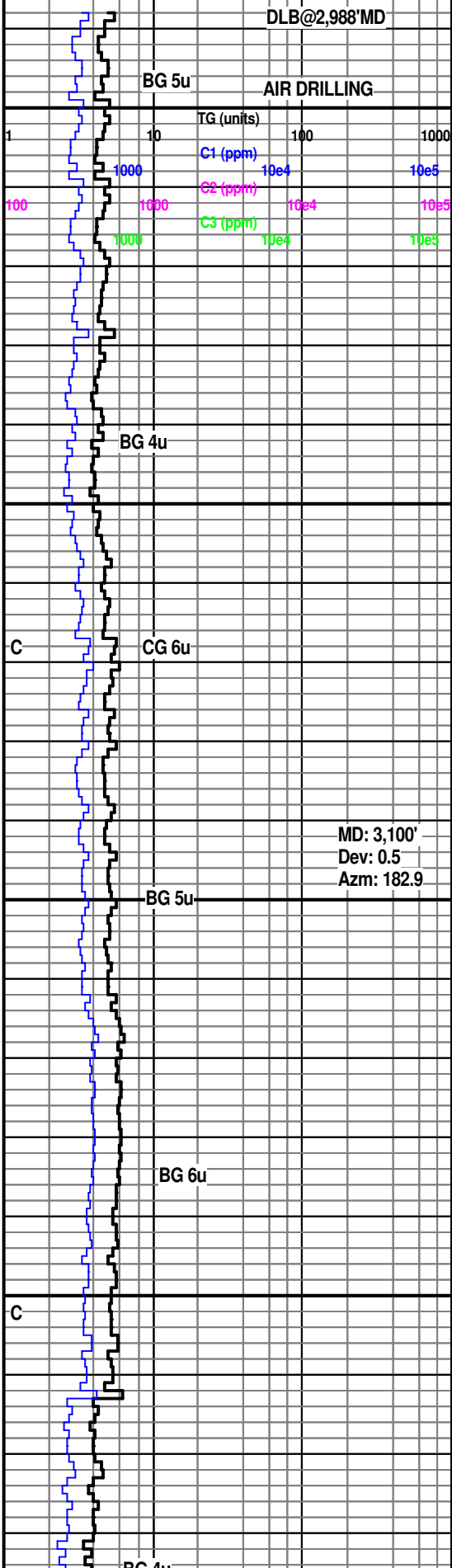
SLTST: lt- m gy, slt gr in lt- m gy arg mtx, grdng to sity sh, blk- pty, micmica, vf carb incl; SH: lt- m gy, f- m tex, sl hd, n calc, blk- pty, sity ip grdng to sltst, micmica, vf carb incl

SH: lt- m gy, f- m tex, sl hd, n calc, blk- pty, sity ip grdng to sltst, micmica, vf carb incl, occ carb strks

SLTST: lt- m gy, slt- vf snd gr in lt- m gy arg mtx, grdng to sity sh, blk- pty, micmica, vf carb incl; SH: lt- m gy, f- m tex, sl hd, n calc, blk- pty, sity ip grdng to sltst, micmica, vf carb incl, occ carb strks

SLTST: lt- m gy, slt- vf snd gr in lt- m gy arg mtx, grdng to sity sh, blk- pty, micmica, vf carb incl; SH: lt- m gy, f- m tex, sl hd, n calc, blk- pty, sity ip grdng to sltst, micmica, vf carb incl, occ carb strks

SS: lt- m gy, slt- vf snd gr snd in lt- m gy



DLB@2,988'MD

BG 5u AIR DRILLING

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

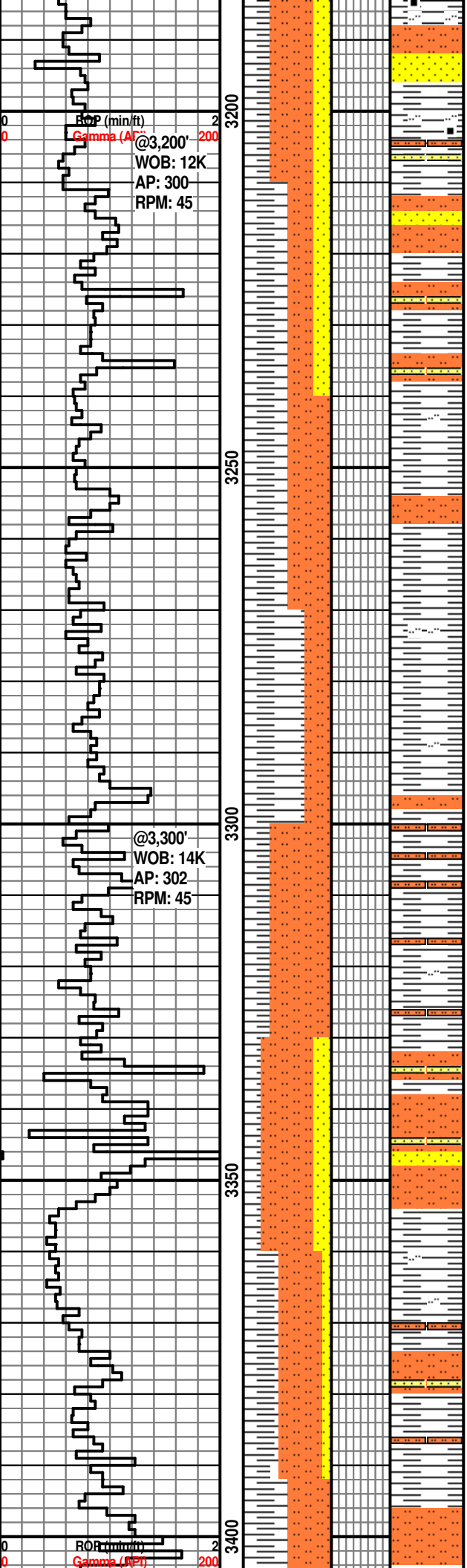
BG 4u

CG 6u

BG 5u

BG 6u

MD: 3,100'  
 Dev: 0.5  
 Azm: 182.9



arg mtx, w srt, sbang, sl hd, micmica, vf carb inc; SLTST: lt- m gy, slit- vf snd gr in lt- m gy arg mtx, grdng to slty sh, blk- pty, micmica, vf carb inc; SH: lt- m gy, f- m tex, sl hd, n calc, blk- pty, slty ip grdng to sltst, micmica, vf carb incl

SH: lt- m gy, sl hd, n calc, blk- pty, slty ip grdng to sltst ip, micmica; SLTST: lt- m gy, slit- vf snd gr in lt- m gy arg mtx, grdng to slty sh, blk- pty, micmica, vf carb inc; SS: lt- m gy, slit- vf snd gr snd in lt- m gy arg mtx, w srt, sbang, sl hd, micmica

SH:rdbn ip, rr lt gy, frm, n calc, blk- pty, slty ip grdng to sltst ip, micmica; SLTST: rdbn to brn, tr dk rdbn, slit- vf snd gr in lt- m gy arg mtx, grdng to slty sh, blk- pty, micmica

SH: ltgy- gy, frm, rr sl hd, n calc, blk- pty, slty ip grdng to sltst ip, micmica; SLTST: gy, ltgy ip, tr rdbn to brn, slit- vf snd gr in lt- m gy arg mtx, grdng to slty sh, blk- pty, micmica

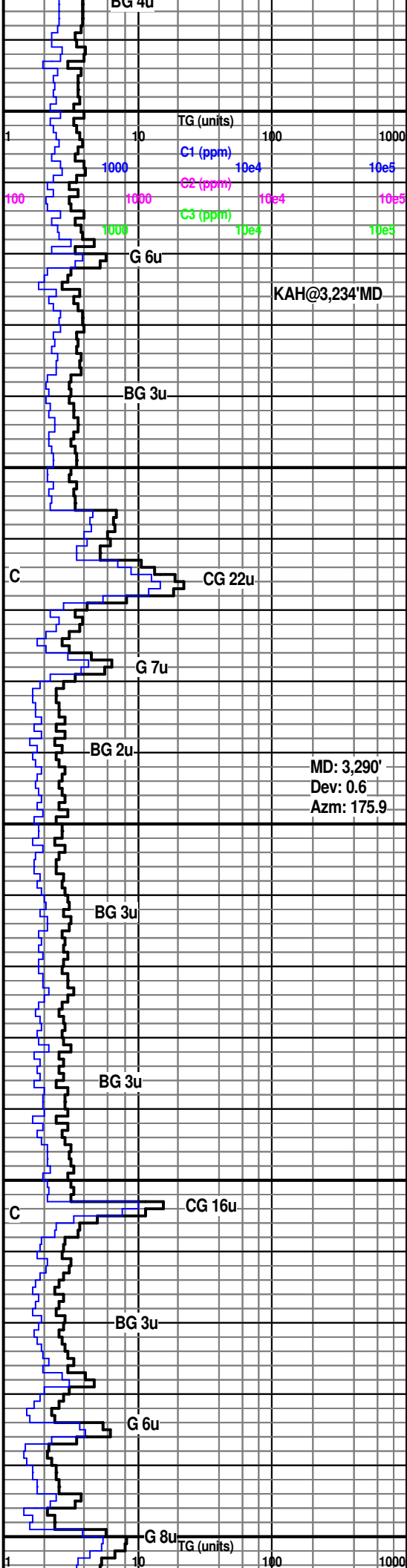
SLTST: rdbn to lt brn, lt gy-gy ip, slit- vf snd gr, grdng to slty sh, blk- pty, micmic; SH: ltgy- gy, frm-sl hd, rr hd, n calc, blk- pty, slty ip grdng to sltst ip, micmica

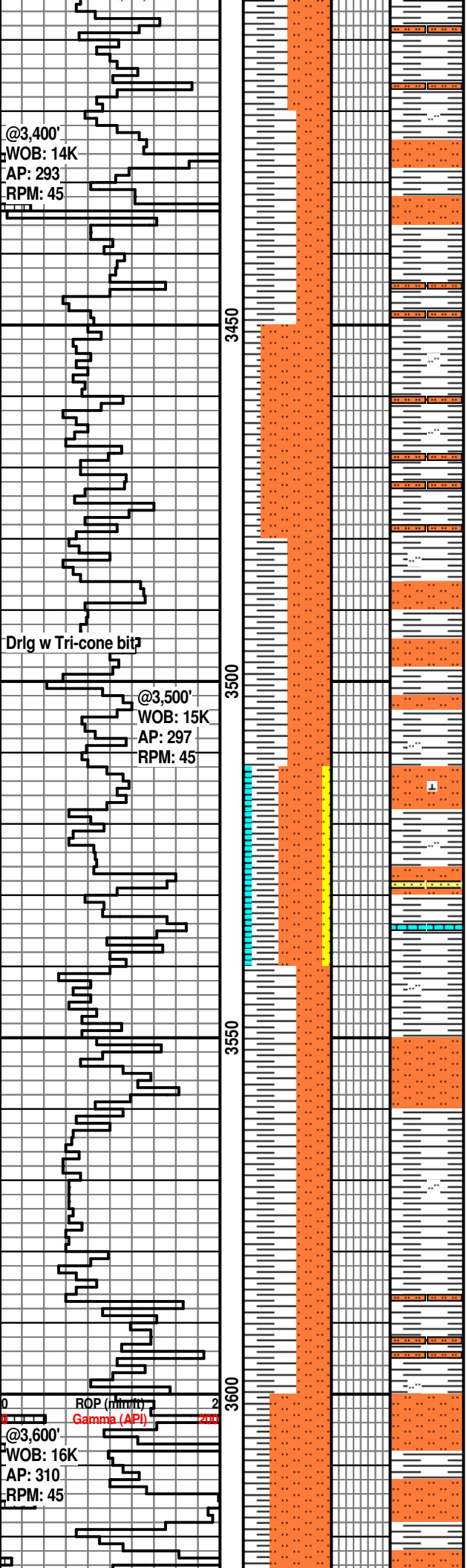
**Speechley Sand @ 3,330'MD**

SLTST: lt gy-gy ip, md gy ip, tr lt rdbn, slit- vf snd gr, blk- pty, micmic; SH: ltgy- gy, sl hd, rr hd/frm, n calc, blk- pty, tr amorph, slty ip grdng to sltst ip, micmica; SS: ltgy, wht, slit- vf snd gr snd in lt- m gy arg mtx, m-p srt, sbang, sb rnd ip, sl hd, micmica, silc cmt

SLTST: lt gy-gy, slit- vf snd gr, blk- pty, micmic; SH: ltgy- gy, sl hd, hd ip, n calc, blk, tr amorph, slty ip grdng to sltst ip, micmica; tr SS: wht, slit- vf snd gr, m-p srt, sbang, sl hd, micmica, silc cmt

SH: ltgy- gy, frm, sl hd ip, rr hd, n calc, blk- pty, slty ip grdng to sltst ip, micmica, tr fn pyr; SLTST: lt gy-gy, frm-sl hd, slit- vf snd ar, blk- pty





SH: ltgy- gy, sl hd-hd, n calc, blk-pty, vry slty ip grdng to sltst ip, micmica, rr fr pyr; SLTST: lt gy-gy, sl hd, slt- vf snd gr, blk- pty, micmic, n calc, vry sl calc ip

SLTST: lt rdbrn, tr gy, hd, sl hd ip, slt- vf snd gr, blk- pty, micmica, sl calc; SH: ltgy- gy, sl hd, n calc, blk-pty, slty ip grdng to sltst ip, micmica

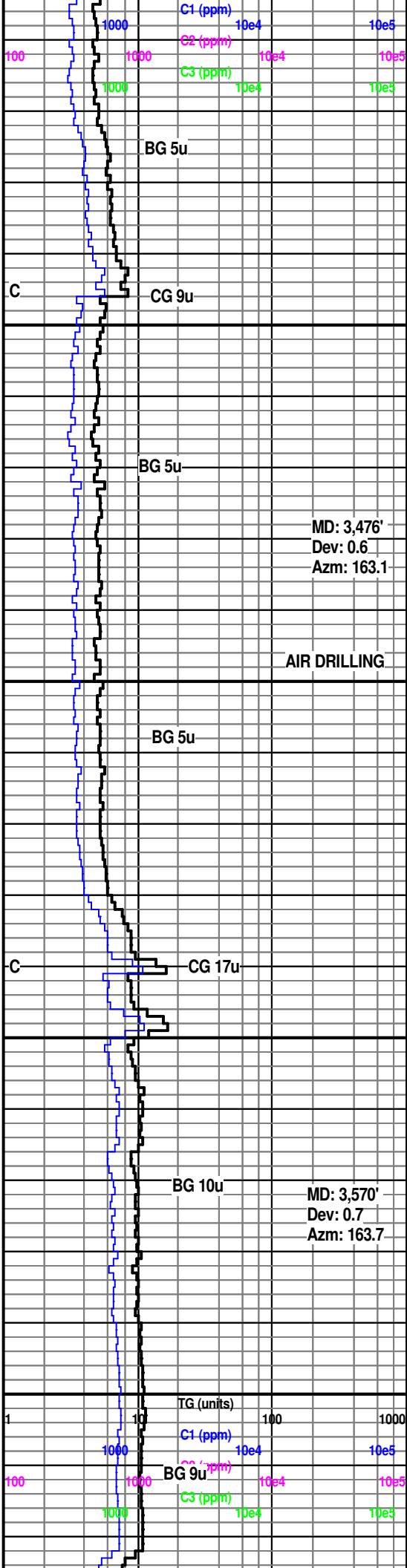
SH: ltgy- gy, sl hd-frm, n-sl calc, blk-pty, slty ip grdng to sltst ip; SLTST: lt gy, gy ip, hd-sl hd, slt- vf snd gr, blk- pty, micmica, sl calc;

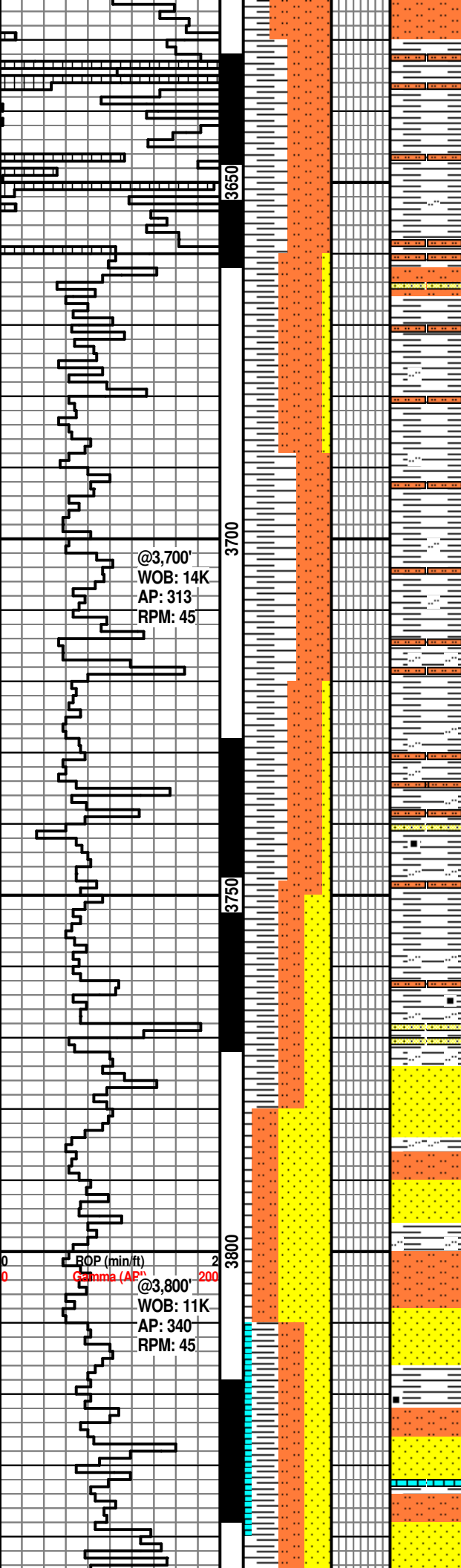
SLTST: lt gy-gy ip, md gy ip, tr lt rdbrn, slt- vf snd gr, blk- pty, micmica, sl calc, calc frgs ip; SH: ltgy- gy, sl hd, rr hd/frm, n-sl calc, blk- pty, tr amorph, slty ip grdng to sltst ip, micmica; tr LS, tr SS

SH: ltgy- gy, frm, sl hd-hd ip, n calc, blk- pty, slty ip grdng to sltst ip, micmica; SLTST: lt gy-gy ip, slt- vf snd gr, blk- pty, micmica, sl calc

SH: ltgy- gy, frm, sl hd-hd ip, n calc, blk- pty, slty ip grdng to sltst ip, micmica; SLTST: lt gy-gy ip, slt- vf snd gr, blk- pty, micmica, n calc

SLTST: md gy, lt/dk gy ip, amorph-blky, tr pty, micmica, n-sl calc, fr [yr ip; SH: gy, frm, sl hd-hd ip, n calc, blk- pty, slty ip grdng to sltst ip, micmica





SLTST: lt rdbrn iup, gy ip, amorph-blky, micmica, fn pyr ip, sl calc, tr calc; SH: gy, frm, n calc, tr sl calc, blkly- pty, amorph, slty ip grdng to sltst ip, micmica

SLTST: lt rdbrn ip, gy ip, amorph-blky, micmica, fn pyr ip, sl calc- calc; SH: gy, frm, n calc, tr sl calc, blkly- pty, slty ip grdng to sltst ip, micmica; tr ltgy SS

SH: gy, frm-sl hd, hd ip, n calc, tr sl calc, blkly- pty, amorph ip, slty ip, vry slty ip grdng to sltst ip, micmica, tr snd grn ip; SLTST: gy, amorph-blky, micmica, sl calc- calc; calc frgs ip

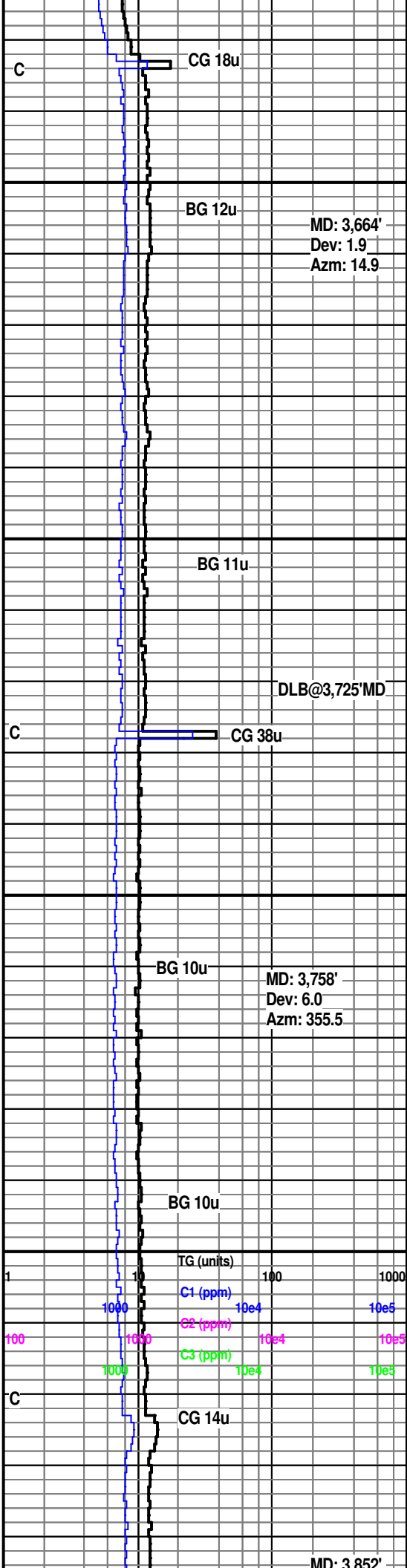
SLTST: lt- m gy, slit- vf snd gr in lt- m gy arg mtz, grdng to slty sh, blkly- pty, micmica, vf carb inc; SH: lt- m gy, f- m tex, sl hd, n calc, blkly- pty, slty ip grdng to sltst, micmica, vf carb incl, occ carb strks

SS: lt- m gy, slit- vf snd gr snd in lt- m gy arg mtz, w srt, sbang, sl hd, micmica, vf carb inc; SLTST: lt- m gy, slit- vf snd gr in lt- m gy arg mtz, grdng to slty sh, blkly- pty, micmica, vf carb inc; SH: lt- m gy, m gy ipf- m tex, sl hd, n calc, blkly- pty, slty ip grdng to sltst, micmica, vf carb inc

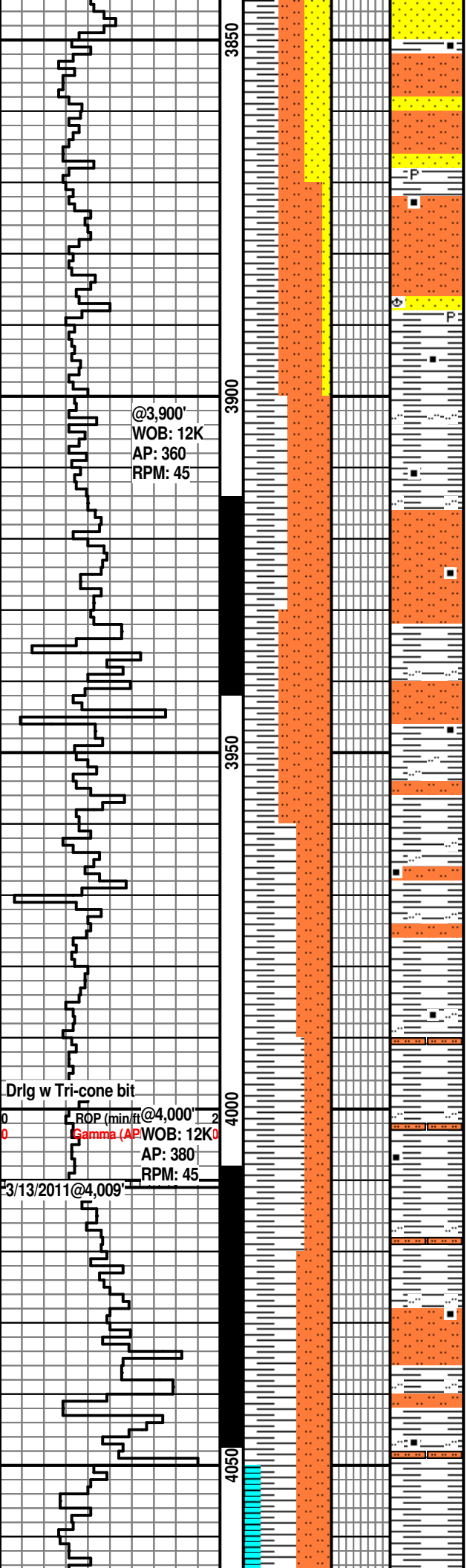
**Upper Balltown Sands @ 3,780'**

SS: pred lt gy, vf- f gr, m srt, sbang- sbrnd, hd, m calc, tr vis por, sme lt- m gy, slit- vf snd gr snd in lt- m gy arg mtz, occ m dk gy, slit- vf snd gr snd in lt- m gy arg mtz, w/ abndt carb incl, no vis por

SS: lt- m gy- gy grn, slit- vf, grdtnl w/ sltst, w srt, sbang, sl hd, calc cmt, micmica, vf carb inc; LS: buff, mdst, crpxln, mass; SH: lt- m gy, m gy ip, f- m tex, sl hd, n calc, blkly- pty, slty ip grdng to sltst, micmica, vf carb inc







SS: lt- m gy, slit- vf gr, grdtnl w/ sltst, w srt, sbang, sl hd, n calc, micmica, vf carb incl & strks, tr pyritized carb strk; SH: m dk gy, f- m tex, slty ip, grdtnl w/ sltst ip, sl hd, n calc, blk- pty, micmica, vf carb incl

SLTST: m gy, slit- vf grn snd in m gy arg mtx, sl hd, n calc, occ calc foss frags, brac, micmica, carb incl & strks, tr pyritized carb strks

SLST: lt gy, slit- vf grn snd in lt gy arg mtx, grdtnl w/ slty sh, sl hd, blk- pty, n calc, micmica, vf carb incls

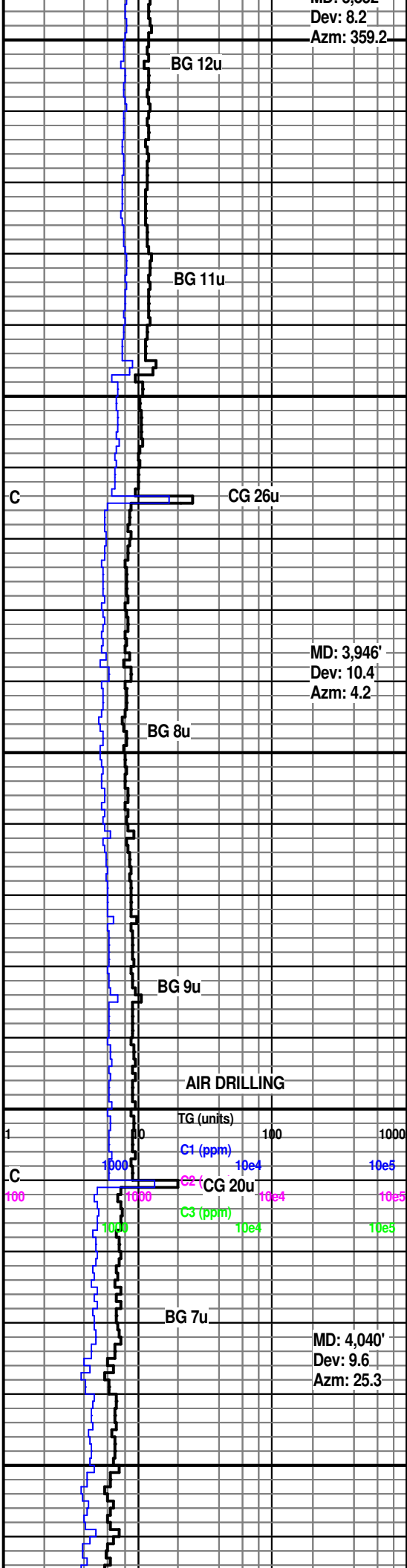
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SLST: lt gy, slit- vf grn snd in lt gy arg mtx, grdtnl w/ slty sh, sl hd, blk- pty, n- sl calc, abndt mica, vf carb incls; SH: lt gy, sli hd- hd, blk- pty, n calc, slty ip grdng to sltst, micmica, vf carb incl

SLTS: lt- m gy, sl brn ip, sl hd, blk- pty, n calc, occ calc foss frags, micmica, occ vf carb incl; SH: lt- m gy, sli hd- hd, blk- pty, n calc, slty ip grdng to sltst, micmica, vf carb incl

SLTS: lt- m gy, sl brn ip, occ m dk gy, sl hd, blk- pty, n calc, micmica, occ vf carb incl; SH: lt- m gy, sli hd- hd, blk- pty, n calc, slty ip grdng to sltst, micmica, vf carb incl

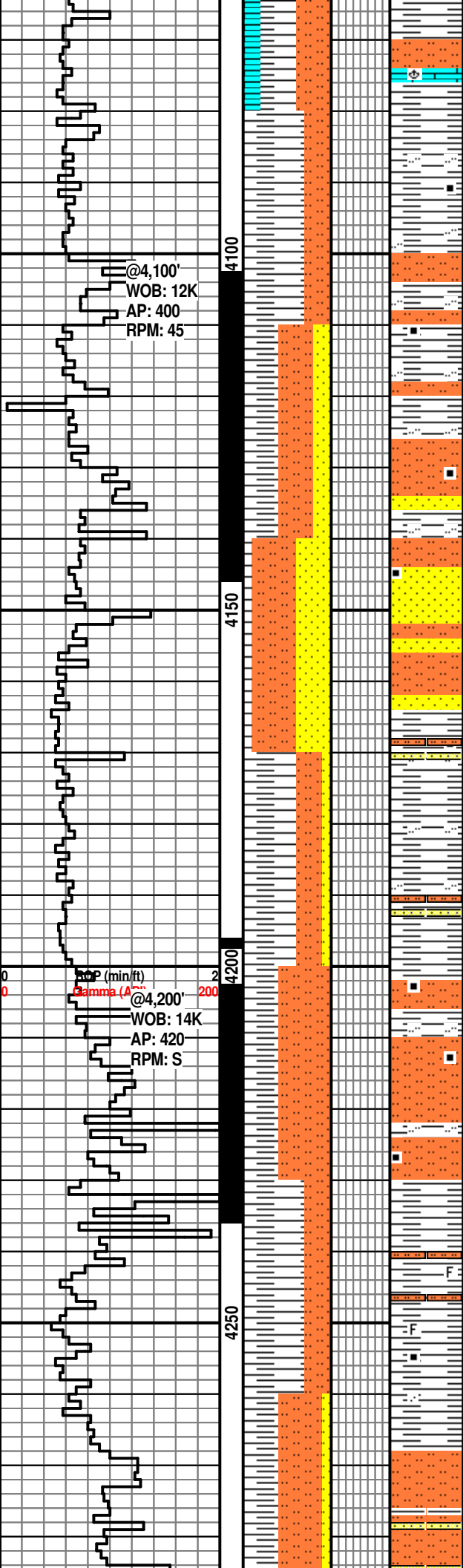
LS: buff- lt gy, mdst- wkst, crpxln- vf



MD: 3,946'  
Dev: 8.2  
Azm: 359.2

MD: 3,946'  
Dev: 10.4  
Azm: 4.2

MD: 4,040'  
Dev: 9.6  
Azm: 25.3



xln, dns, arg ip, slty ip grndg to calc sltst, occ foss frag, brac?

SH: lt- m gy, sli hd- hd, blk- pty, n calc, slty ip grndg to sltst, micmica, vf carb incl, tr foss ls

SS: lt gy, slt- vf gr, grdtl w/ sltst, w srt, sbang, sl hd, sl calc cmt, arg, vf carb incl ip; SLTST: lt gy, sl hd, blk, n- sl calc, arg, vf carb incl; SH: SH: lt- m gy, sl hd- hd, blk- pty, n calc, slty ip grndg to sltst, micmica, vf carb inc

**Benson Sandstone@4,140'**

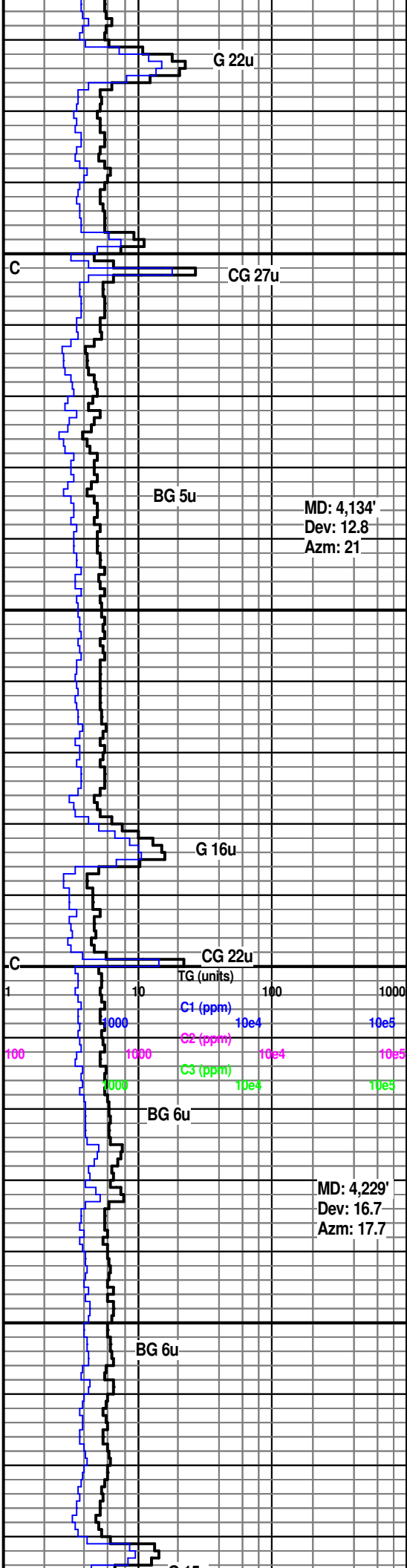
SS: lt gy, slt- vf gr, grdtl w/ sltst, w srt, sbang, sl hd, sl calc cmt, arg, vf carb incl ip; SLTST: lt gy, sl hd, blk, n- sl calc, arg grndg to slty sh ip, vf carb incl

SH: lt gy, sl h- hd, blk, n calc, vf cab incl, slty ip grndg to sltst, occ intbd slt- vf SS: lt gy, w srt, sbang- sbrnd, hd, sl calc, arg

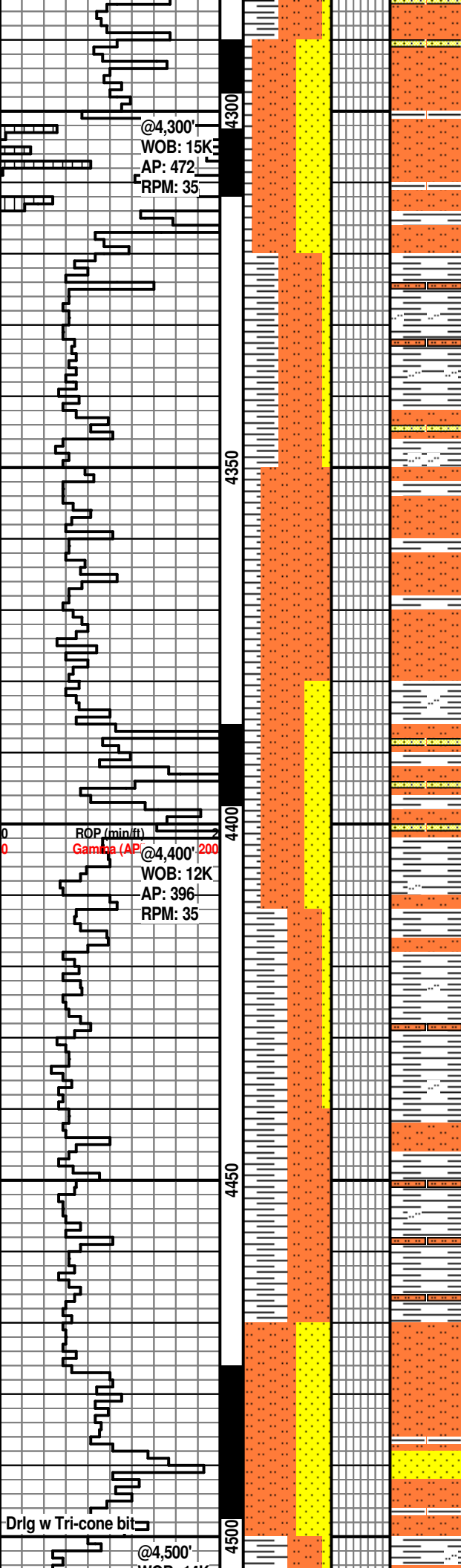
SLTST: m dk gy- gy brn, sl hd- hd, blk- pty, n calc, abndt vf carb incl, arg grndg to slty sh

SH: pred lt gy, occ m dk gy, f- m tx, slty ip grndg to sltst, sl hd- hd, blk, n calc, occ calc foss frag, vf carb incl ip

SLTST: pred m gy, m dk gy ip, sl hd- hd, arg, grdtl w/ slty sh, n calc, occ ss intbd, lt gy, slt- vf gr, hd, sl- m calc cmt, vf carb incl







@4,300'  
WOB: 15K  
AP: 472  
RPM: 35

ROP (min/ft)  
Gamma (AP) @4,400' 200  
WOB: 12K  
AP: 396  
RPM: 35

@4,500'

SLTST: ltgy-gy ip, lt rdbrn ip, sl hd-hd, tr vry hd, amorph, tr blkly, n calc, arg, micmica; SS: lt gy ip, lt brn ip, slit-vf gr, grdtl w/ sltst, p-m srt, sbang, sl hd, silc cmt, arg ip, micmica; SH: lt- m gy, hd, blkly- plty, n calc, vry slty ip grdng to sltst, micmica

SLTST: md gy-gy, dk gy ip, sl hd-hd, tr vry hd, amorph, tr blkly, n-sl calc, arg, micmica, vry fn pyr ip; SH: m gy-gy, hd, blkly- plty, n calc, vry slty ip grdng to sltst, micmica; tr SS: wht-vry lt gy, slit-vf gr, grdtl w/ sltst, p-m srt, tr w srt, sbang, sbrnd ip, sl hd, silc cmt, arg ip, micmica

SLTST: lt rdbrn-dk rdbrn, md gy ip, tr vry dk gy, frm-sl hd, amorph, n-sl calc, arg ip, micmica, vry fn pyr ip; SH: m gy-gy, frm-slhd, hd ip, blkly-amorph, rr plty, n calc, vry slty ip grdng to sltst, micmica

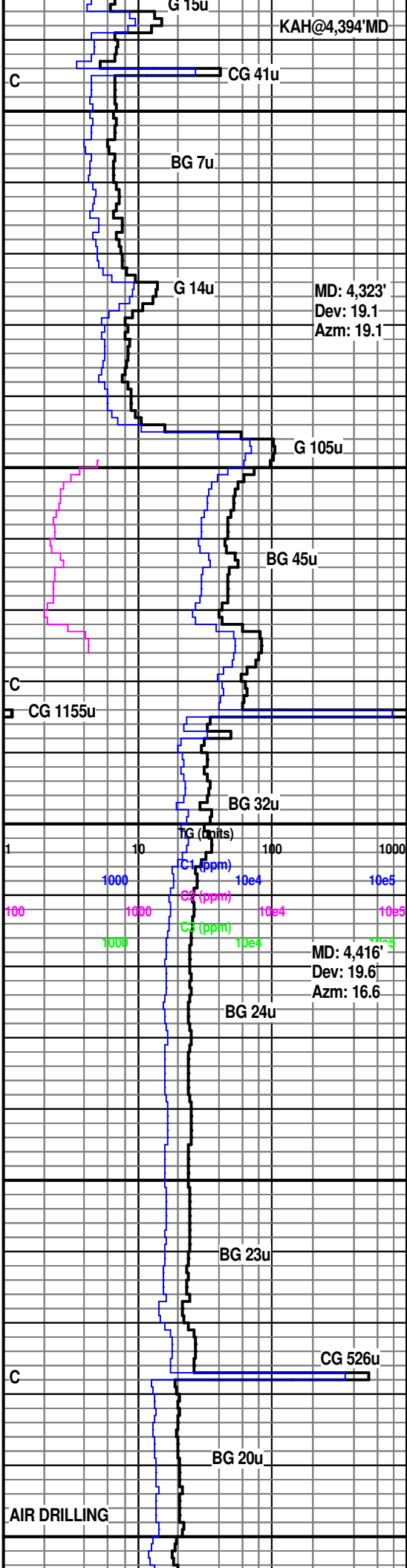
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SH: lt gy, frm, blkly- plty, n calc, vry slty ip grdng to sltst, micmica; SLTST: gy-md gy, tr lt rdbrn, ltgy ip, frm, amorph-blky, n calc, micmica; tr SS

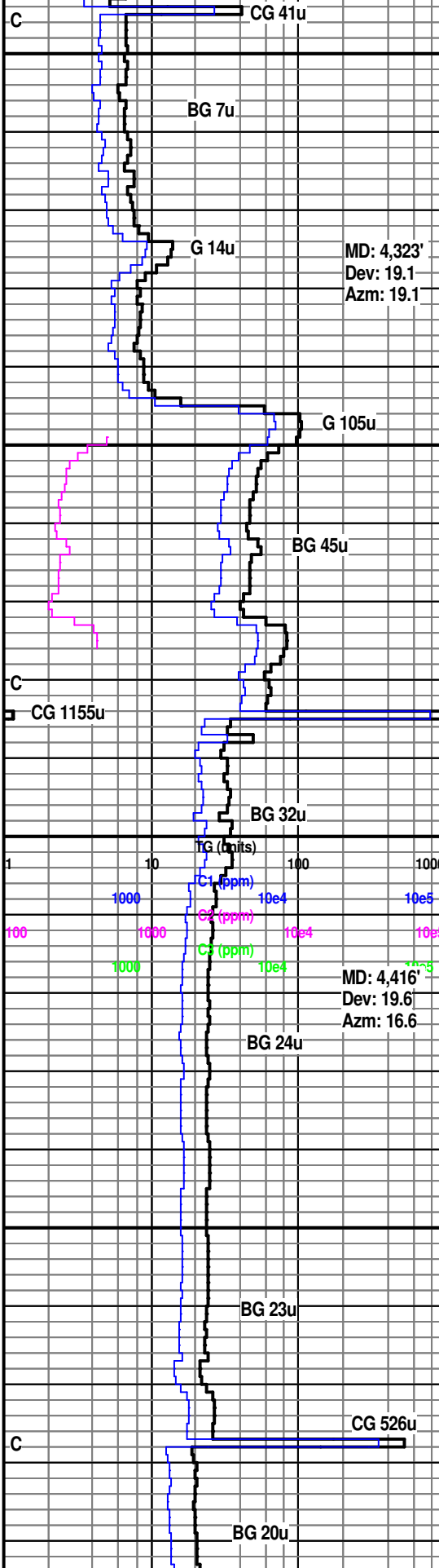
SH: md-dk gy, gy ip, lt gy ip, frm-sl hd, blkly, plty, amorph ip, n calc, slty grd to sltst ip, micmica, fd pyr ip, f lam; SLTST: lt gy- gy, frm, amorph-blky, n calc, micmica, grdng to slty sh ip

SLTST: gy-lt gy ip, lt rdbrn ip, ltgy ip, frm-sl hd, amorph, n calc, micmica, arg ip; SS: lt gy-wht ip, slit- vf gr, w-m srt, sbang ip, sbrnd-rnd ip, sl hd, calc cmt, arg ip, micmica, fd pyr ip, rr nod pyr

SH: md-dk gy, gy ip, lt gy ip, frm-sl hd



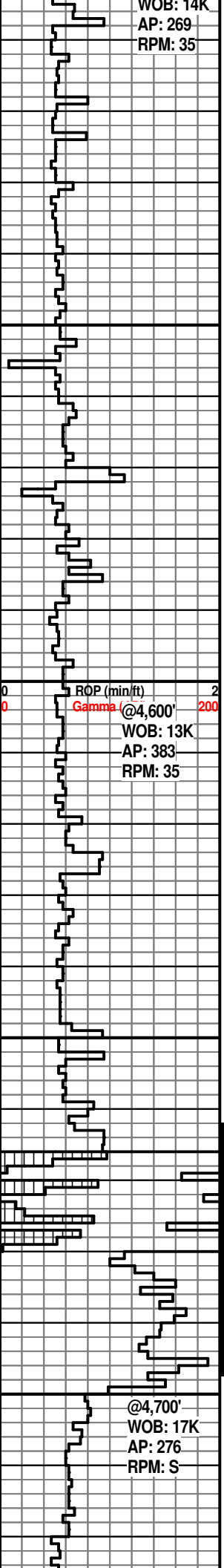
KAH@4,394'MD



MD: 4,323'  
Dev: 19.1  
Az: 19.1

MD: 4,416'  
Dev: 19.6  
Az: 16.6

AIR DRILLING



WOB: 14K  
AP: 269  
RPM: 35

ROP (min/ft)  
Gamma @4,600'  
WOB: 13K  
AP: 383  
RPM: 35

@4,700'  
WOB: 17K  
AP: 276  
RPM: S

4550  
4600  
4650  
4700

SH: md-dk gy, gy ip, lt gy ip, m-p srt, n calc, slty grd to blky, plty, amorph ip, n calc, slty grd to sltst ip, micmica, fd pyr ip, f lam; SLTST: m gy- gy, frm, amorph-blky, n calc, micmica, grdng to slty sh ip; tr SS

SH: gy, frm, sl hd ip, n calc, micmica ip; SLTST: pred gy, ltgy ip, md gy ip, frm-fri, amorph-blky, tr plty, n calc, micmica, arg ip; tr SS: lt gy, tr wht, slt-vf gr, tr fn gr, m-p srt, sbang ip, sbrnd ip, sl fri ip, sl hd ip, pred silc cmt, calc cmt ip, arg ip, micmica

SLTST: pred gy, ltgy ip, md gy ip, frm-fri, amorph-blky, tr plty, n calc, micmica, arg ip; SH: gy, frm, sl hd ip, n calc, micmica ip, slty, vry slty grd to sltst, rr fd pyr;

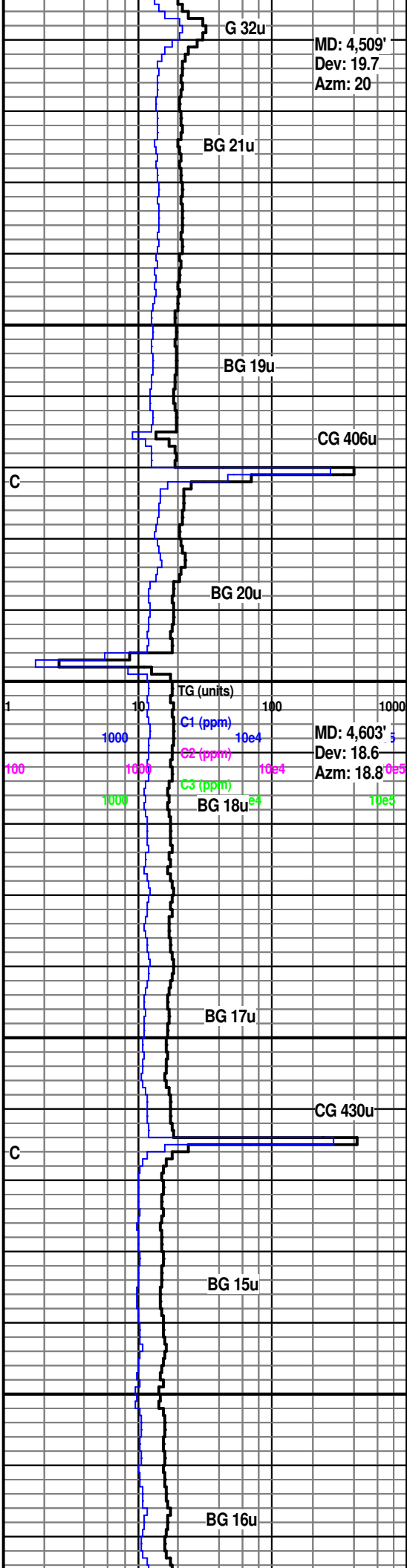
SH: pred ltgy, m-dk gy ip, frm, tr sl hd, n calc, micmica ip, slty ip, vry slty grd to sltst ip; SLTST: pred gy- ltgy, frm-fri, amorp, tr blky, n calc, sl calc ip, micmica, arg ip

SLTST: pred gy, ltgy ip, md gy ip, frm-sl frm, amorph-blky, tr plty, n calc, micmica, arg ip; SH: gy, frm, sl hd ip, n calc, micmica ip, slty, vry slty grd to sltst, rr fd pyr; SS: lt gy, tr wht, slt-vf gr, tr fn gr, m-p srt, sbang ip, sbrnd ip, sl fri ip, sl hd ip, pred silc cmt, calc cmt ip, arg ip, micmica

SLTST: gy, ltgy ip, frm-sl hd, amorph, blky ip, n calc, micmica, arg ip, fd pyr ip; SH: gy, frm, sl hd, n calc, micmica ip, slty, vry slty grd to sltst, rr fd pyr; SS: wht, vf- fn gr, m-p srt, tr w srt, sbang ip, sbrnd ip, sl hd, pred silc cmt, calc cmt ip, arg ip, micmica

SLTST: gy, ltgy ip, frm-sl hd, amorph, blky ip, n calc, micmica, arg ip, fd pyr ip; SH: gy, frm, sl hd, n calc, micmica ip, slty, vry slty grd to sltst

SLTST: gy, ltgy ip, frm-sl hd, amorph, blky ip, n calc, micmica, arg ip, fd pyr ip; SH: gy, frm, sl hd, n calc, micmica, slty,



MD: 4,509'  
Dev: 19.7  
Azm: 20

MD: 4,603'  
Dev: 18.6  
Azm: 18.8

MD: 4,700'  
Dev: 18.6  
Azm: 18.8

G 32u

BG 21u

BG 19u

CG 406u

BG 20u

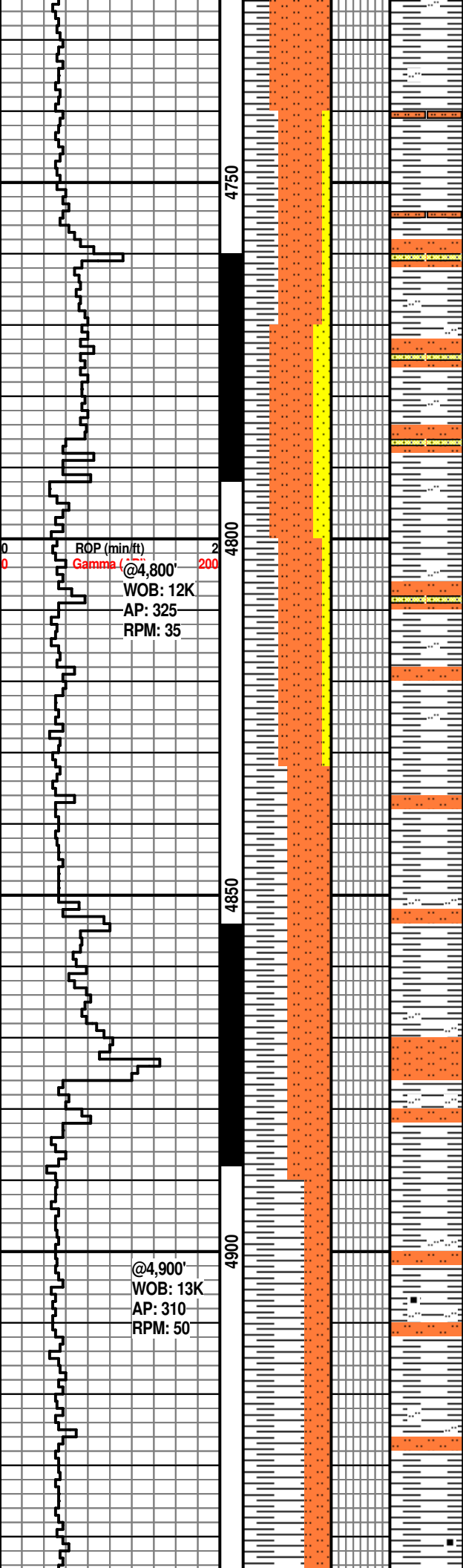
BG 18u

BG 17u

CG 430u

BG 15u

BG 16u



vry slty grd to sltst, fd pyr ip, dru pyr ip;

SLTST: gy, ltgy ip, frm-sl hd, amorph, blky ip, n calc, micmica, arg ip, fd pyr ip; SH: gy, frm, sl hd, n calc, micmica, slty, vry slty grd to sltst, fd pyr ip, dru pyr ip; tr wht SS

SLTST: gy-ltgy, sl hd, hd/frm ip, amorph, blky ip, n calc, micmica, arg ip, fd pyr ip; SH: gy, frm, sl hd ip, n calc, micmica, slty, vry slty grd to sltst ip; SS: wht, vf- fn gr, m-w srt, sbang ip, sbrnd ip, sl hd-hd, silc cmt, calc cmt ip, arg ip, micmica

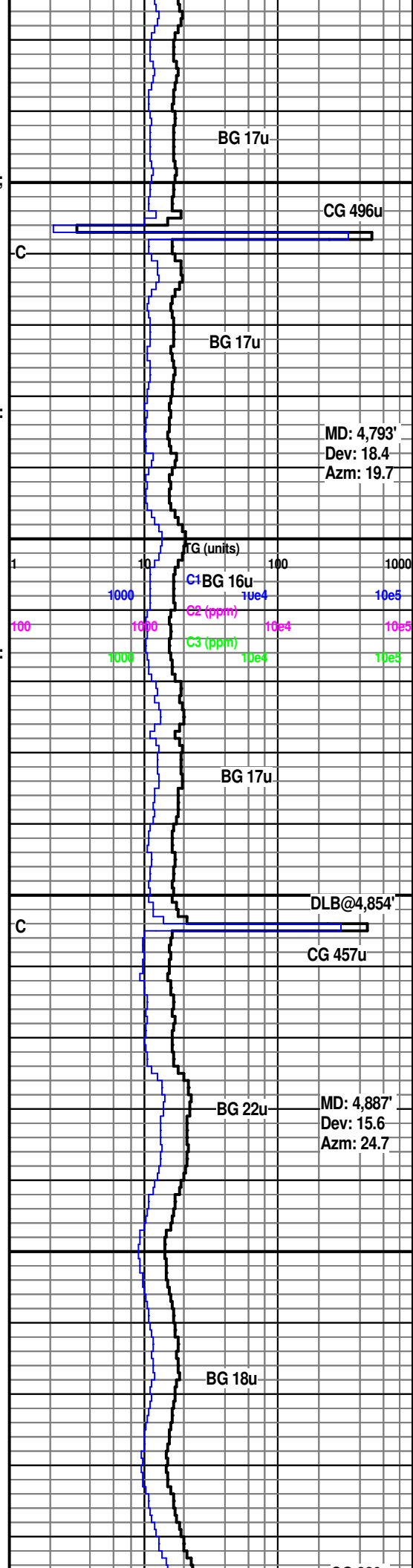
SLTST: gy-ltgy, sl hd, hd/frm ip, amorph, blky ip, n calc, micmica, arg ip, fd pyr ip; SH: gy, frm, sl hd ip, n calc, micmica, slty, vry slty grd to sltst ip; SS: wht, vf- fn gr, m-w srt, sbang ip, sbrnd ip, hd, silc cmt, arg ip, micmica

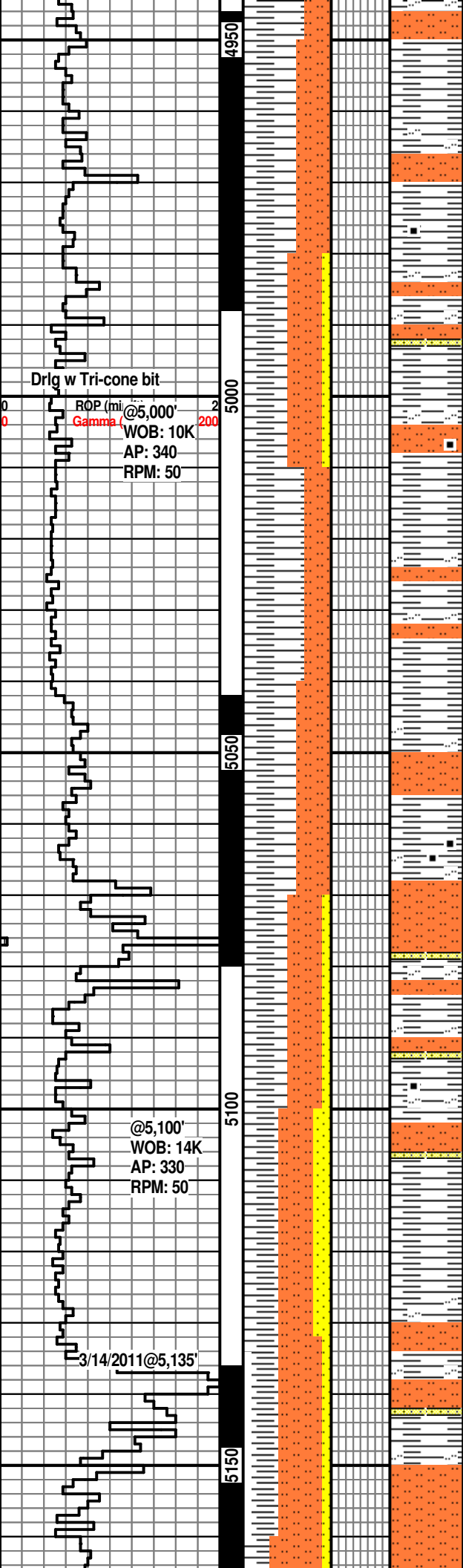
SLTST: lt- m gy, m dk gy ip, sli hd- hd, blky, n calc, arg, micmica; SH: m gy, m dk gy ip, sli hd, n calc, slty ip grdng to arg sltst

SLTST: lt- m gy, m dk gy ip, sli hd- hd, blky, n calc, arg, micmica; SH: m gy, m dk gy ip, sli hd, n calc, slty ip grdng to arg sltst

SH: pred lt gy, m- mdk gy ip, blky- plty, n calc, slty ip grdng to arg sltst, vf carb incl ip

SH: pred lt gy, m- mdk gy ip, blky- plty, n calc, slty ip grdng to arg sltst, vf carb incl ip





SH: pred lt gy, m- mdk gy ip, blk- plty, n calc, slty ip grdng to arg sltst, vf carb incl ip, micmica

SLTST: pred lt gy, slt- vf snd gr, w srt, hd, n calc, sl arg, grdtnl w/ ss, m- m dk gy ip, arg grdtnl w/ slty sh, vf carb incl, micmica ip

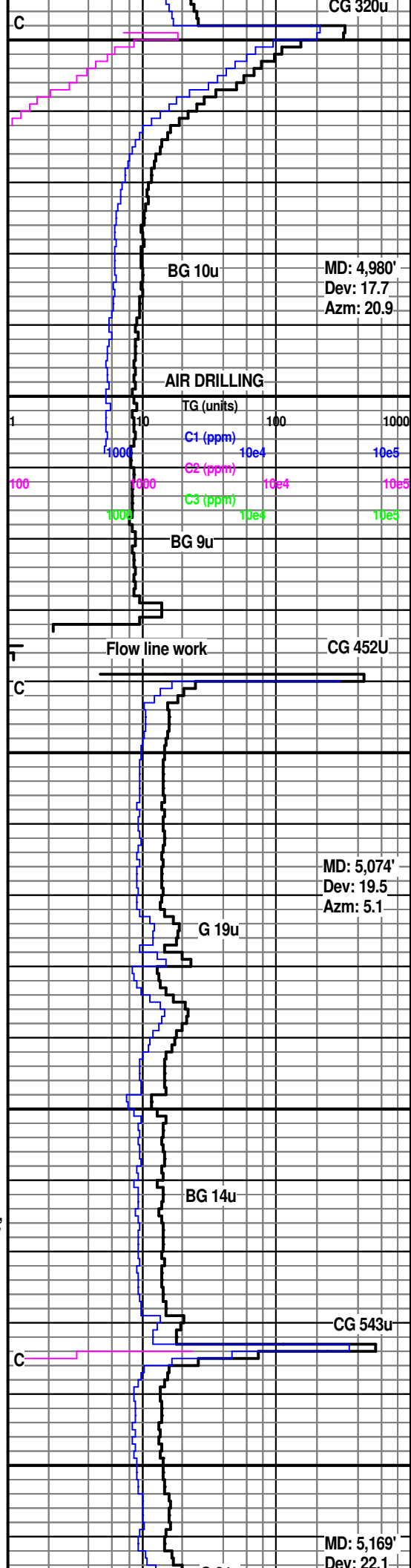
SH: lt- m gy, f- m tex, blk- plty, n calc, slty ip grdng to sltst

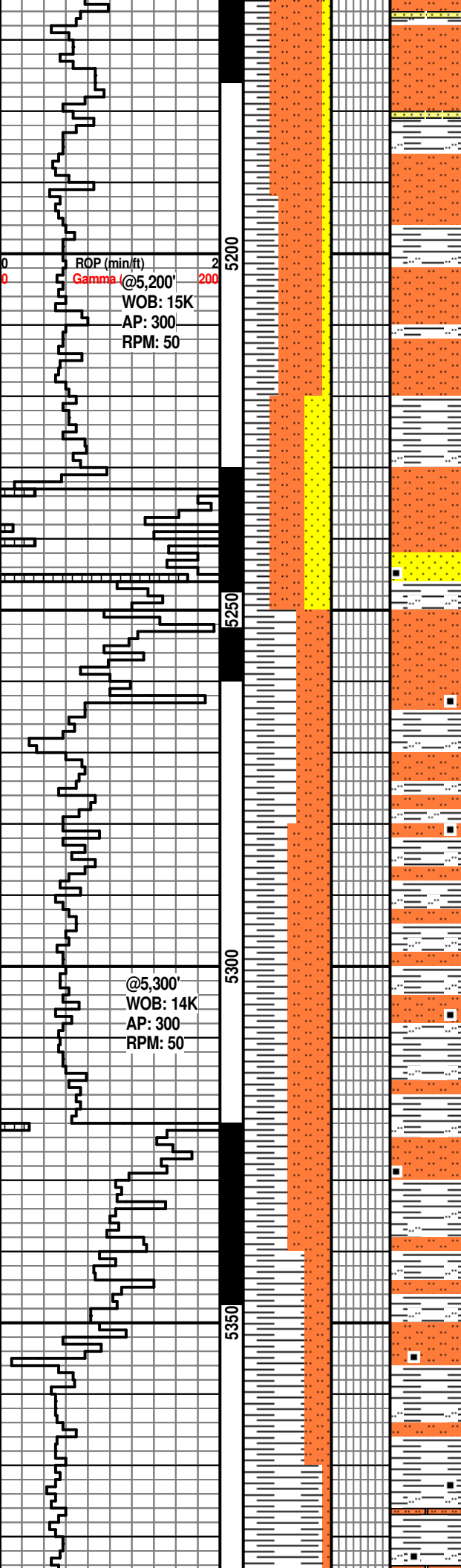
SLTST: lt gy, sli hd- hd, blk- plty, sl calc, arg, occ vf carb incl; SH: pred lt gy, f- m tex, blk- plty, n calc, slty ip grdng to sltst, occ m dk gy, plty- flky, abndt vf carb incl

SLTST: pred lt gy, slt- vf snd gr, w srt, hd, n calc, sl arg, grdtnl w/ ss, m- m dk gy ip, arg grdtnl w/ slty sh, vf carb incl, micmica ip

SS: lt gy, slt- vf gr, w srt, sbang- sbrnd, hd, sl calc, arg, micmica; SLTST: pred lt gy, slt- vf snd gr, w srt, hd, n calc, sl arg, grdtnl w/ ss, m- m dk gy ip, arg grdtnl w/ slty sh, vf carb incl, micmica

SLTST: pred lt gy, slt- vf snd gr, w srt, hd, n calc, sl arg, grdtnl w/ ss, m- m dk gy ip, arg grdtnl w/ slty sh, vf carb incl, micmica; SH: pred lt gy, f- m tex, blk- plty, n calc, slty ip grdng to sltst, occ m dk gy, plty- flky, abndt vf carb incl





SLTST: lt gy, slit- vf snd gr, w srt, hd, n calc, sl arg, grdtl w/ ss, SH: lt gy, f- m tex, blk- ply, n calc, slty ip grdng to sltst

SH: lt gy, f- m tex, blk- ply, n calc, slty ip grdng to SLTST: lt gy, slit- vf snd gr, w srt, hd, n calc, arg, grdtl w/ ss

SS: lt gy, slit- vf gr, w srt, sbang- sbrnd, hd, n calc, arg, micmica, vf carb incl ip; SLTST: lt gy, hd, blk, n calc, arg; SH: lt gy, f- m tex, hd, blk- ply, n calc, slty ip grdng to sltst

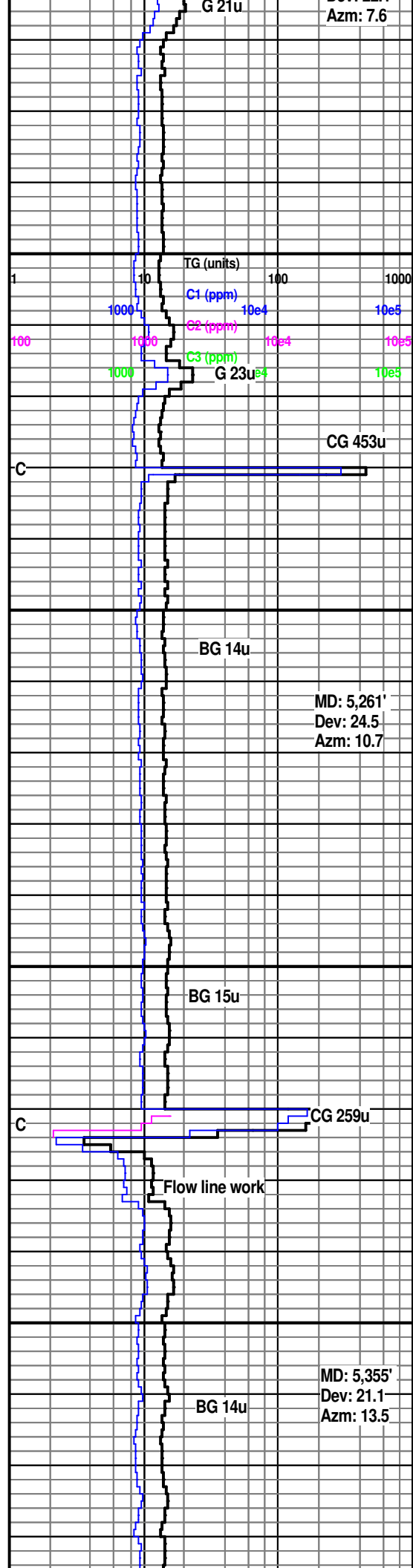
SH: lt gy, f- m tex, hd, blk- ply, n calc, slty ip grdng to sltst; SLTST: lt gy, hd, blk, n- sl calc, arg, micmica, vf carb incl, carb strks ip

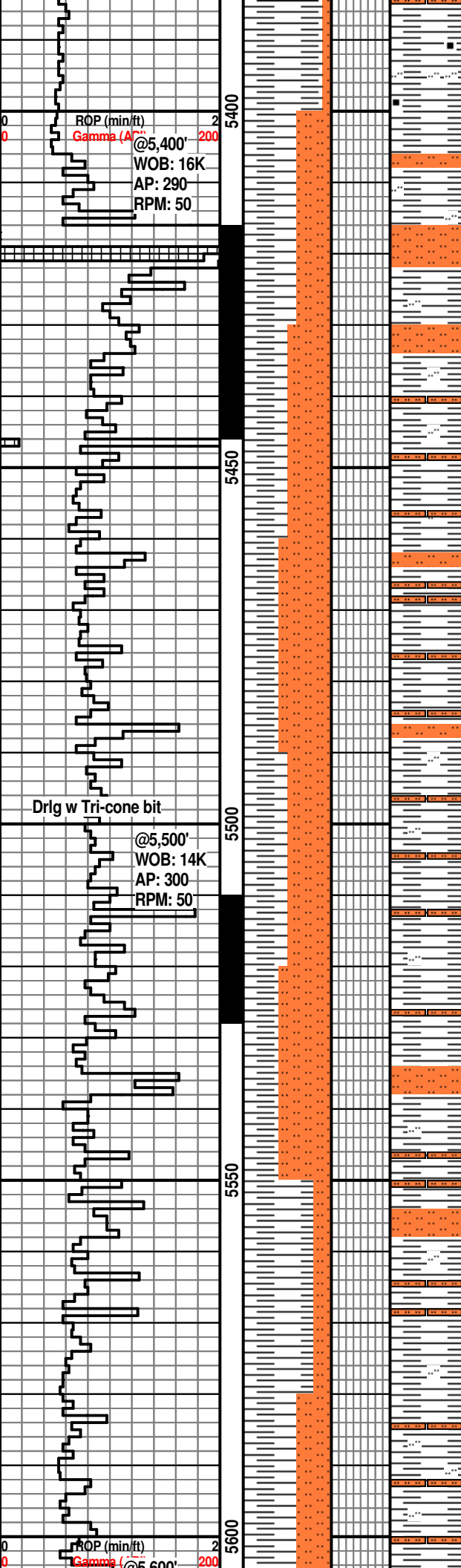
SLTST: lt gy, hd, blk, n- sl calc, arg, micmica, vf carb incl, carb strks ip; SH: lt gy, f- m tex, hd, blk- ply, n calc, slty ip grdng to sltst

SLTST: lt gy, hd, blk, n- sl calc, arg, micmica, vf carb incl, carb strks ip; SH: lt gy, f- m tex, hd, blk- ply, n calc, slty ip grdng to sltst

SH: lt gy, occ m dk gy, f- m tex, blk- ply, sli hd, incr sft, amorph, clst; SLST: lt gy, hd, blk, sl- m calc, arg

SH: pred m dk gy, m- c tex, frm- sli hd, blk- ply, n calc, abndt vf carb incl, f





lam, sme lt gy, f- m tex, hd, sl calc, slty ip grdng to sltst

### Brallier Formation @ 5,400'

SH: lt gy, f- m tex, frm-hd, blk- pty, n calc, slty ip grdng to sltst, micmica ip;  
 SLTST: lt gy-gy, hd ip, frm ip, blk, sl calc-calc, arg ip, micmica, tr fd pyr

SLTST: lt gy-gy, hd ip, tr frm, blk, sl calc-calc, arg ip, micmica, tr fd pyr; SH: lt gy, f- m tex, frm-hd, blk- pty, n calc, slty ip grdng to sltst, micmica ip

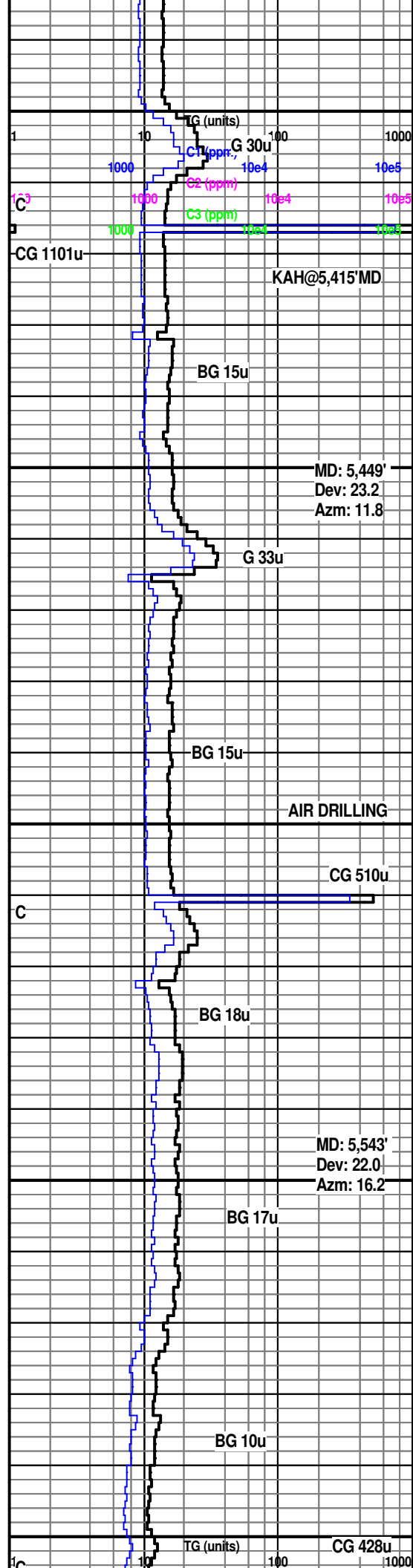
SLTST: lt gy-gy, md gy ip, hd, tr frm, blk, calc, arg ip, micmica; SH: lt gy, tr md gy- gy, f- m tex, frm-hd, blk- pty, n- sl calc, slty ip grdng to sltst, micmica

SLTST: lt gy-gy, hd, pred amorph, tr blk, n- sl calc, arg ip, micmica; SH: lt gy-gy, f- m tex, frm-hd, blk- amorph, n calc, slty ip grdng to sltst, micmica

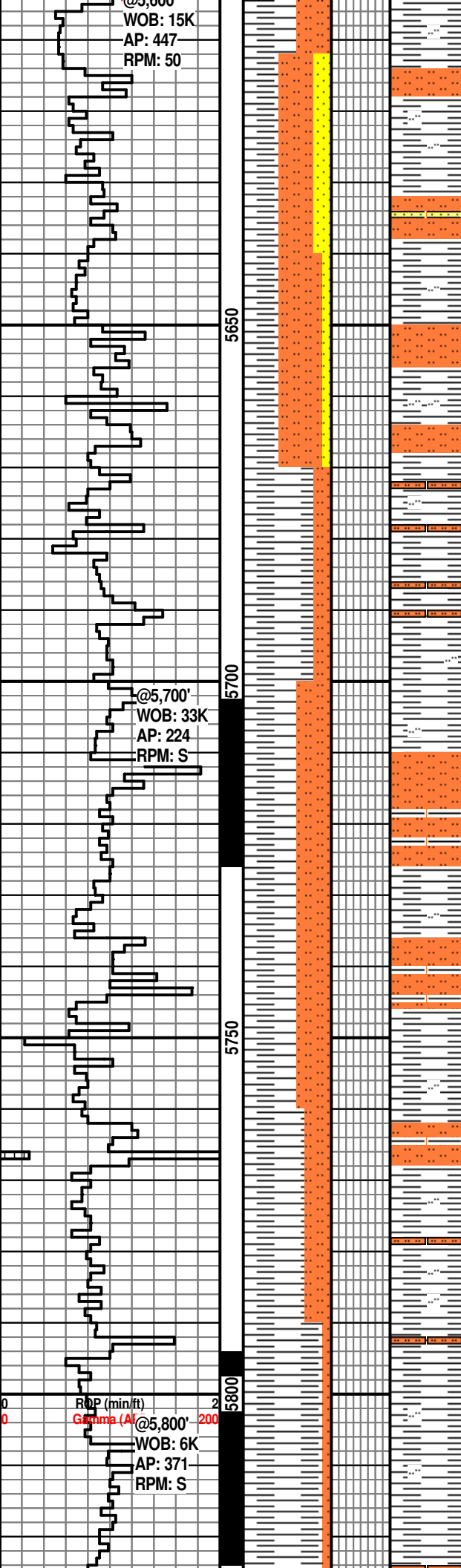
SLTST: lt gy-gy, hd, pred amorph, tr blk, n- sl calc, arg ip, micmica; SH: lt gy-gy, f- m tex, frm-hd, blk- amorph, n calc, slty ip grdng to sltst, micmica

SH: lt gy-gy, vry f tex, hd- vry hd, tr frm, blk- amorph, tr pty, n calc, pred sl slty, slty ip grdng to sltst ip, micmica, fd pyr ip; SLTST: lt gy-gy, hd, pred amorph, n calc, micmica

SH: lt gy-gy, tr md gy, vry f tex, hd- vry hd, frm ip, blk- amorph, tr pty, n calc, pred sl slty, slty ip grdng to sltst ip, micmica; SLTST: lt gy-gy, hd, pred amorph, n calc, micmica, fd pyr ip







SH: gy, tr md gy, vry f tex, hd, frm ip, blk-amorph, plty ip, n calc, pred sl slty, slty ip grdng to sltst ip, micmica; SLTST: lt gy-gy, hd, pred amorph, n calc, micmica, fd/nod pyr ip; SS: wht, slt- vř gr, w srt, sbang- sbrnd, hd, n calc, arg, micmica, vf carb incl ip

SLTST: lt gy-gy, hd, pred amorph, n calc, micmica, fd/nod pyr ip; SH: gy, tr md gy, vry f tex, hd, frm ip, blk-amorph, plty ip, n calc, pred sl slty, slty ip grdng to sltst ip, micmica; SS: wht, slt- vř gr, w srt, sbang- sbrnd, hd, n calc, arg, micmica, vf carb incl ip

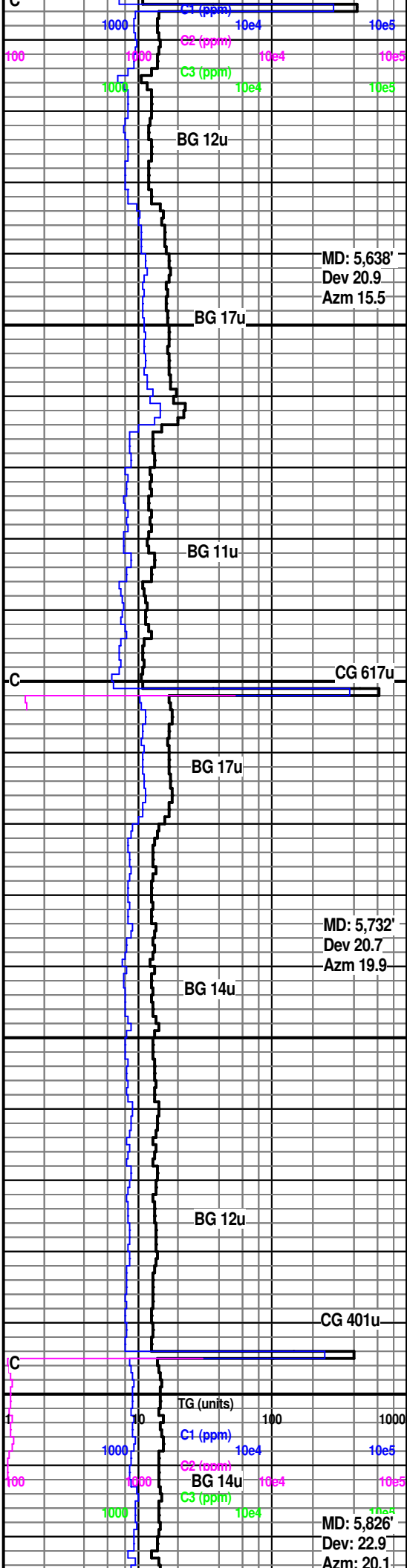
SH: gy, tr md gy, f-m tex, hd, frm ip, blk-amorph, plty ip, n calc, slty ip grdng to sltst ip, micmica, tr fd pyr; SLTST: lt gy-gy, hd, pred amorph, n calc, micmica

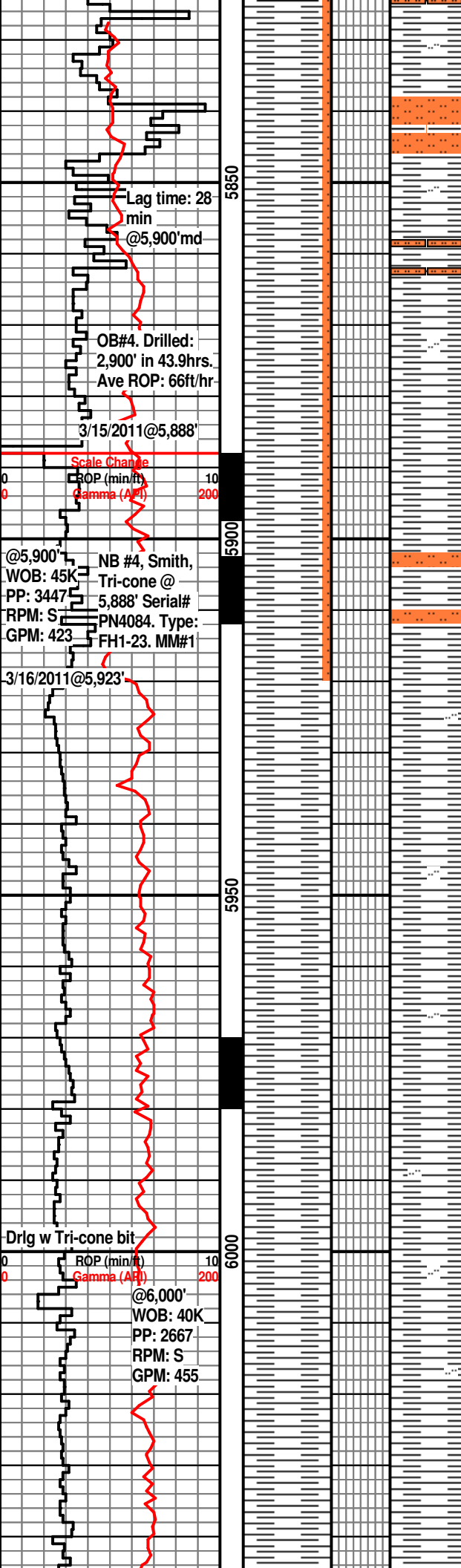
SH: gy-md gy, brngn ip, f-m tex, hd, frm ip, blk-amorph, plty ip, n calc, slty ip, micmica; SLTST: lt gy, hd, pred amorph, n calc, micmica

SH: gy-md gy, brngn ip, f-m tex, hd, frm/vry hd ip, blk-amorph, plty ip, n calc, slty ip, abnt micmica ip; SLTST: lt gy, hd, tr vry hd/frm, pred amorph, n calc, micmica

SH: gy, brngn ip, f-m tex, hd-frm, blk-plty, amorph ip, n calc, slty ip, abnt micmica ip; SLTST: lt gy, hd, frm ip, pred amorph, tr blk, n calc, micmica

SH: gy, ltgy ip, f-m tex, hd-frm, blk-plty, amorph ip, n calc, slty ip, abnt micmica ip; SLTST: lt gy, hd, frm ip, pred amorph, tr blk, n calc, micmica





SH: gy, ltgy ip, f-m tex, vry f tex ip, hd frm, blk-ply, amorph ip, n calc, slty ip, micmica ip; SLTST: lt gy, hd, frm ip, pred amorph, tr blk, n calc, abnt micmica

SH: gy-m gy, f-m tex, vry f tex ip, hd frm, blk-ply, amorph ip, n calc, slty, vry slty grd to sltst ip, micmica ip; SLTST: lt gy, hd, frm ip, pred amorph, tr blk, n calc, abnt micmica

**SWITCH TO OBM @5,888'MD**

SH: m gy, f-m tex, frm, blk-ply, n calc, slty ip grndg to arg SLTST: m gy, frm-sl hd, blk-ply, n calc

SH: m gy, f-m tex, frm, blk-ply, n calc, slty ip grndg to arg SLTST: m gy, frm-sl hd, blk-ply, n calc

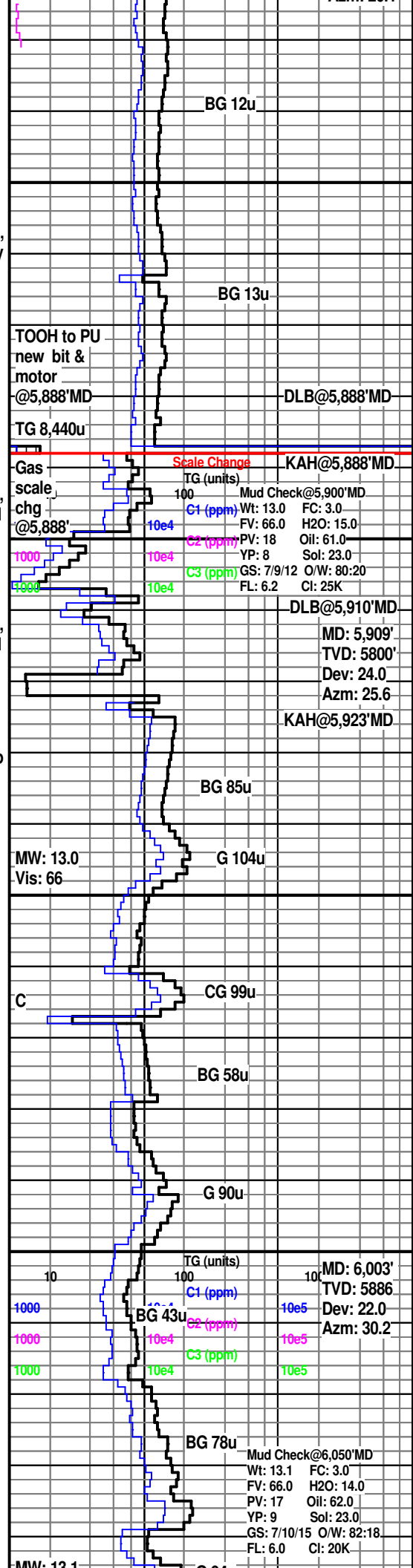
SH: gy, lt/md gy ip, f-m tex, frm-sl hd, tr hd, blk-ply, amorph ip, n calc, sl slty ip, micmica, tr fn pyr; tr SLTST

SH: gy, lt/md gy ip, f-m tex, frm-sl hd, tr hd/sft, blk, amorph ip, n calc, sl slty ip, micmica, tr fn pyr; rr SLTST

SH: gy, lt/md gy ip, f-m tex, frm-sl hd, tr hd/sft, blk, amorph ip, n calc, sl slty ip, micmica; rr SLTST

SH: gy-md gy, lt gy ip, f-m tex, frm-sl hd ip, sft ip, blk-amorph, n calc, sl slty ip, micmica, fd pyr ip

SH: gy-md gy, lt gy ip, rr dk gy, f-m tex, pred frm-sl hd, sft ip, rr hd



BG 12u

BG 13u

TOOH to PU new bit & motor @5,888'MD TG 8,440u

DLB@5,888'MD

Scale Change KAH@5,888'MD  
 Gas scale chg @5,888'  
 TG (units) 100  
 C1 (ppm) 10e4  
 C2 (ppm) 10e4  
 C3 (ppm) 10e4  
 Mud Check@5,900'MD  
 Wt: 13.0 FC: 3.0  
 FV: 66.0 H2O: 15.0  
 PV: 18 Oil: 61.0  
 YP: 8 Sol: 23.0  
 GS: 7/9/12 O/W: 80:20  
 FL: 6.2 Cl: 25K

DLB@5,910'MD

MD: 5,909'  
 TVD: 5800'  
 Dev: 24.0  
 Azm: 25.6  
 KAH@5,923'MD

BG 85u

MW: 13.0  
 Vis: 66

G 104u

CG 99u

BG 58u

G 90u

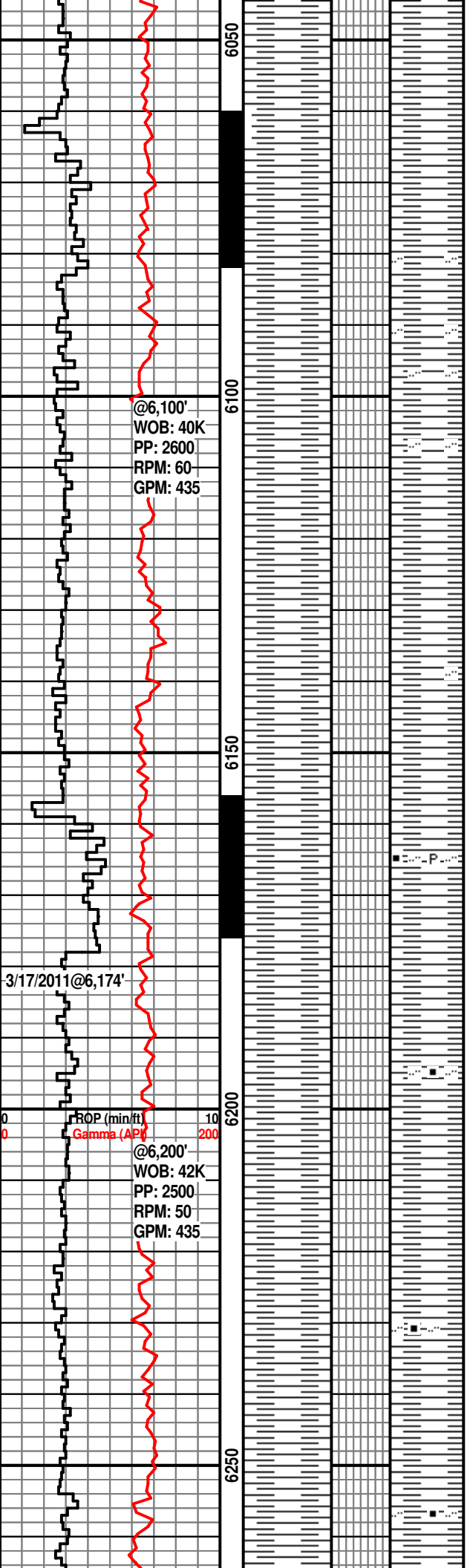
TG (units) 100  
 C1 (ppm) 10e5  
 C2 (ppm) 10e5  
 C3 (ppm) 10e5  
 MD: 6,003'  
 TVD: 5886'  
 Dev: 22.0  
 Azm: 30.2

BG 43u

BG 78u

Mud Check@6,050'MD  
 Wt: 13.1 FC: 3.0  
 FV: 66.0 H2O: 14.0  
 PV: 17 Oil: 62.0  
 YP: 9 Sol: 23.0  
 GS: 7/10/15 O/W: 82:18  
 FL: 6.0 Cl: 20K

MW: 12.1



pred m- sly sh, sly ip, n calc, blk- amorph, rr plty, n calc, rr vry sl calc, sl slty ip, micmica

SH: m gy, f tex, frm, blk, n calc, slty ip, clay sh, bcm v sft, amorph w/ wtr

SH: m gy, occ m dk gy, f tex, frm, blk, n calc, slty ip, carb ip, clay sh, bcm v sft, amorph w/ wtr

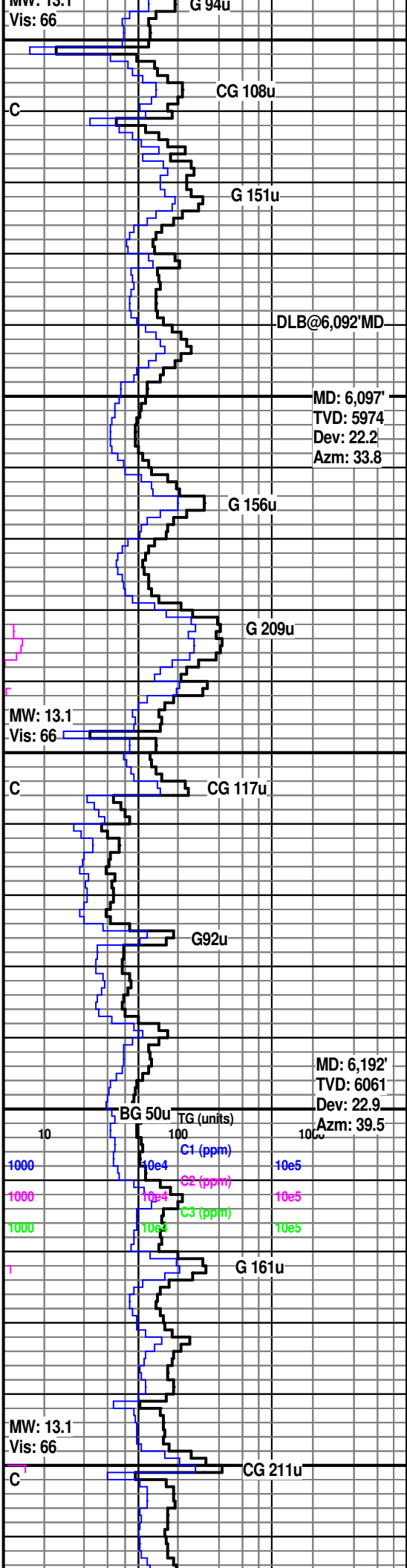
SH: m gy, occ m dk gy, f tex, frm, blk, n calc, slty ip, carb ip, clay sh, bcm v sft, amorph w/ wtr

SH: pred clyst, m gy, f tex, frm, blk, n calc, slty ip, bcm v sft, amorph w/ wtr, occ m dk gy, slty, sl carb, tr pp pyr

SH: pred clyst, m gy, f tex, frm, blk, n calc, slty ip, bcm v sft, amorph w/ wtr, occ m dk gy, slty, sl carb

SH: pred clyst, m gy, f tex, frm, blk, n calc, slty ip, bcm v sft, amorph w/ wtr, occ m dk gy, slty, sl carb

SH: pred clyst, m gy, f tex, frm, blk, n calc, slty ip, bcm v sft, amorph w/ wtr, occ m- dk gy, slty, sl carb



MW: 13.1  
Vis: 66

C

MW: 13.1  
Vis: 66

C

MW: 13.1  
Vis: 66

C

MD: 6,097'  
TVD: 5974  
Dev: 22.2  
Azm: 33.8

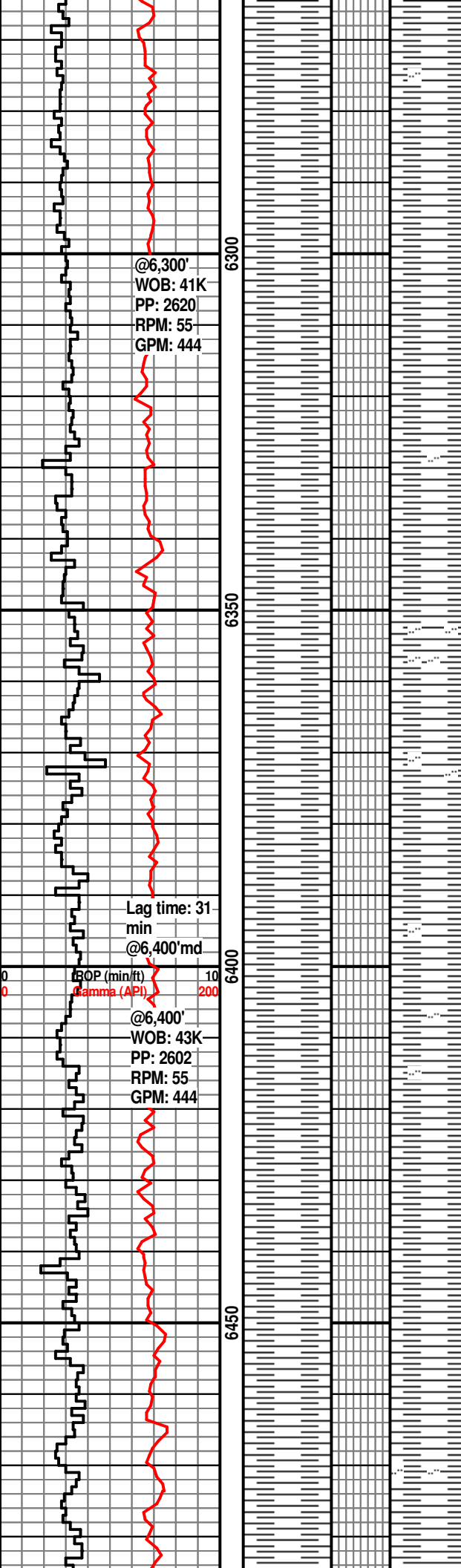
MD: 6,192'  
TVD: 6061  
Dev: 22.9  
Azm: 39.5

TG (units)

C1 (ppm)

C2 (ppm)

C3 (ppm)



@6,300'  
WOB: 41K  
PP: 2620  
RPM: 55  
GPM: 444

Lag time: 31 min  
@6,400' md

@6,400'  
WOB: 43K  
PP: 2602  
RPM: 55  
GPM: 444

SH: m g, ltgy-gy ip, f tex, frm-sft, tr sl hd, blk-ymorph, pred n calc, rr sl calc, slty ip, rr micmica

SH: m g, ltgy-gy ip, f tex, frm-sft, rr sl hd, blk-ymorph, n calc, sl slty ip, rr micmica

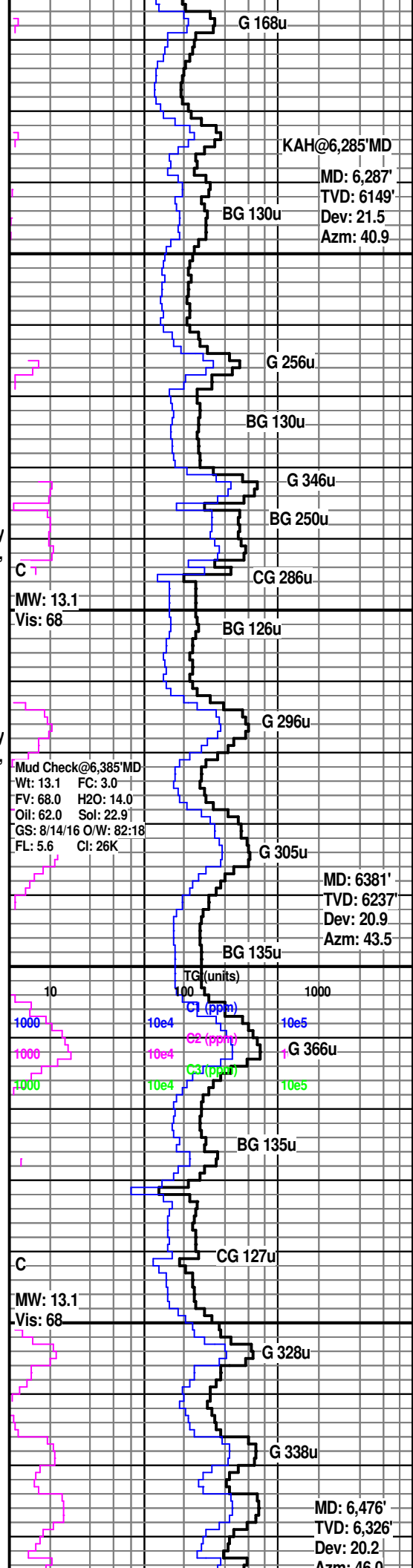
SH: m-dk gy, ltgy-gy ip, f tex, frm-sft, vry sft-clystn ip, blk-ymorph, tr plty, n calc, sl slty ip, rr micmica

SH: m-dk gy, ltgy-gy ip, f tex, frm-sft, vry sft-clystn ip, blk-ymorph, tr plty, n calc, sl slty ip, rr micmica

SH: m-dk gy, gy ip, f tex, frm-sft, vry sft ip, pred blk-ymorph, plty ip, n calc, sl slty ip, rr micmica, fd pyr

SH: m-dk gy, gy-ltgy ip, f-m tex, frm-sft, vry sft grd to clystn ip, pred blk-ymorph, plty ip, n calc, sl slty ip

SH: m-dk gy, gy-ltgy ip, f-m tex, frm-sft, vry sft grd to clystn ip, pred blk-ymorph, plty ip, n-vry sl calc, sl slty ip



KAH@6,285' MD  
MD: 6,287'  
TVD: 6149'  
Dev: 21.5  
Azm: 40.9

MW: 13.1  
Vis: 68

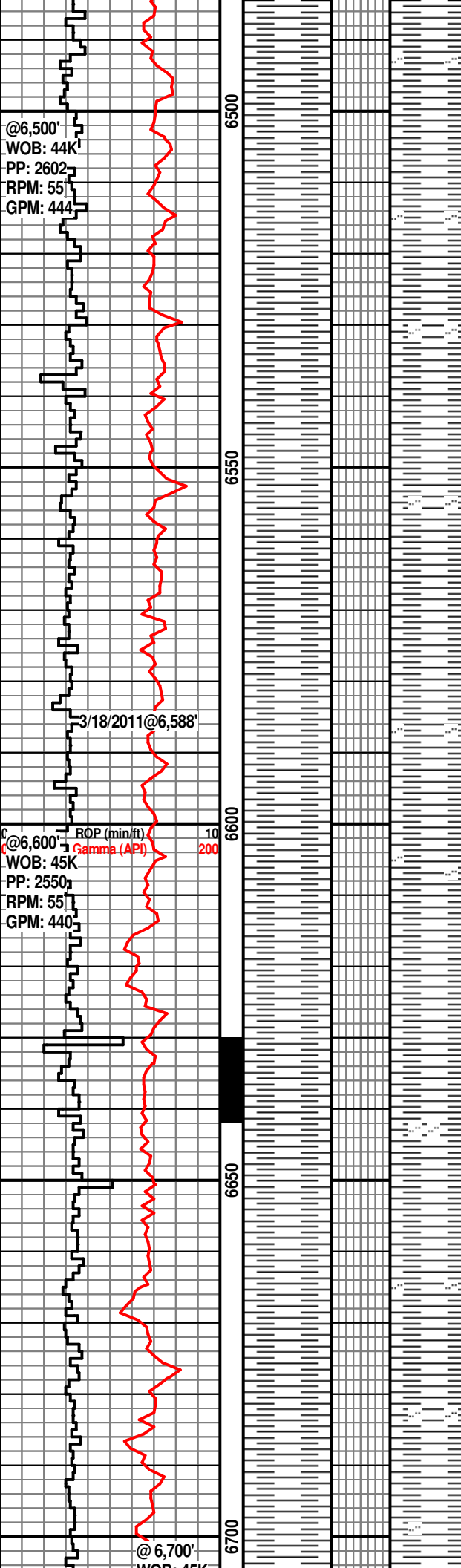
Mud Check@6,385' MD  
Wt: 13.1 FC: 3.0  
FV: 68.0 H2O: 14.0  
Oil: 62.0 Sol: 22.9  
GS: 8/14/16 O/W: 82:18  
FL: 5.6 CI: 26K

MD: 6381'  
TVD: 6237'  
Dev: 20.9  
Azm: 43.5

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

MW: 13.1  
Vis: 68

MD: 6,476'  
TVD: 6,326'  
Dev: 20.2  
Azm: 46.0



@6,500'  
WOB: 44K  
PP: 2602  
RPM: 55  
GPM: 444

3/18/2011@6,588'

@6,600'  
WOB: 45K  
PP: 2550  
RPM: 55  
GPM: 440

@6,700'  
WOB: 45K

SH: pred clyst, m- m dk gy, f- m tex, frm, blky, n- sl calc, slty ip, bcm v sft, amorph w/ wtr, occ m- dk gy, slty, grdtl w/ sltst ip

SH: pred clysh, m- m dk gy, f- m tex, frm, blky- plty, n- sl calc, slty ip, bcm v sft, amorph w/ wtr, occ m- dk gy, slty, grdtl w/ sltst ip

SH: pred clysh, m- m dk gy, f- m tex, frm, blky- plty, n calc, slty ip, bcm v sft, amorph w/ wtr

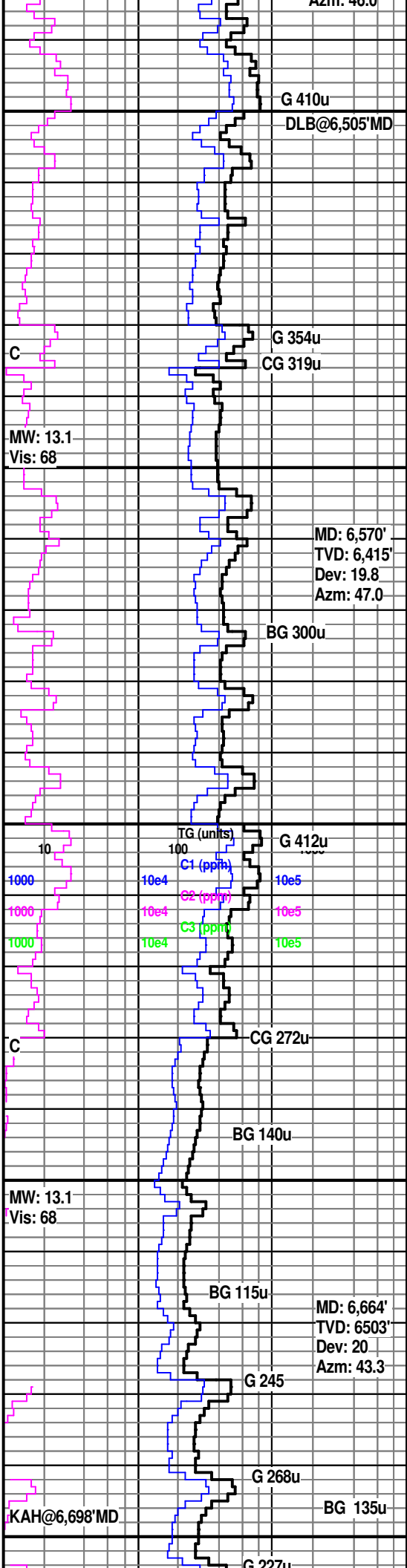
SH: pred clysh, m- m dk gy, lt gy ip, f- m tex, frm, blky- plty, n calc, slty ip, bcm v sft, amorph w/ wtr

SH: pred clysh, lt- m gy, m dk gy ip, f- m tex, frm, blky- plty, amorph ip, n calc, slty ip, bcm v sft, amorph w/ wtr

SH: pred clysh, lt- m gy, m dk gy ip, f- m tex, frm, pred amorph, blky- plty ip, n calc, slty ip, grdng to sltst, bcm v sft, amorph w/ wtr

SH: pred clysh, lt- m gy, m dk gy ip, f- m tex, frm, pred amorph, blky- plty ip, n calc, slty ip, grdng to sltst, bcm v sft, amorph w/ wtr

SH: clysh, lt- m gy, m dk gy ip, f- m tex, frm ip, sft ip, tr vry sft, amorph, blky-



G 410u  
DLB@6,505'MD

C  
G 354u  
CG 319u

MW: 13.1  
Vis: 68

MD: 6,570'  
TVD: 6,415'  
Dev: 19.8  
Azm: 47.0

BG 300u

G 412u

C  
CG 272u

BG 140u

MW: 13.1  
Vis: 68

BG 115u

MD: 6,664'  
TVD: 6503'  
Dev: 20  
Azm: 43.3

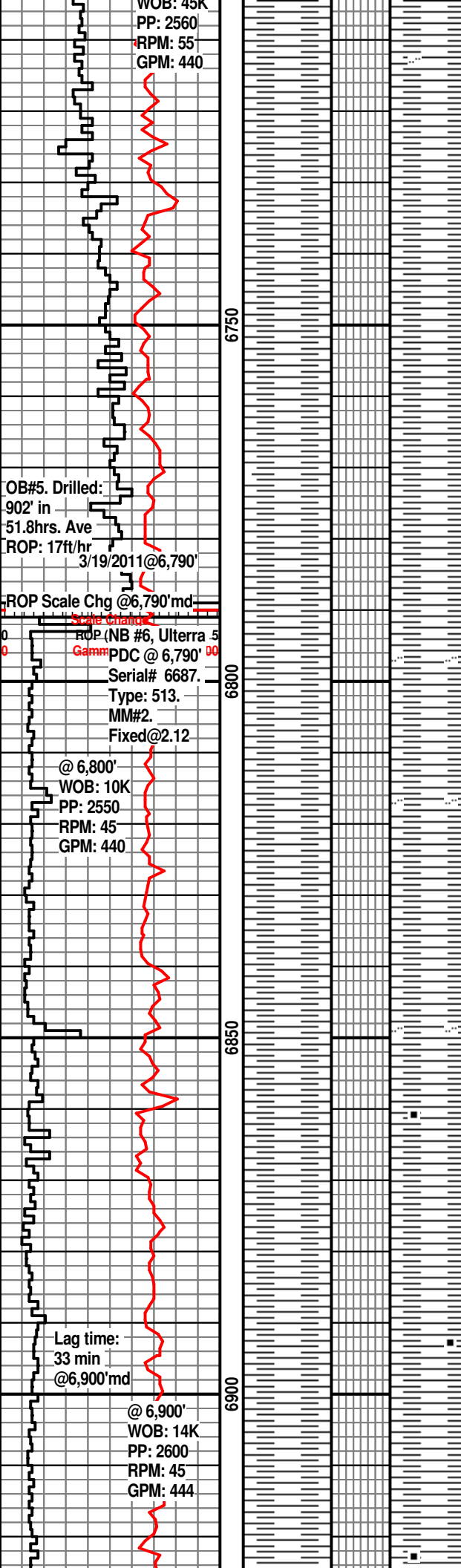
G 245

G 268u

BG 135u

KAH@6,698'MD

G 227u



pty ip, n calc, slty ip, grndg to slst ip, bcm v sft, amorph w/ wtr

SH: clysh, lt- m gy, m dk gy ip, f- m tex, frm ip, sft ip, tr vry sft, rr slty- hd pieces, amorph, blk- pty ip, n calc, sl slty- slty ip, grndg to slst ip, bcm v sft, amorph w/ wtr

SH: clysh, lt- m gy, m dk gy ip, f- m tex, frm ip, sft ip, tr vry sft, rr slty- hd pieces, amorph, blk- pty ip, n calc, sl slty- slty ip, grndg to slst ip, bcm v sft, amorph w/ wtr ip

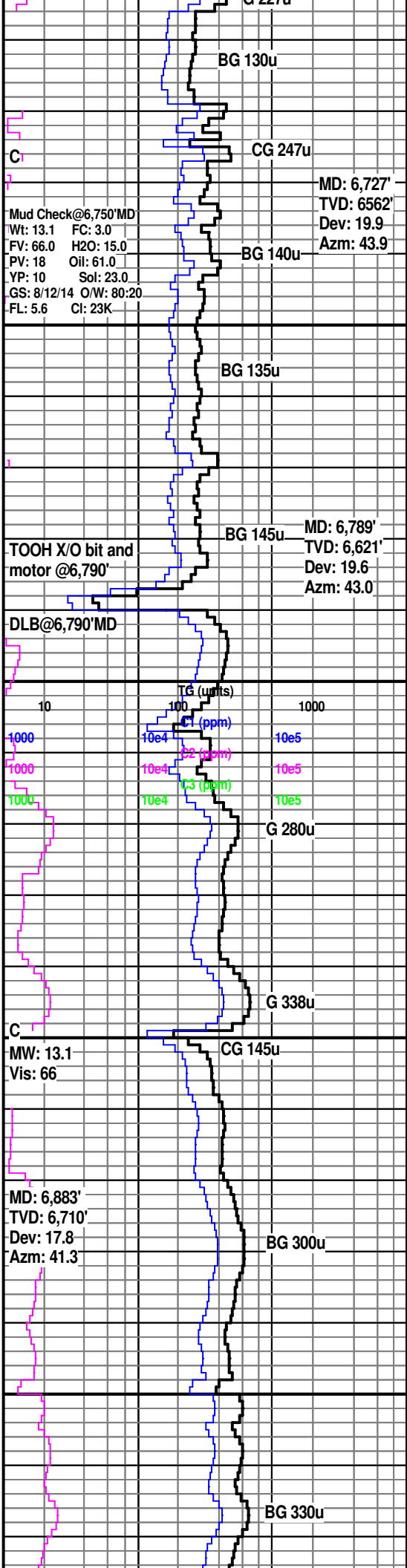
SH: clysh, lt- m gy, f tex, frm, blk- pty, n calc, bcm v sft, amorph w/ wtr

SH: clysh, lt- m gy, sl brnsh ip, f tex, frm, blk- pty, n calc, slty ip, micmica ip, bcm v sft, amorph w/ wtr

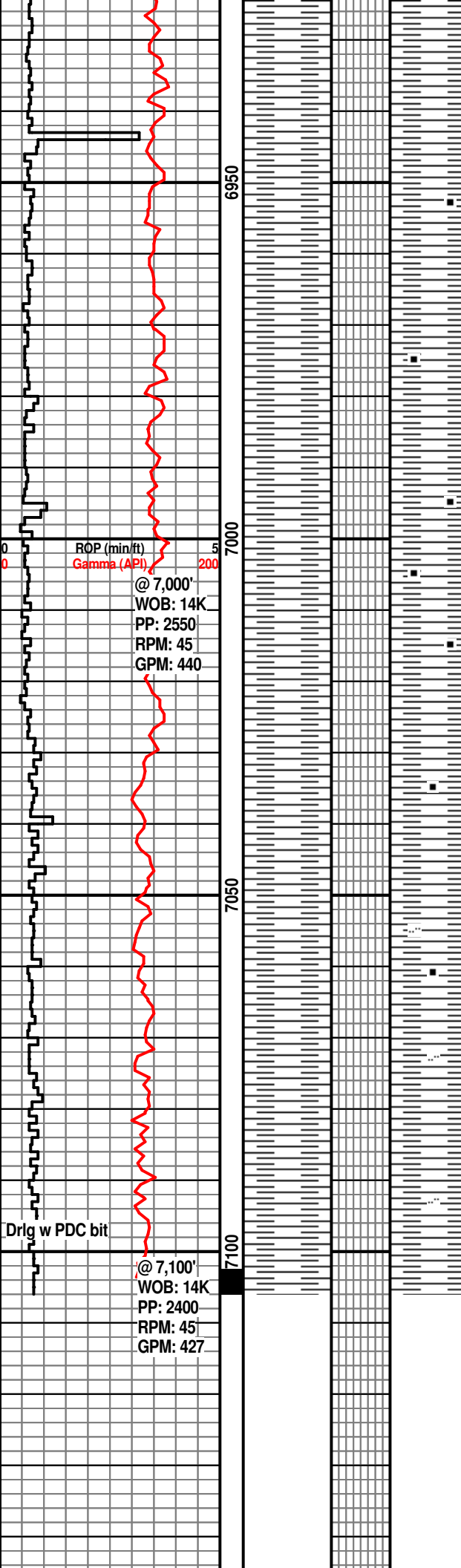
SH: clysh, lt- m gy, occ m dk gy, sl carb, f tex, frm, blk- pty, n calc, slty ip, micmica ip, bcm v sft, amorph w/ wtr

SH: clysh, lt- m gy, occ m dk gy, sl carb, f tex, frm, blk- pty, n calc, micmica ip, f lam, bcm v sft, amorph w/ wtr

SH: clysh, lt- m gy, occ m dk gy, sl carb, f tex, frm, blk- pty, n calc, micmica ip, f lam, bcm v sft, amorph w/ wtr







SH: clysh, lt- m gy, occ m dk gy, sl carb, f tex, frm, blk- pty, n calc, micmica ip, f lam, bcm v sft, amorph w/ wtr

SH: clysh, lt- m gy, occ sl carb, m dk gy, pred f tex, m tex ip, frm, blk- pty, n calc, micmica ip, f lam, bcm v sft, amorph w/ wtr

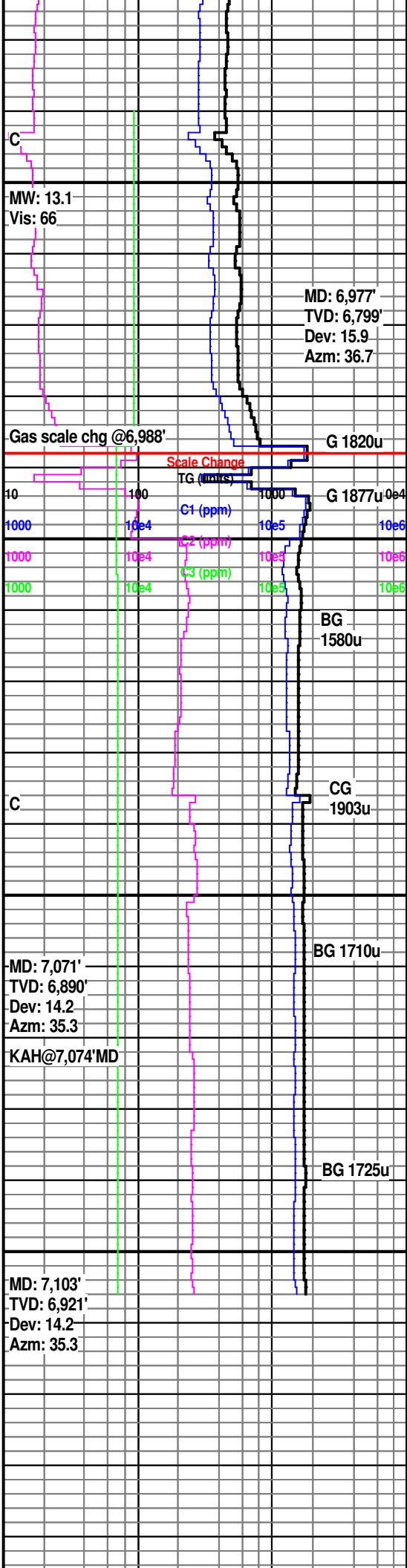
SH: 50% clysh, lt- m gy, f tex, frm, blk- pty, n calc, f lam, bcm v sft, amorph w/ wtr, 50% m dk gy, m tex, sl- m carb, thn lam

SH: 80% clysh, lt- m gy, f tex, frm, blk- pty, n calc, f lam, bcm v sft, amorph w/ wtr, 20% m dk gy, m tex, sl- m carb, thn lam

SH: mdgy ip, dk/lt gy ip, tr vry dk gy-blk ip, frm-sl hd, tr sft/vry hd, f-m tex, blk- amorph, pty ip, n calc, tr fd pyr, tr micmica, rr sl slty, lam ip, bcm v sft, amorph w/wtr

SH: gy-md gy, lt gy ip, tr dk gy, frm-sl hd, tr sft/vry hd, f-m tex, blk- amorph, pty ip, n calc, lam ip, bcm v sft, amorph w/wtr

**KOP @ 7,104'MD**



MW: 13.1  
Vis: 66

MD: 6,977'  
TVD: 6,799'  
Dev: 15.9  
Azm: 36.7

Gas scale chg @6,988'

Scale Change

G 1820u

G 1877u

BG 1580u

CG 1903u

BG 1710u

BG 1725u

MD: 7,071'  
TVD: 6,890'  
Dev: 14.2  
Azm: 35.3

KAH@7,074'MD

MD: 7,103'  
TVD: 6,921'  
Dev: 14.2  
Azm: 35.3

50

See Zogol 2213H Horizontal log