

Petrolific Consulting Services

Peter Debenham
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Wellsite Geology
720/220-4860
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Scale 1:240 (5"=100') Imperial

Well Name: Western Operating Company, Fretz Trust No. 1, Arroyo Field
Location: 2285'FSL & 660'FWL, Sec. 15, 29S, 41W, Stanton Co. KS
Licence Number: API: 15-187-21280 Region: Hougaton
Spud Date: 7/4/14 Drilling Completed: 7/13/14
Surface Coordinates: 2285'FSL & 660'FWL, Sec. 15, 29S, 41W, Stanton Co. KS

Bottom Hole Coordinates: 2285'FSL & 660'FWL, Sec. 15, 29S, 41W, Stanton Co. KS
Ground Elevation (ft): 3410' K.B. Elevation (ft): 3421'
Logged Interval (ft): 3600' To: TD Total Depth (ft): 5800'
Formation: Cherokee, Morrow, Keyes, Mississippi
Type of Drilling Fluid: Chemical Gel/LSND/LCM, mud up 3400'

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

OPERATOR

Company: Western Operating Company
Address: 518th 17th Street, Suite 200
Denver, CO 80202
Pres.: Steve James, Geologist Scott Stapp


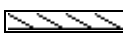
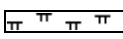
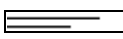
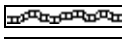

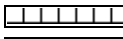
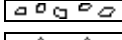
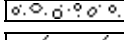
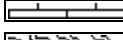
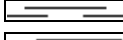
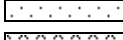


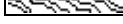
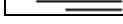
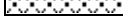
GEOLOGIST

Name: Wellsite: Peter Debenham
Company: Petrolific Consulting Services
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Drake, CO 80515
720/220-4860, Petrolific@gmail.com

Comments

Mrufin Rig. No. 4, T.P. Pat Hale, jackknife tripple stand, Service Mud/MudCo., Engineer Justin Whiting,
Weatherford Logs engineer Adam Sill,

ROCK TYPES

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

ACCESSORIES

FOSSIL

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

- Ostra
- Pelec
- Pellet
- Pisolite
- Plant
- Strom

MINERAL

- Anhy
- Arggrn
- Arg
- Bent
- Bit
- Brefracg
- Calc
- Carb

- Chtdk
- Chtlt
- Dol
- Feldspar
- Ferrpel
- Ferr
- Glau
- Gyp
- Hvymin
- Kaol
- Marl
- Minxl
- Nodule
- Phos
- Pyr
- Salt

- Sandy
- Silt
- Sil
- Sulphur
- Tuff

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

INTERVALS

- Core
- Dst

EVENTS

- Rft
- Sidewall

POROSITY TYPE

- Earthy
- Fenest
- Fracture
- Inter
- Moldic
- Organic

- Pinpoint
- Vuggy

SORTING

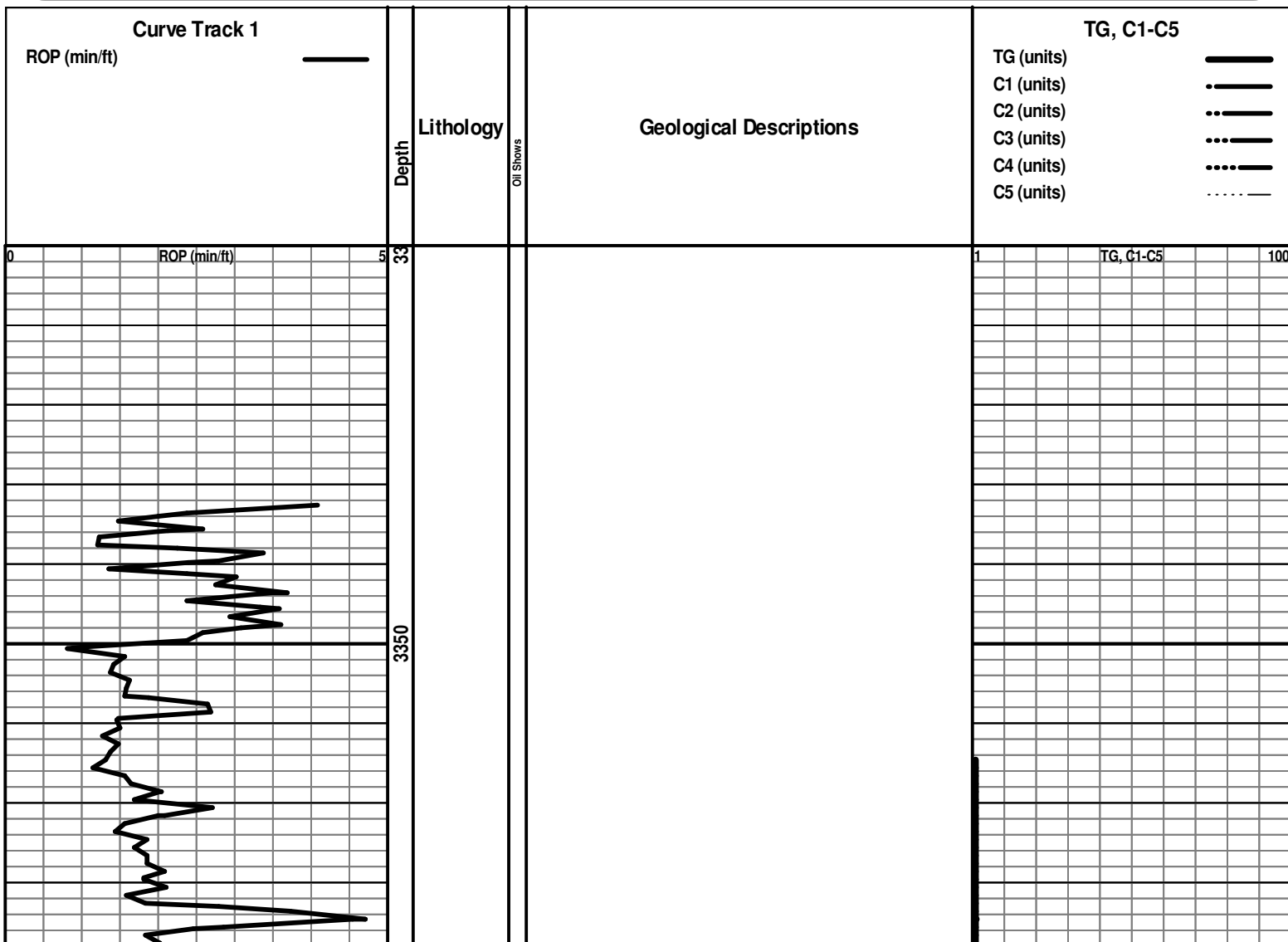
- Well
- Moderate
- Poor

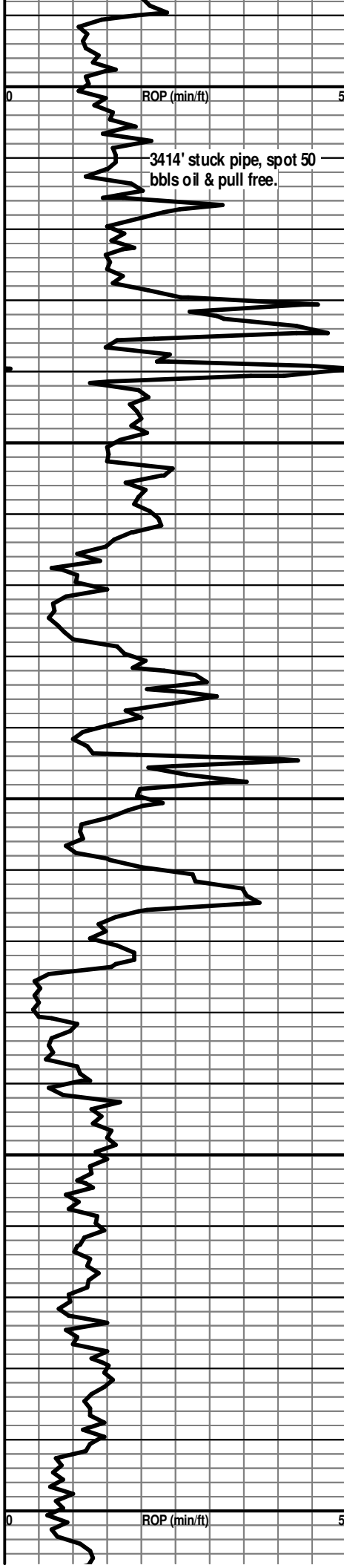
ROUNDING

- Rounded
- Subrnd
- Subang
- Angular

OIL SHOWS

- Even
- Spotted
- Ques
- Dead





ROP (min/ft)

3414' stuck pipe, spot 50
bbls oil & pull free.

3400
3450
3500
3550
3600



LS: Lt brn to bf micxn mic/crpxln frm foss ool dns to tr
intxn & moldic por no flor no stn or cut intbd with SH:
Gy to bl frm blk carb calc

LS: Pred aa foss ool with occ gd oomoldic por tr intxn
por no show intbd with SH: aa

SH: Med to dk brn to gy blk blk frm carb wxy to stly with
LS: aa

LS: Lt brn bf oomicr micxn brit cln exc oomoldic por
intxn por no flor no stn or cut

LS: Brn micr micxn frm to hd mic/crpxln cln foss with
occ gd moldic por no show occ intbd with SH: aa

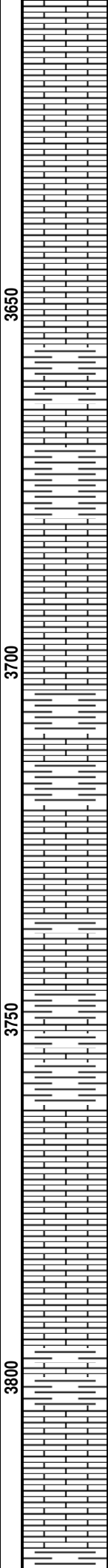
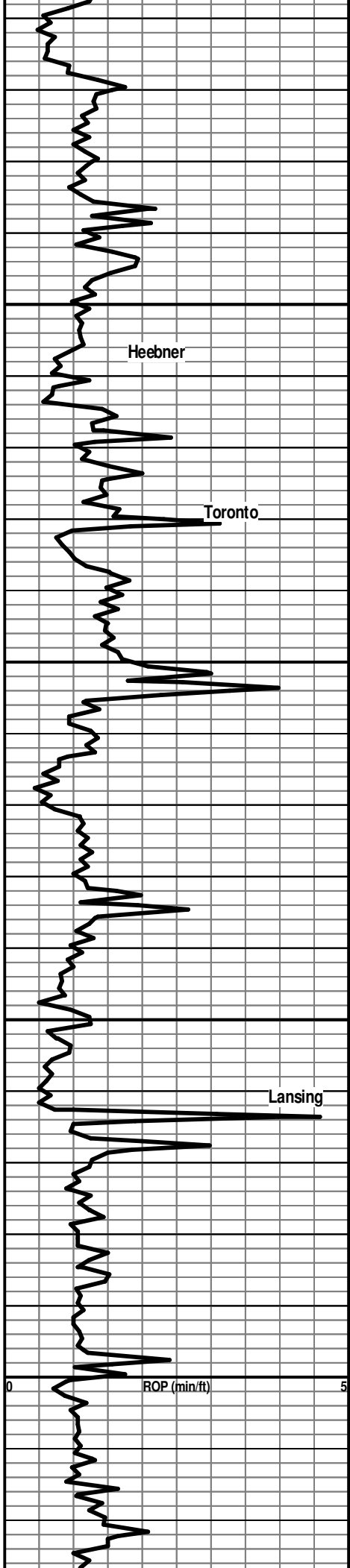
TG, C1-C5

100

1200 Units gas background from
contaminated mud - spotted 50
bbls oil. Gas reading remained
above 300 Units to TD. No
noticable gas increases noted.

TG, C1-C5

100



LS: Lt brn oomifc r xln/micsuc ip brit cln v ool with exc oomoldic por no flor no stn or cut

LS: Mot brn to gy f xln dns sil foss tt no show

SH: Blk frm sbfis carb calc intbd with LS: Lt brn micxln micsuc brit cln sbchky ip carb incl tr intxln por no show

Lt brn micxln micsuc brit cln sbchky ip carb incl tr intxln por occ gd moldic por no show

SH: Blk dk brn to gy frm fis to blk carb csalc mica with intbd LS: Mot brn mic/crpxln hd dns to tr intxln por sil & tt ip tripolic foss carb no show tr CHRT: Mot gy tripolic hd dns

LS: Lt to med brn bf micr micxln micsuc cln sbchky & brit ip foss occ oomoldic por no show with SH: Gy brn gygn frm sbfis wxy carb

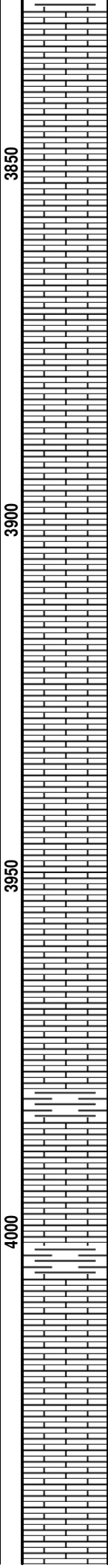
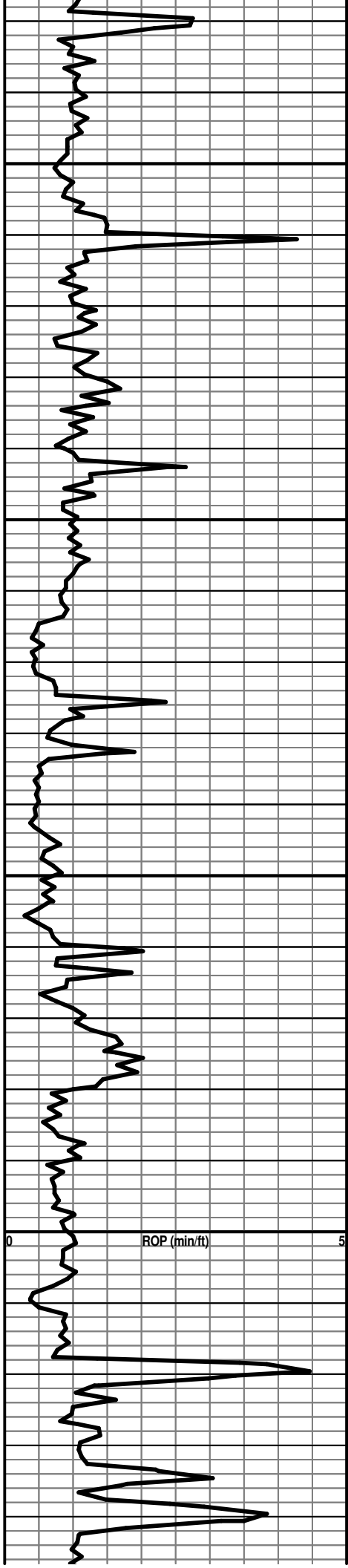
SH: Gy brn gygn frm sbfis wxy carb

LS: Brn gy crpxln hd dns sil ip foss p vis por no flor no stn or cut tr CHRT: Brn tripol ip hd xln foss intbd with SH: Gy brn gygn frm sbfis wxy carb

LS: Pred aa occ v chky & brit micsuc with intxln por no show intbd with SH: Gy brn gygn frm sbfis wxy carb

LS: Lt to med brn to gy micr micxln micsuc ip cln foss tr intxln & occ moldic por no show

WT 8.3
 VIS 69
 PV 22
 YP 24
 pH 10.0
 WL 7.6
 CL 900
 LCM 11



LS: Lt to med brn gy bf micr micxln micsuc ip cln foss tr
intxln por occ moldic por no show

LS: Mot brn to gy pred aa pred hd & tt no show occ intbd
with SH

LS: Lt brn bf oomicr micxln micsuc brit cln foss ool with
moldic por no flor no stn or cut intbd with LS: Brn tan
crpxln hd dns sil tt no show

LS: Lt brn bf oomicr v brit cln v ool with exc oomoldic
por no show

LS: Lt brn bf oomicr v brit cln v ool with exc oomoldic
por no show

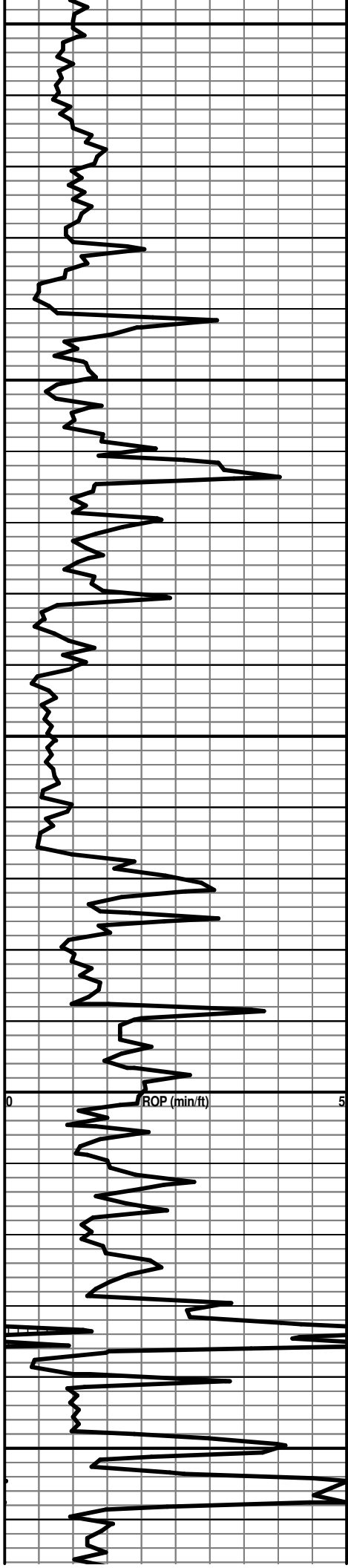
LS: Lt to med brn micxln to crpxln hd dns to tr intxln &
occ moldic por cln foss sbchky ip occ sil & tt no show
with SH: Brn gy gygn blkx wxy to sndy ip carb

LS: Pred aa suc with occ fr intxln por no show

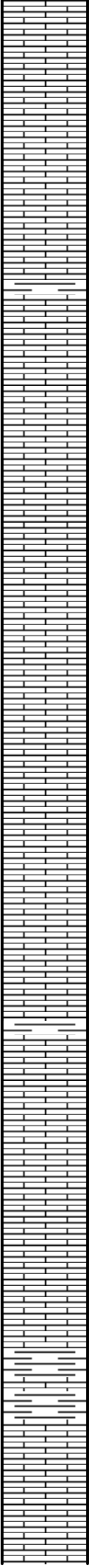
LS: Med to dk brn to gy dk gy crpxln hd dns arg to mrlly
ip tt no show intbd with SH: Gy brn frm sbfis to blkx carb
calc

LS: Med brn to gy f xln dns arg to mrlly ip foss pred tt no
flor no stn or cut intbed with SH: Med gy brn hd blkx calc
carb slty mica

LS: Lt brn gy micxln micsuc ip brit cln to arg chky occ
intxln por no show



4050
4100
4150
4200
4250



LS: Lt brn oomcr f xln brit cln v ool with exc oomoldic por no flor no sth or cut occ intbd with LS: Brn to gy frm blk calc

LS: Lt brn oomcr f xln brit cln v ool with exc oomoldic por no flor no sth or cut with LS: Mot brn brit sbchky foss cln tr intxn por no show occ intbd with SH: Gy brn gygn blk calc carb

LS: Lt brn oomcr f xln brit cln v ool with exc oomoldic por no flor no sth or cut with LS: Mot brn brit sbchky foss cln tr intxn por no show

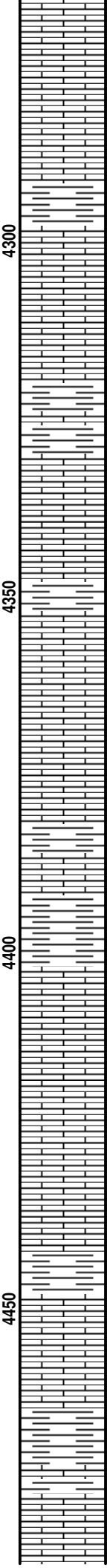
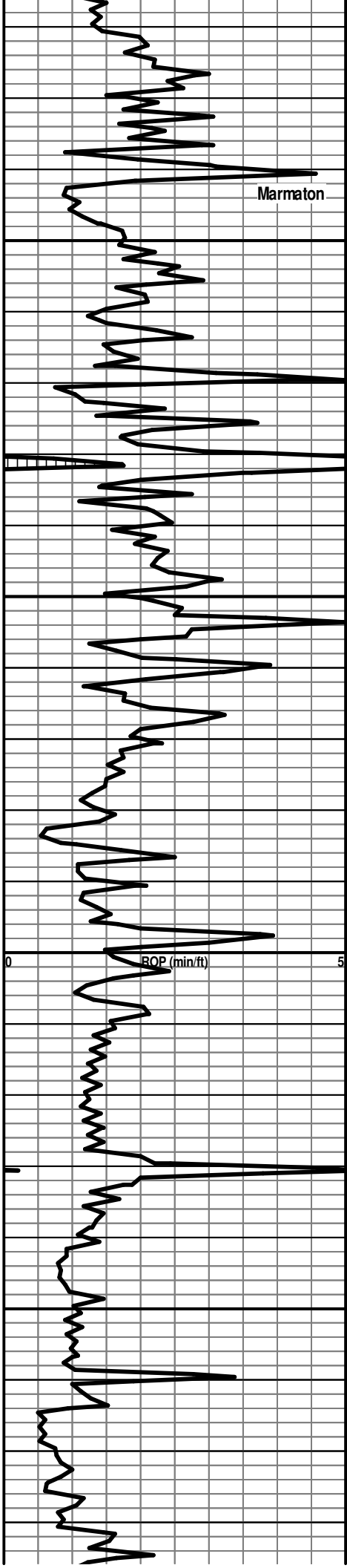
LS: Lt brn oomcr f xln brit cln v ool with exc oomoldic por no flor no sth or cut with LS: Mot brn brit sbchky foss cln tr intxn por no show

SH: Med brn mot gy to gygn blk calc stly

LS: Mot brn gy micr f xln sbchky dns cln to mrlly ip foss ool with occ moldic por no flor no stn or cut

LS: Med to dk brn to gy f xln dns arg foss pred tt no show

LS: Med to lt mot brn biomicr micxln micsuc brit cln to arg foss nvr tr intxn and moldic por no flor no stn or cut



SH: Brn hd blk calc foss ip

LS: Med to dk brn to gy crpxln hd dns tt no show intbd with SH: Brn hd blk calc foss ip

LS: Lt brn oomicr brit cln v foss & ol with moldic por no flor no stn or cut

SH: Med to dk brn to gy occ blk frm sbfis to blk carb calc intbd with LS: aa no show

LS: Mot brn gy f xln micsuc ip sbchky arg to mrlly ip tr intxln & occ moldic por no flor no stn or cut

SH: Blk frm sbfis carb sl calc with LS: aa

LS: Mot brn gy f xln micsuc ip sbchky arg to mrlly ip tr intxln & occ moldic por no flor no stn or cut

1 TG, C1-C5 100

Contaminated mud - Gas reading remained above 300 Units to TD. No noticeable gas increases noted.

Cherokee

4500

SH: dk bm to gy occ blk frm sbfis to blk calc slty intbd with LS: Mot brn gy f xln micsuc ip sbchky arg to mrly ip tr intxln & occ moldic por no flr no stn or cut

LS: Brn gy crpxln hd dns sil ip foss carb pyr tt no show

4550

SH: Dk bm gy gygn frm blk calc

LS: Lt to med brn to gy f xln dns to tr intxln por cln foss pred tt no show intbd with SH: aa with LS: Lt brn bf micxln micsuc brit cln sbchky foss ool pyr tr intxln & moldic por no flr no stn or cut CHRT: Mot gy mlky gy trnsi hd xln

4600

ROP (min/ft)

SH: Dk gy blk hd slty to sndy ip carb calc mica

LS: Lt to med brn to gy biomicro micro to crpxln pred hd & dns cln foss carb sil p vis por no show with tr CHT: aa intbd with SH: Dk gy blk hd slty to sndy ip carb calc mica

SH: Dk gy blk hd slty to sndy ip carb calc mica

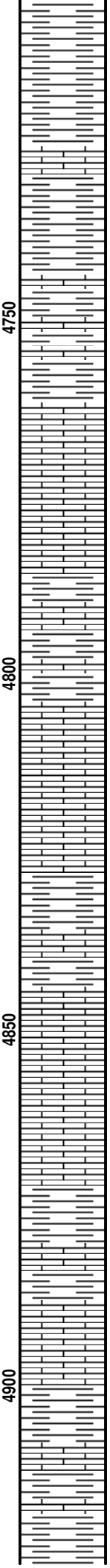
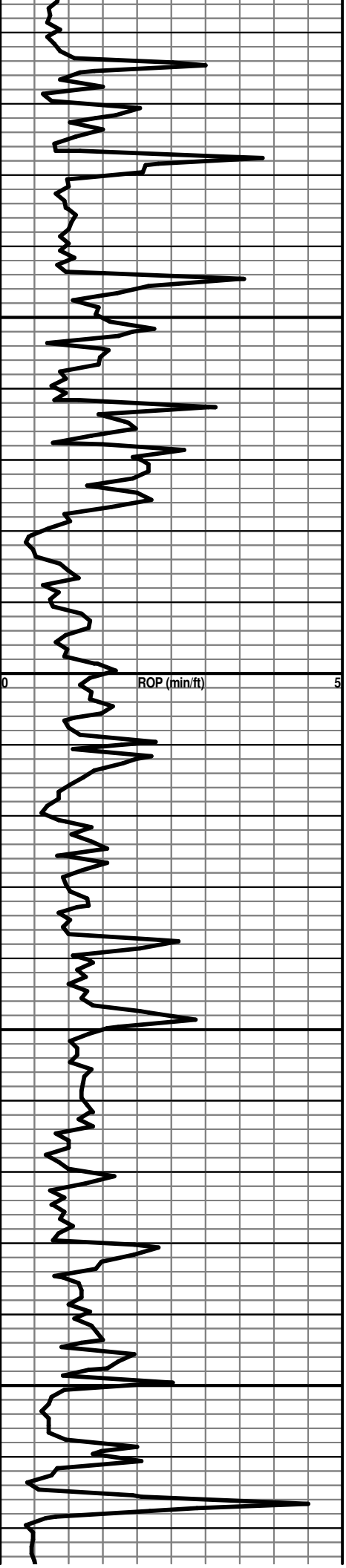
4650

LS: Med to dk mot gy to brn f xln micsuc ip cln to mrly foss carb occ por no flr no stn or cut intbd with SH: Dk gy blk hd slty to sndy ip carb calc mica with CHRT: aa

4700

SH: Dk gy blk mot hd blk calc carb sndy occ foss occ intbd with LS: aa

1 TG, C1-C5 100



LS: Med brn gy mot micr micxln micsuc ip cln to mrly ip foss sndy no show with CHRT intbd with SH: Dk gy blkly hd slty to sndy ip carb calc mica

LS: Med to dk mot gy to brn f xln micsuc ip cln to mrly foss carb occ por no flr no stn or cut CHRT: Mlky gy brn trnsl hd xln

LS: Med to dk mot brn to gy f xln micsuc ip cln to mrly sil ip foss sndy carb tt no show

LS: Med to dk mot brn to gy f xln dns cln to arg slty to sndy ip carb foss p vis por no flr no stn or cut intbd with SH: aa Blk frm fis carb

SH: Blk gy to brn hd blkly calc carb slty pyr

LS: Med to dk mot brn to gy f xln micsuc ip cln to mrly ip foss carb tt to occ intxln por no flr no stn or cut

SH: Blk frm sbfis carb mica calc

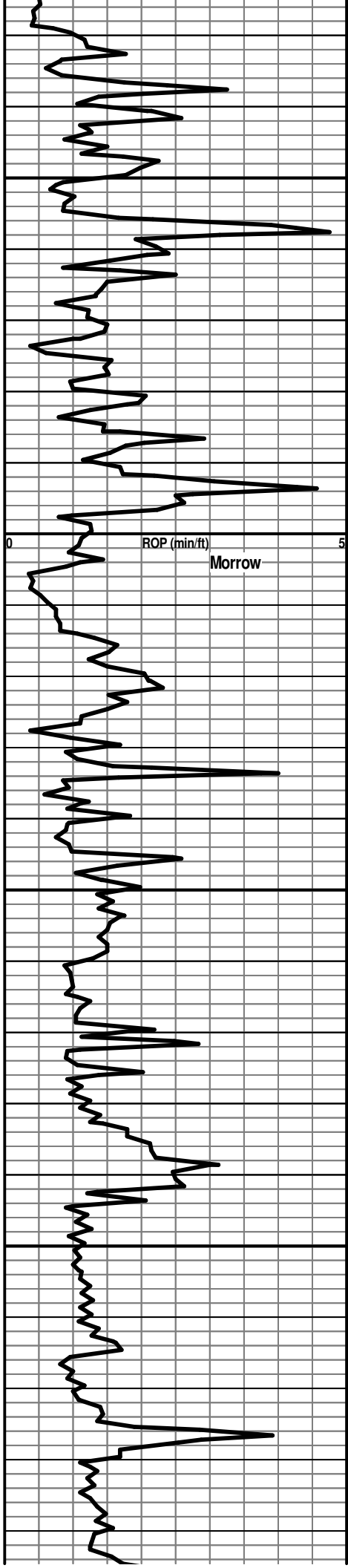
LS: Brn crpxln hd dns foss tt no show with CHRT: Mlky gy trnsl brn hd xln foss ip

SH: Blk dk gy frm sbfis to fis carb slty foss ip CHRT: Dk mot gy mlky hd xln intbd with LS: Lt to med brn gy f xln arg to mrly dns tt no show

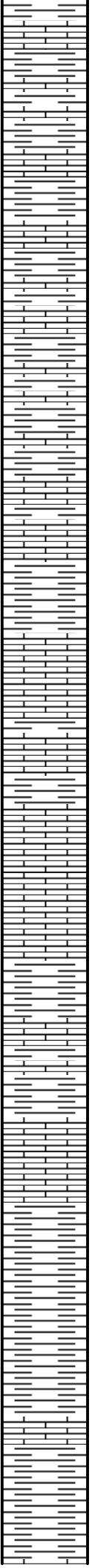
SH: Blk frm fis carb mica with SH: Gy blkly & slty carb incld intbd with LS: Med to dk mot brn to gy micr crpxln hd dns ar to mrly foss tt no show occ micsuc with tr intxln por no flr no stn or cut

WT 8.9
VIS 43
PV 14
YP 15
pH 10.5
WL 8.8
CL 1350
LCM 7

1 TG, C1-C5 100



4950
5000
5050
5100



SH: Blk frm fis carb mica with SH: Gy blk & slty carb
 incl intbd with LS: Med to dk mot brn to gy micr crpxln
 hd dns ar to mrlly foss tt no show occ micsuc with tr
 intxln por no flor no stn or cut

LS: Med to dk mot brn to gy occ blk micr crpxln hd dns
 arg to mrlly foss tt no show intbd with SH: aa

SH: Blk frm fis wxy to slty ip v carb mics with LS: Dk bm
 to gy occ blk micr crpxln hd dns marl tt no show

LS: Lt mot bm bf micxln micsuc ip sbchky foss arg tt/tr
 intxln por no flor no stn or cut

SH: Blk frm fis wxy to slty ip v carb mica occ intbd with
 mrlly LS: tt no show

SH: Blk frm fis wxy to slty ip v carb mica occ intbd with
 mrlly LS: tt no show

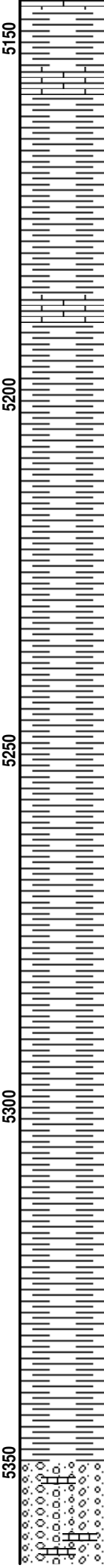
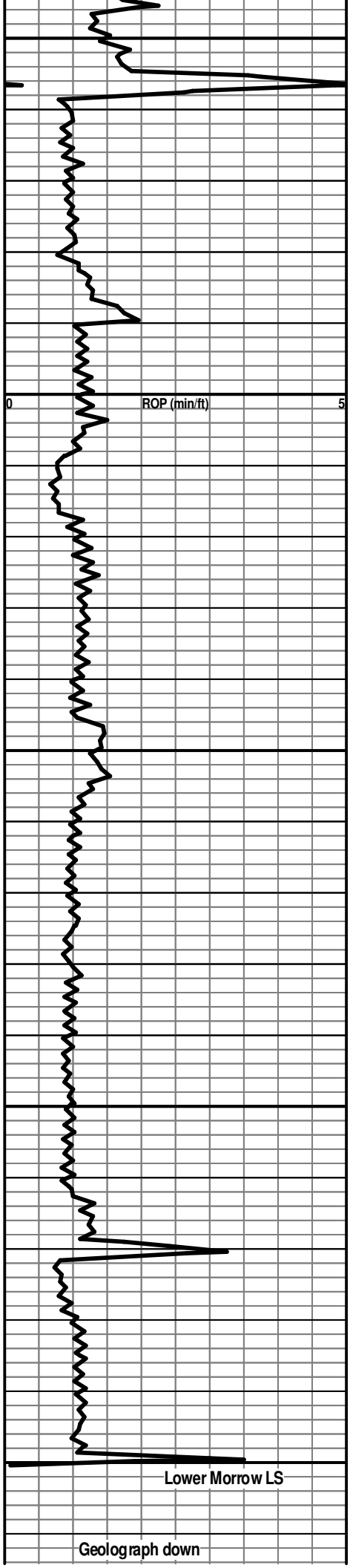
SH: Blk frm fis wxy to slty ip v carb mica occ intbd with
 mrlly LS: tt no show

SH: Blk frm fis wxy to slty ip v carb mica occ intbd with

TG, C1-C5

100

Contaminated mud - Gas
 reading remained above 300
 Units to TD. No noticable gas
 increases noted.



mrly LS: tt no show

SH(100% sp!): Blk dk gy frm asbfis to fis carb wxy mica

SH(100% sp!): Blk dk gy frm asbfis to fis carb wxy mica

SH(100% sp!): Blk dk gy frm asbfis to fis carb wxy mica

SH(100% sp!): Blk dk gy frm fis wxy carb

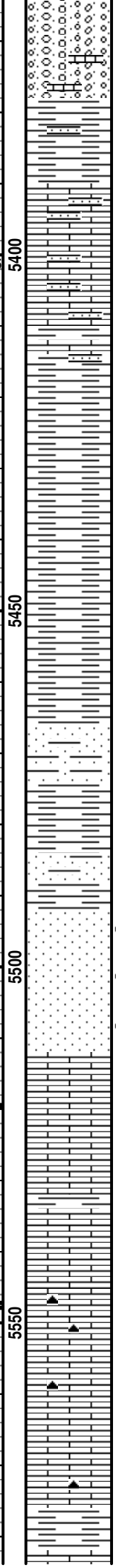
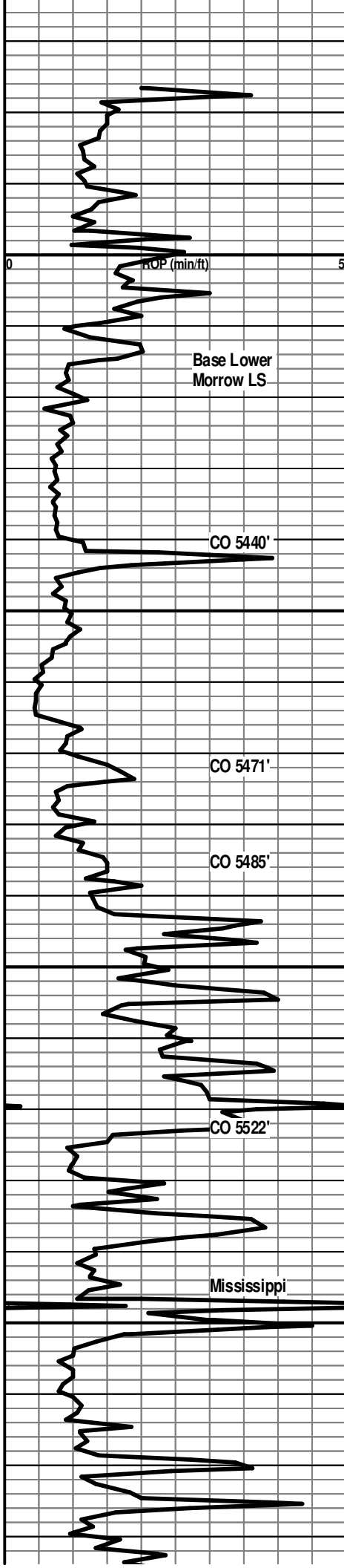
SH(100% sp!): Blk dk gy frm fis wxy carb

LS: Mot gy to gn s&p spec gn frm dns f xln sbchky ip micsuc v sndy with m/vc & conglc ip p srted sbang grs glauc ip pyr p vis por no flor no stn or cut grnd to & intbd with Congl: Clr s&p spec gn hd to fri ip vc/conglc p srted sbrng to sbrnd grs calc cmt cln to arg ip glauc pyr occ gd intgran por no show with abt unconsl grs intbd

Lower Morrow LS

Geolograph down

1 TG, C1-C5 100



with SH: Blk dk gy frm sbfis to blk y wxy to sndy ip carb

LS: Mot brn to gy spec gn s&p spec gn frm dns f xln sbchky ip micsuc v sndy with f/vc & conglc ip p srted sbang grs glauc ip pyr p vis por no flor no stn or cu grdng to & intbd with SS: Clr s&p spec gn hd to fri ip v to conglc p srted sbmg to sbmd grs calc cmt cln to arg ip glauc p vis por no show with abt unconsl grs

Abt c p srted unconsl grs

SH: Blk frm fis wxy carb occ med gy to gygn & blk y with Abt c p srted unconsl grs with abt c p srted unconsl grs

SH: Dk gy blk frm blk y to sbfis wxy to sndy ip carb mica pyr

SS: Spec gn s&p gy hd dns fl/fu w srted sbrnd grs ca cmt cln to arg glauc pyr carb p vis por no flor no stn or cut intbd with SH: aa

- SS(5% sp): Med to lt brn clr trnsl v fri ip mu/fl mod srted sbmd grs sil cmt calc cln carb incld gd intgran por - sm clay infill bri it bl to yel hydc flor(all SS) gd strmg cut lt brn o stn gas bubbles when crushed

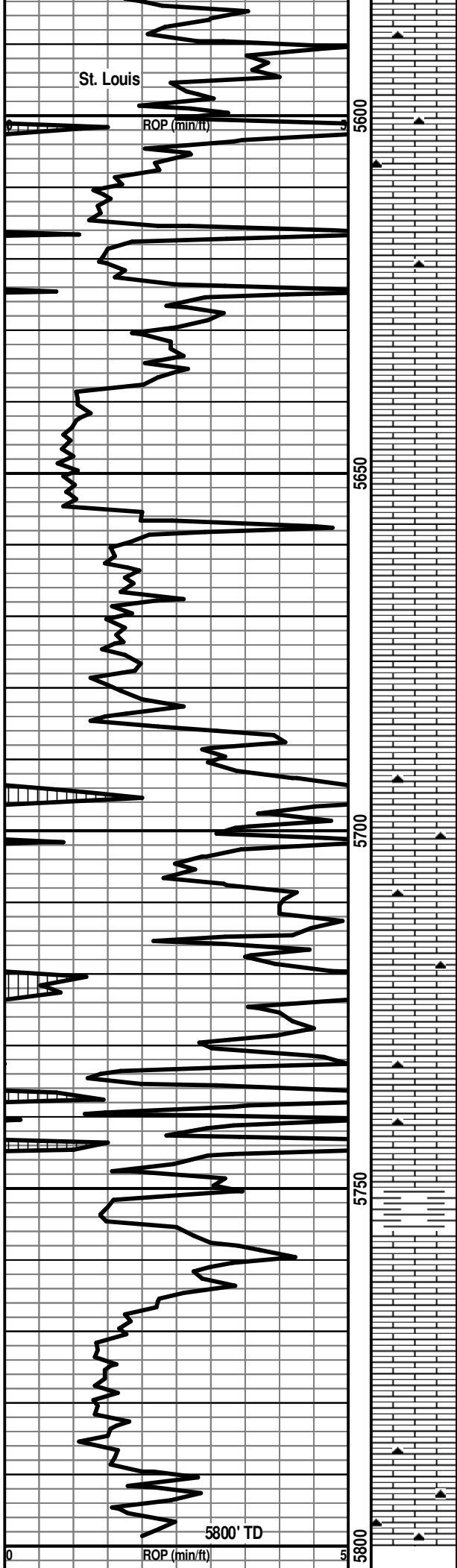
LS: Wh tan to bf micxln micsuc sbchky brit v sndy w f w srted sbrnd grs p vis por no show intbd with SH: Blk frm fis to blk y carb

LS: Lt brn bf micxln micsuc brit v sndy & ool foss cln sl glauc p vis por no show

LS: Wh lt brn bf micxln micsuc sbchky sft brit cln ool foss sndy with f w srted sbmd grs p vis por no flor no stn or cut tr CHRT: Orng mlky wh to gy hd xln tripol ip

SH: Blk frm fis to blk y wxy to sndy ip carb

1	TG, C1-C5	100
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CHRT: Trnsl mlky hd xln LS: Lt to med brn bf micxn sbchky v sndy ool occ por pred tt no flor no stn or cut

1 TG, C1-C5 100

LS: Med to lt brn to bf wh biomcr micxn sbchky cln ool & foss sndy ip p vis por no show

LS: Wh lt brn to bf brit chky cln v sndy & ool with intpart por intxn por no flor no stn or cut tr CHRT: Mlky gy to brn occ orng hd xln

LS: Med to lt mot brn bf micr micxn sbchky cln brit v ool with tr intpart por tr intxn por no flor no stn or cut with CHRT

Contaminated mud - Gas reading remained above 300 Units to TD. No noticable gas increases noted.

LS: Med to lt mot brn bf micr micxn sbchky cln brit v ool with tr intpart por tr intxn por no flor no stn or cut with CHRT

LS: Med brn crpxln hd dns sndy & glauc ip cln tt no show

LS: Med to lt bn biomcr f xln sbchky cln foss sndy ip p vis por no show tr CHRT: Trnsl mlky gy hd xln with LS: Med brn crpxln hd dns sndy & glauc ip cln tt no show

SH: Blk frm fis carb

LS: Med to dk brn micr crp/micxn hd dns cln sil foss carb tt n show

Abt CHRT: Mlky wh to gy hd xln LS: Lt to dk brn crpxln hd dns sil tt no show

1 TG, C1-C5 100

