



Scale: 5" / 100'
Measured Depth Log

Well Name Ruegge 3D-4H-N165

Location Sec. 4 T1N R65W

State Colorado

County Weld

Country USA

Rig Number Ensign 140

API Number 05123465560000

AFE # 1619080

Geographic Region Rockies

Field Wattenberg

Spud Date 5/27/2018

Drilling Completed 6/1/2018

Surface Coordinates Lat/Long: 40.075229/-104.671021

SHL: Sec: 4 Twp: 1N 65W
Footage: 696 FSL 2067 FWL

Bottom Hole Coordinates Proposed BHL: Sec: 4 Twp: 1N 65W
Footages: 460 FNL 500 FWL

Ground Elevation 4,917'

K.B. Elevation 4,940'

Logged Interval 6,600' **To** 12,140'

Total Depth 12,140'

Formation C Chalk

Type of Drilling Fluid Synthetic Oil Based Mud

Operator

Company Crestone Peak Resources

Address 370 17th Street #2170
Denver, CO 80202



CRESTONE PEAK
RESOURCES

Geologist

Zone Color Coding

Geologist

Name John Ready

Company Crestone Peak Resources

Address 370 17th Street #2170
Denver, CO 80202



CRESTONE PEAK
RESOURCES

Zone Color Coding



Oil



Condensate



Gas



Note



Core



Pressure



Error



Water



Seal

Other

Loggers: Brian Ferwerda / Nick Watkins

Services Provided: 2-Man Mudlogging / Geosteering

Equipment: ML-533

Contractor: Empirica, Reservoir Group
6360 West Sam Houston Pkwy N
Houston, Texas, 77041

Rock Types

? UNKNOWN

ANHYDRITE

GYPSUM

SALT

SIDERITE or LIMONITE

LIMESTONE

DOLOMITE

CHERT

COAL

MARLSTONE

CHALK

SHALE

SHALE GRAY

SHALE COLORED

SILTSTONE

SANDSTONE

CONGLOMERATE

BRECCIA

TILL

BENTONITE

TUFF

IGNEOUS

METAMORPHIC

CEMENT

Accessories

Fossils

ALGAE

AMPHIPORA

BELEMNITE

BIOCLASTIC

BRACHIOPOD

BRYOZOA

CEPHALPOD

CORAL

CRINOID

ECHINOID

FISH

FORAMINIFERA

F FOSSIL

GASTROPOD

OOLITE

OSTRACOD

PELECPOD

PELLET

PISOLITE

PLANT REMAINS

PLANT SPORES

SCAPHOPD

STROMATOPOROID

Minerals

ANHYDRITIC

ARGILLACEOUS

ARGILLITE GRAIN

BENTONITE

BITUMENOUS SUBSTANCE

BRECCIA FRAGMENTS

CALCAREOUS

CARBONACEOUS FLAKES

CHTDK

CHTLT

COAL - THIN BEDS

DOLOMITIC

FELDSPAR

FERRUGINOUS PELLET

FERRUGINOUS

GLAUCONITE

GYPSIFEROUS

HEAVY MINERAL

KAOLIN

MARLSTONE

MINERAL CRYSTALS

NODULES

PHOSPHATE PELLETS

PYRITE

SALT CAST

SANDY

SILICEOUS

SILTY

TUFFACEOUS

Stringer

ANHYDRITE STRINGER

BENTONITE STRINGER

COAL STRINGER

DOLOMITE STRINGER

GYPSUM STRINGER

LIMESTONE STRINGER

MARLSTONE (CALC) STRG

MARLSTONE (DOL) STRG

SANDSTONE STRINGER

SHALE STRINGER

SILTSTONE STRINGER

Other Symbols

Oil Show

- DEAD
- EVEN
- QUESTIONABLE
- SPOTTED STAINING

Porosity

- EARTHY
- FENESTRAL
- FRACTURE
- INTERCRYSTALLINE
- INTEROOLITIC
- MOLDIC

- ORGANIC
- PINPOINT
- VUGGY

Engineering

- BIT
- CASING
- CONNECTION (LEFT)
- CONNECTION (RIGHT)
- CONNECTION GAS
- CORE - LOST
- CORE - RECOVERED
- DST INTERVAL
- FAULT

- FORMATION TOP
- GAS SHOW
- MN DEPTH
- NORMAL FAULT
- OIL SHOW
- OVERTURNED STRATA
- REVERSE FAULT
- SIDEWALL CORE (LEFT)
- SIDEWALL CORE (RIGHT)
- SLIDE
- SURVEY
- TRIP GAS
- WIRELINE TESTED - LEFT
- WIRELINE TESTED - RT

Rounding

- ANGULAR
- ROUNDED
- SUBANG
- SUBRND

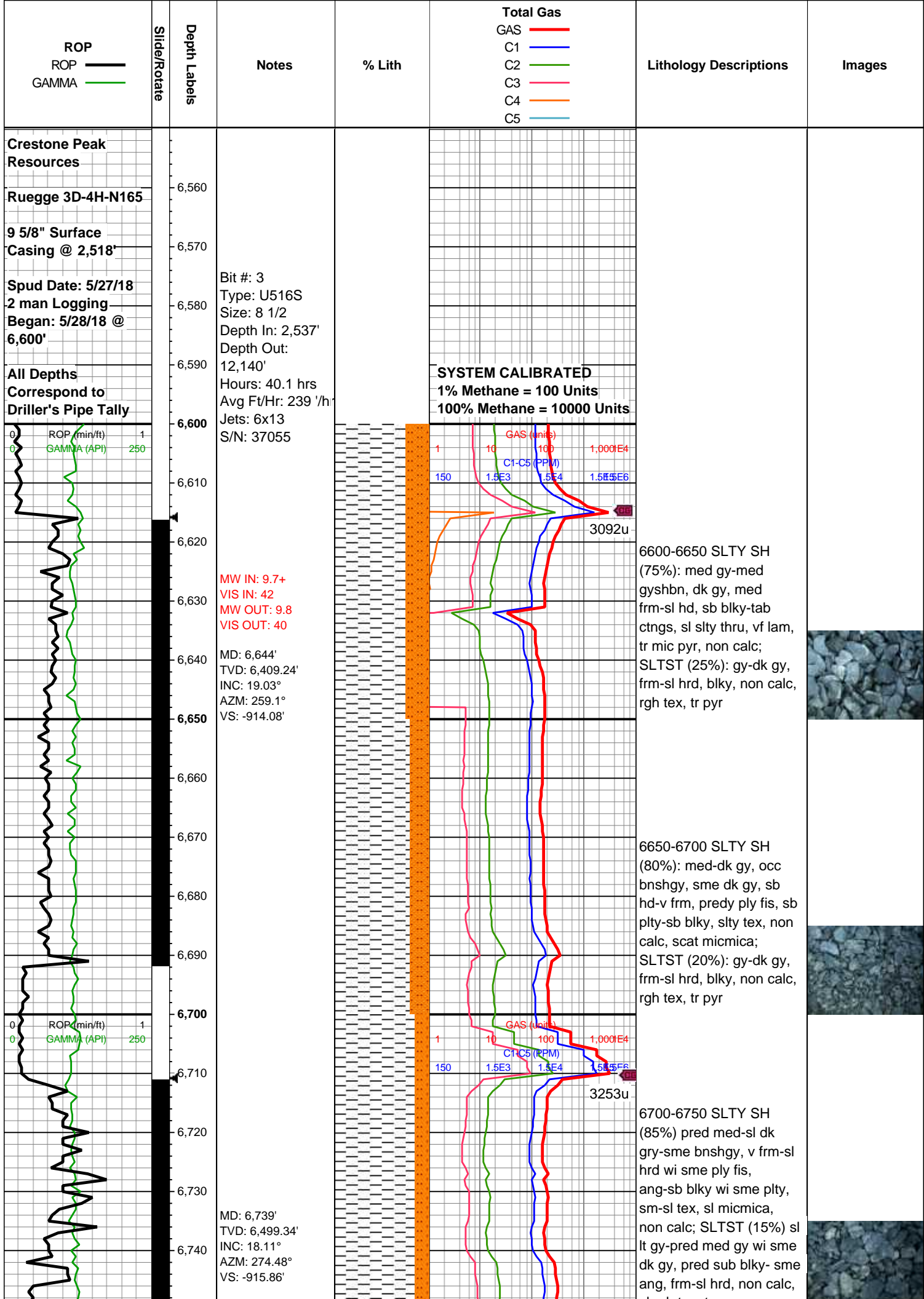
Textures

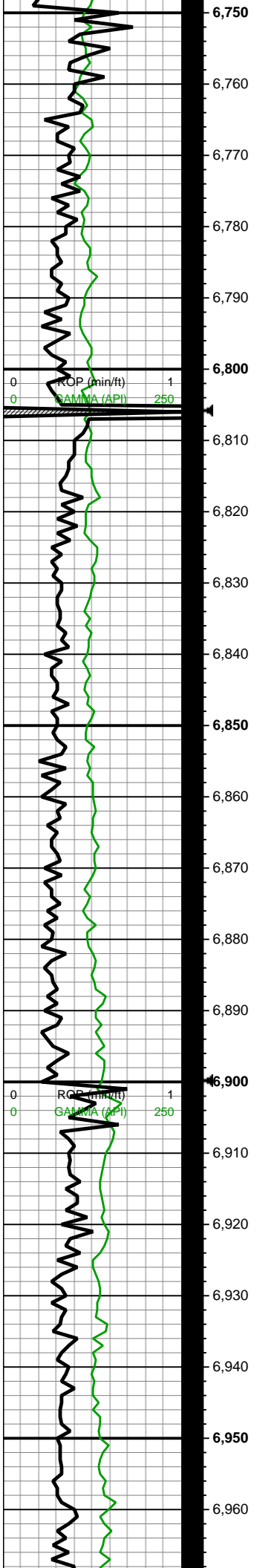
- BOUNDSTONE
- CHALKY
- CRYPTOXLN
- EARTHY
- FINELYXLN
- GRAINSTONE

- LITHOGRAPHIC
- MICROXLN
- MUDSTONE
- PACKSTONE
- WACKESTONE

Sorting

- MODERATE
- POOR
- WELL





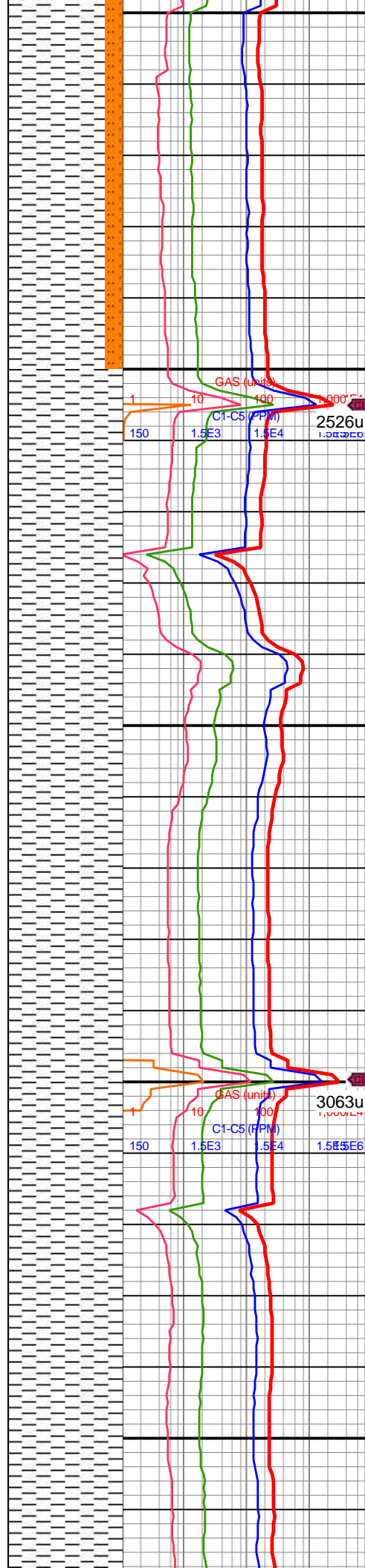
MW IN: 9.7+
VIS IN: 42
MW OUT: 9.7
VIS OUT: 40

WOB: 36.9klbs
RPM: 0
SPM: 204
SPP: 3,545psi

MD: 6,833'
TVD: 6,588.9'
INC: 18.19°
AZM: 307.26°
VS: -905.81'

MW IN: 9.7
VIS IN: 41
MW OUT: 9.6+
VIS OUT: 39

MD: 6,928'
TVD: 6,677.63'
INC: 24.04°
AZM: 329.85°
VS: -880.03'



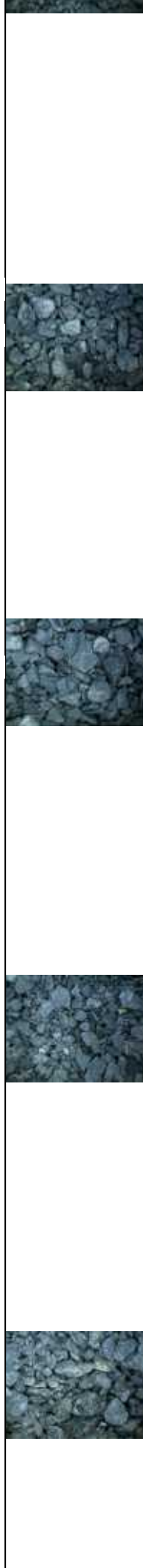
sl rgh tex, tr pyr

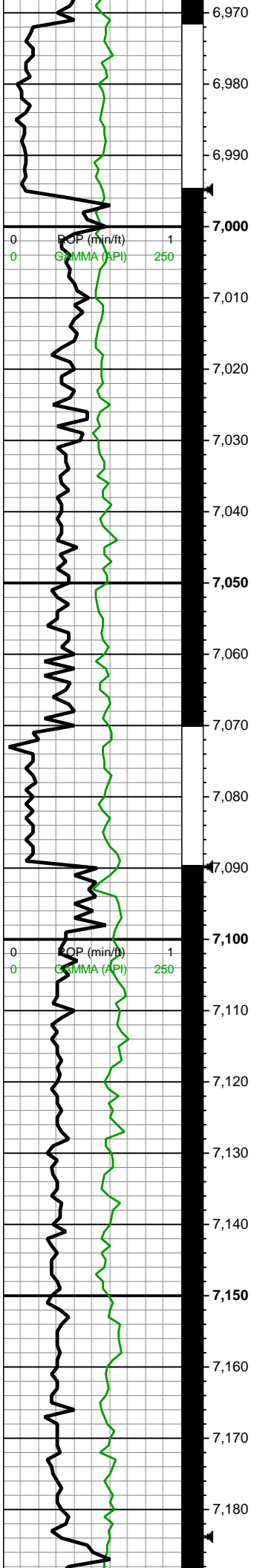
6750-6800 SLTY SH
(85%) pred med-sl dk
gry-sme bnshgy, frm-sl
hrd wi sme ply fis,
ang-sb blkly wi plty, sm-sl
tex, micmica, non calc;
SLTST (15%) sl lt gy-med
gy wi sme dk gy, pred
sub blkly- sme ang, frm-sl
hrd, non calc, rgh tex, tr
pyr

6800-6850 SLTY SH
(100%) pred lt- med gry
wi sl bnshgy, v frm wi
sme fis, v plty-sb blkly, sm
tex wi scat micmica,
non-sl calc,

6850-6900 SLTY SH
(100%) pred lt- med gry
wi sl bnshgy, v frm-sl hrd
wi sme fis, plty-sb
blkly-sme sb ang, sm tex
wi sl scat micmica,
non-sl calc,

6900-6950 SLTY SH
(100%) v gysbnn wi lt-sl
med gy-occ scat dk gy, v
frm-sl hrd wi sme fis, v
pred plty-blkly wi sl ang,
sm tex wi scat-tr
micmica, non-sl calc,



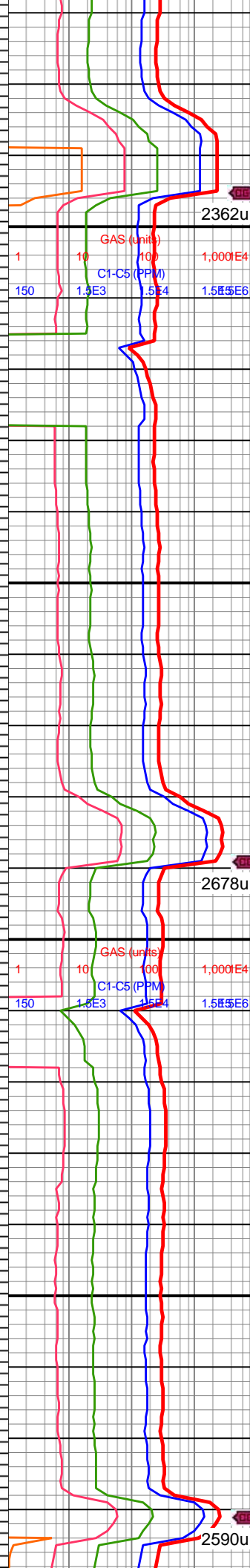


WOB: 27.1klbs
RPM: 0
SPM: 206
SPP: 3,589psi

MD: 7,023'
TVD: 6,764.99'
INC: 22.37°
AZM: 342.68°
VS: -846.02'

MW IN: 9.6+
VIS IN: 40
MW OUT: 9.6+
VIS OUT: 40

MD: 7,117'
TVD: 6,850.16'
INC: 27.69°
AZM: 350.68°
VS: -819.3'



6950-7000 SLTY SH
(100%) pred gyshbn wi sl
med gy-occ scat dk gy, v
frm-sl brit wi sme fis,
pred plty-blky wi sl ang,
sm tex wi scat micmica,
non-sl calc,

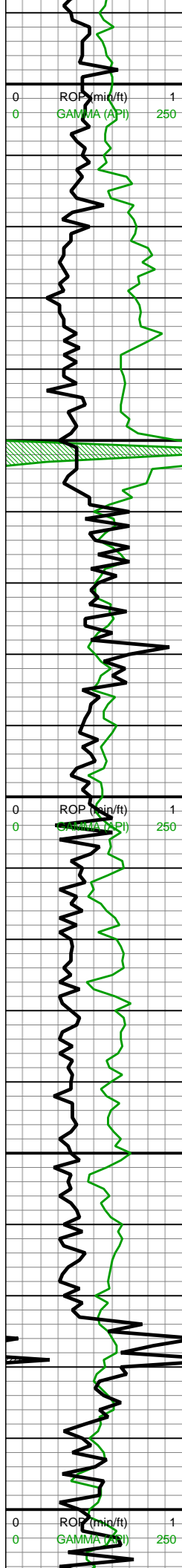
7000-7050 SLTY SH
(100%): lt-med gyshbn,
scat blkgy, frm, brit, sb
plty-sb blkgy, dull, com v
thnly lam, non calc,
micmica, rr diss m pyr

7050-7100 SLTY SH
(100%): dk gy- v dk gy,
sme med gy, occ blk,
frm-v frm, blkgy, sme
plty-sb plty, micmica, tr
pyrc nod, non calc, sm
tex

7100-7150 SLTY SH
(100%): pred dk gy- dk
gy, sme grdgy to blk,
frm-sl hrd, blkgy, sme plty,
com micmica, non-sl
calc

7150-7200 SLTY SH
(100%): dk gy-v dk gy,
sme gyshbn-blk, frm-sl





WOB: 22.2klbs
RPM: 0
SPM: 206
SPP: 3,494psi

MD: 7,212'
TVD: 6,930.19'
INC: 37.31°
AZM: 353.05°
VS: -768.88'

Sharon Springs
7219 MD/6936 TVD

Niobrara
7251 MD/6960 TVD

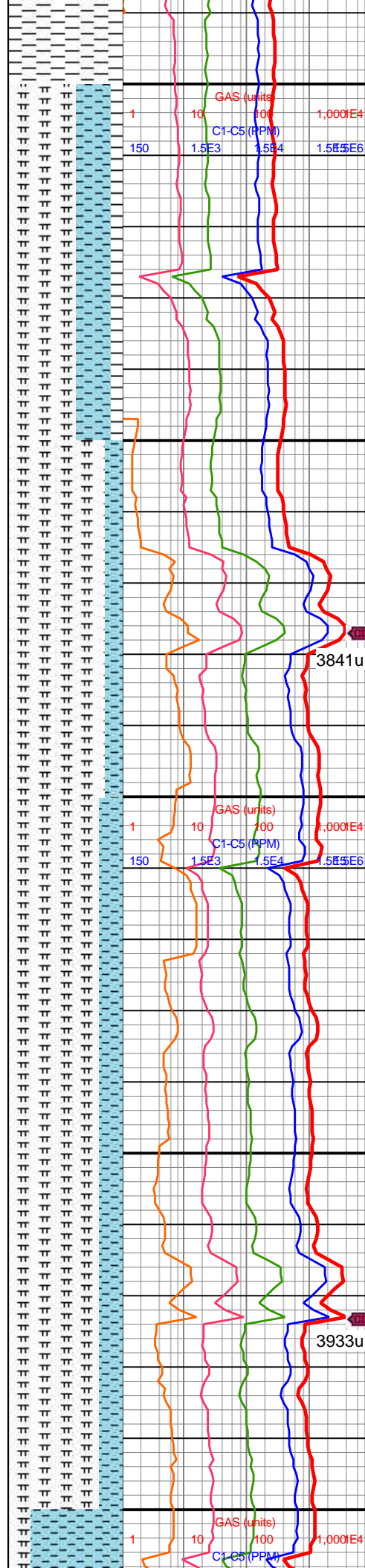
MW IN: 9.7
VIS IN: 39
MW OUT: 9.6+
VIS OUT: 39

MD: 7,307'
TVD: 7,001.24'
INC: 45.75°
AZM: 352.61°
VS: -706.51'

MW IN: 9.6+
VIS IN: 39
MW OUT: 9.6+
VIS OUT: 39

WOB: 30.3klbs
RPM: 0
SPM: 188
SPP: 3,219psi

MD: 7,401'
TVD: 7,061.28'
INC: 54.76°
AZM: 352.79°
VS: -634.97'



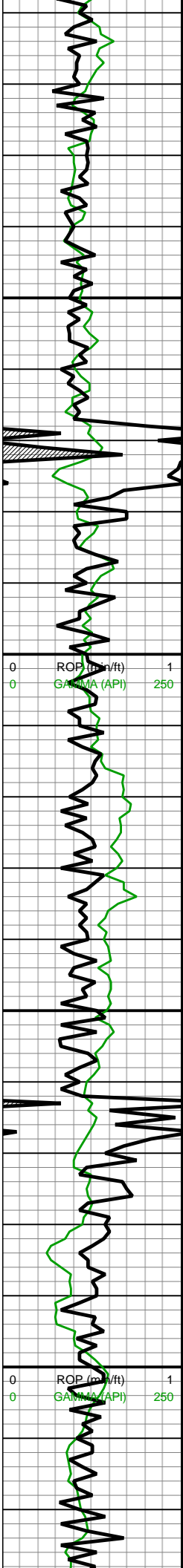
hrd, occ hrd, blkly, sme
plty, tr-scat micmica, tr pp
pyr, sm-sl rgh tex, non-sl
calc

7200-7250 MRLST
(60%): pred med brn-dk
brn, frm-v frm, sme sl
hrd, blkly, occ mot, sl rgh
tex, v calc, scat pyrc nod;
CHK (30%): pred med
brn-lt brn, sme lt gy, sft-sl
frm, blkly, chky tex, v calc;
SH (10%): pred dk gy-v
dk gy, blkly, sme plty,
frm-v frm, sm tex, scat
micmica, non calc

7250-7300 MRLST
(85%): pred med brn-dk
brn, sme gyshbn, frm-v
frm, blkly, mot-lam, sme
mot, v calc, scat pyrc nod;
CHK (15%): pred med
gy-med brn, sme lt brn,
blkly, sft-sl frm, v calc,
chky tex

7300-7350 MRLST
(80%): pred med gy-dk
gy, frm-v frm, blkly, sl
mot-lam, sme sl mot, v
calc, occ-scat pyrc nod,
sme tr micmica; CHK
(20%): pred med gyshbn,
sme lt brn, v blkly, sft-sl
frm, v calc, chky tex

7350-7400 MRLST
(80%): pred med gy-dk
gy, frm-v frm, blkly, sl
mot-lam, sl-com lam, v
calc, v rr-occ pyrc nod wi
sme tr pyr, sme tr-rr
micmica; CHK (20%):
pred med-sl gyshbn,
sme dk brn, v blkly, sft-sl
frm, v calc, chky tex



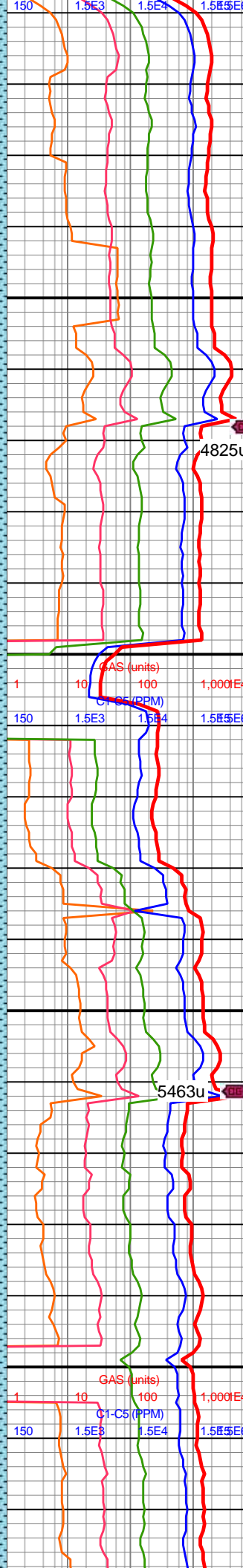
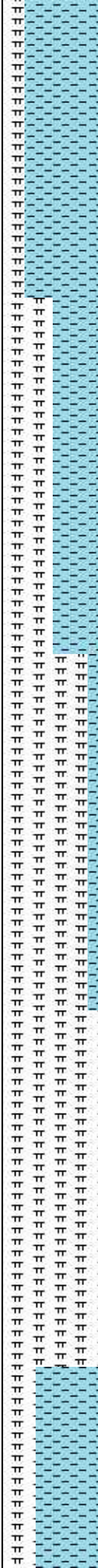
B Chalk
7420 MD/7072 TVD

MD: 7,496'
TVD: 7,109.05'
INC: 64.78°
AZM: 352.7°
VS: -553.74'

C Chalk
7581 MD/7137 TVD

MD: 7,591'
TVD: 7,140.38'
INC: 76.64°
AZM: 353.84°
VS: -464.94'

WOB: 41.2klbs
RPM: 5
SPM: 179
SPP: 3,000psi



7400-7450 CHK (80%)
pred med gyshbn-lt brn,
sub blkyl-blky, sft-sl frm,
tr-rr pp pyr; MRLST (20%)
v med-sme dk gry, sub
blkyl-sl rnd, sl lam wi tr
micmica

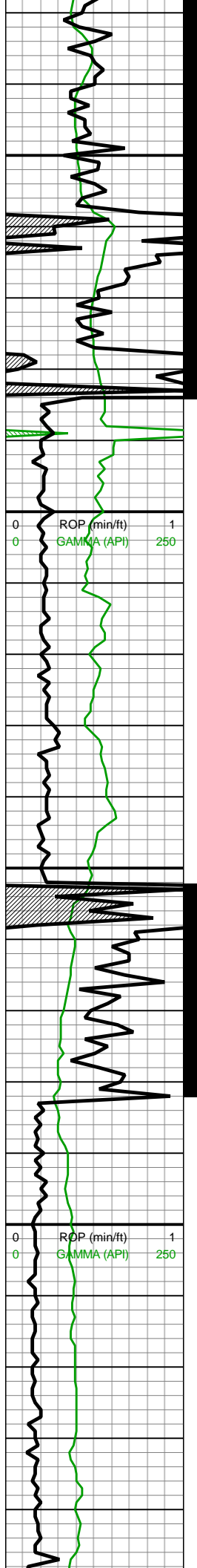
7450-7500 CHK (55%)
pred med gyshbn-lt brn,
sub blkyl-blky wi sme sl
plty, sft-sl frm, tr-rr pp pyr;
MRLST (45%) v
med-sme occ dk gry, sub
blkyl-sme rnd, occ lam wi
tr micmica

7500-7550 MRLST
(75%): dk gy-gyshbn,
mot, sl hd-frm, sb blkyl-sb
ang ctngs, tr intbd CHK,
calc; CHK (25%): predy
gyshbn, mot-sl stri, sb
blkyl ctngs, sl frm-brit, tr
MRLST incl, sm chky tex,
v calc

7550-7600 MRLST(85%):
med-v dk gry, predy blkyl
wi com lamn, v brit-hrd,
micmica, hily calc; CHK
(15%) pred ltgy-occ
gyshbn wi sme com lt thn
chky lamn, sub blkyl-blky
with occ plty, v soft-ltly
frm, rgh tex wi rr-pp pyr,
hily calc

7600-7650 CHK (70%):
pred lt med gy-sme occ lt





MW IN: 9.7
VIS IN: 39
MW OUT: 9.6
VIS OUT: 38

Power outage
on rig from
storm

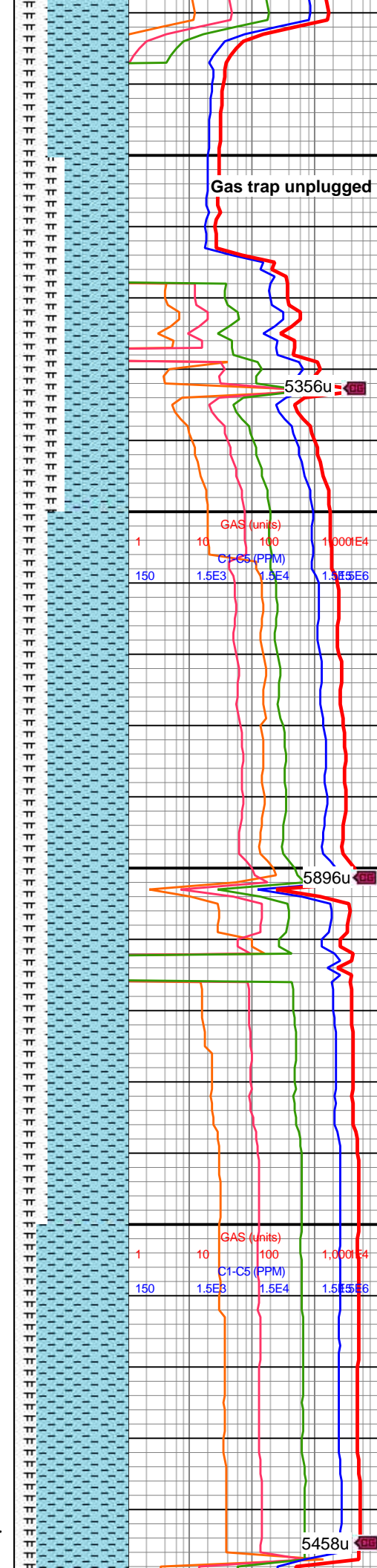
MD: 7,685'
TVD: 7,154.38'
INC: 86.22°
AZM: 359.65°
VS: -372.33'

MW IN: 9.65
VIS IN: 43
MW OUT: 9.65
VIS OUT: 40

MD: 7,780'
TVD: 7,157.67'
INC: 89.82°
AZM: 356.66°
VS: -277.49'

WOB: 34klbs
RPM: 70
SPM: 200
SPP: 3,890psi

On gas buster



Gas trap unplugged

5356u

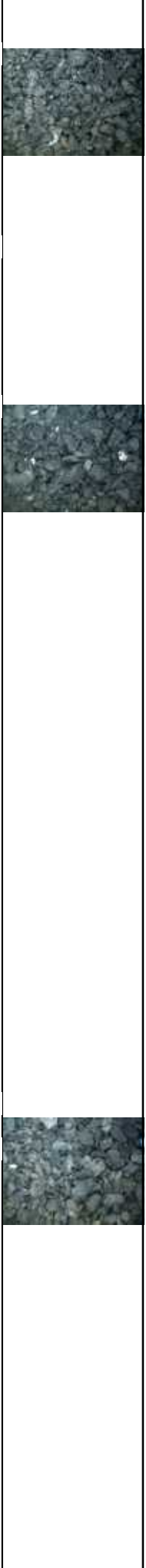
5896u

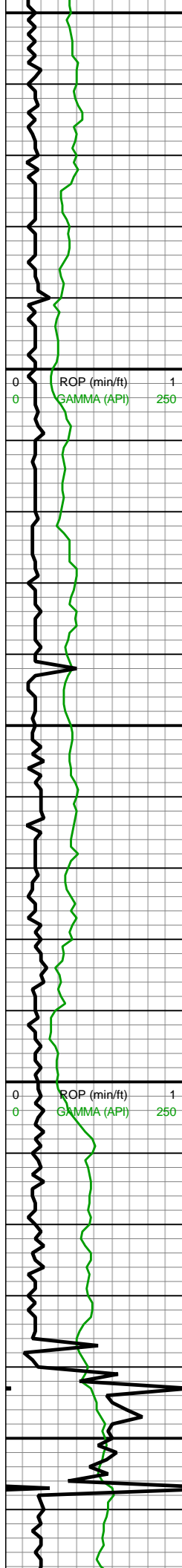
5458u

brn, sl sft-frm, blk, v-hi
calc, v rr-occ pyrc nod wi
sme tr pyr; MRLST (30%):
pred med-sme dk gry, v
blky-sb blk, brit-sl
hrd,non calc, chky lam wi
sme chky tex

7650-7700 CHK (55%): lt
gyshbn-med gyshbn, rr lt
gy, sb frm-frm, sft ip, mod
fis sb ang-sb blk ctns
wi predy sm arg tex, sl
silty ip, rr gt forams & tr
inoc fos frags, tr vf
pyr-ptch pyr strg, med-hi
calc; MRLST (45%):
gyshbn-dk gy, frm-hd, occ
sft, predy brit, sm sl silty
tex, mod calc wi brn mrly
resdl

7700-7800 CHK (70%): lt
gy-lt gyshbn, occ dk gy wi
chky vn, sft-sb
frm-frm-brit, mod fis sb
ang-sb blk ctns wi
predy sm arg tex, sl silty
ip, rr forams, tr vf pyr-ptch
pyr strg, med-hi calc;
MRLST (30%): gyshbn-dk
gy, occ dk gy wi intbdd
chky vn, frm-hd-brit, sm sl
silty tex, mod calc wi brn
mrly resdl





7,850
7,860
7,870
7,880
7,890
7,900
7,910
7,920
7,930
7,940
7,950
7,960
7,970
7,980
7,990
8,000
8,010
8,020
8,030
8,040
8,050
8,060

Off gas buster

MD: 7,875'
TVD: 7,158.44'
INC: 89.25°
AZM: 356.31°
VS: -182.72'

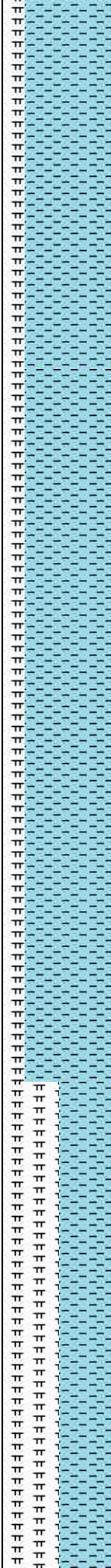
MW IN: 9.65
VIS IN: 40
MW OUT: 9.65
VIS OUT: 39

MD: 7,969'
TVD: 7,160.14'
INC: 88.68°
AZM: 356.04°
VS: -89'

WOB: 36klbs
RPM: 70
SPM: 210
SPP: 4,170psi

MW IN: 9.65
VIS IN: 40
MW OUT: 9.7
VIS OUT: 39

MD: 8,064'
TVD: 7,161.23'
INC: 90°
AZM: 357.18°

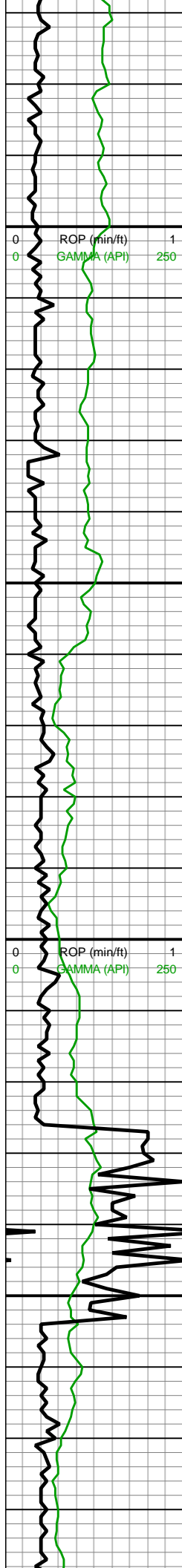


7800-7900 CHK (80%): lt
gy-lt gyshbn, occ dk gy wi
chky vn, sft-sb
frm-frm-brit, mod fis sb
ang-sb blkly ctngs wi
predy sm arg-sl slty tex,
sl gt tex ip wi rr-occ f
forams, tr vf pyr, hi calc;
20% MRLST: predy dk gy,
occ med-dk gyshbn,
frm-hd-brit, sm sl slty tex,
bumpy tex ip, mod calc

7900-8000 CHK (80%): lt
gyshbn, occ lt gy-dk gy wi
occ chky incl, sft-sb
frm-frm-brit, mod fis sb
ang-sb blkly ctngs wi
predy sm arg-sl slty tex, tr
tn bent, tr vf pyr, hi calc;
20% MRLST: predy dk gy,
occ med-dk gyshbn,
frm-hd-brit, sm sl slty tex,
bumpy tex ip, mod calc

8000-8100 MRLST
(50%): gyshbn-dk gy,
frm-hd, occ sft, predy brit,
sm sl slty tex, rr-tr tn bent,





VS: 5.77'

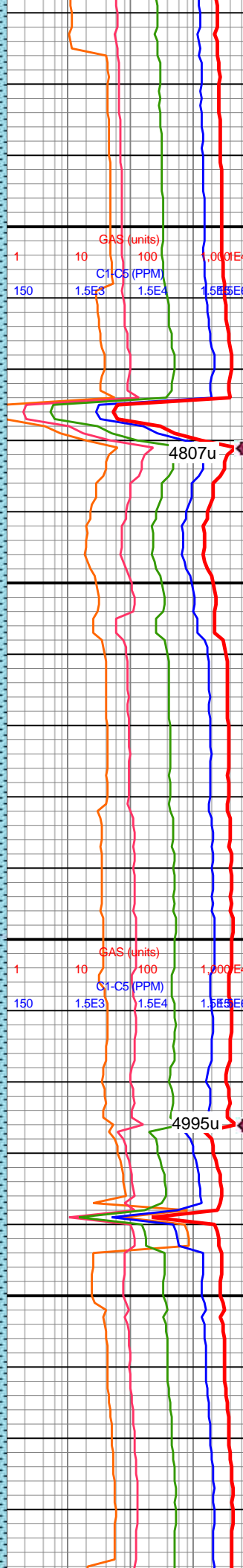
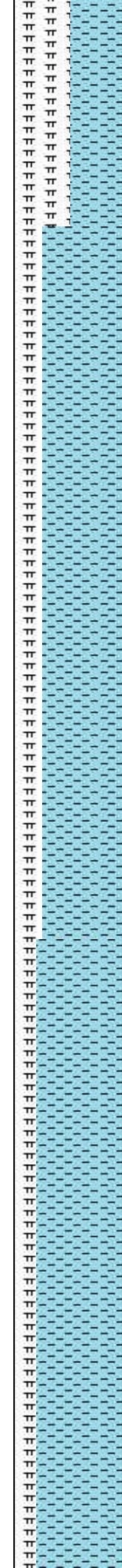
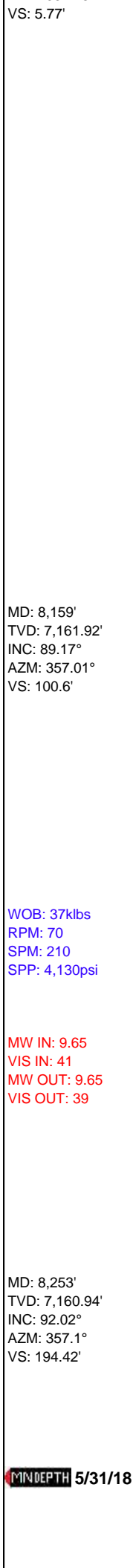
MD: 8,159'
TVD: 7,161.92'
INC: 89.17°
AZM: 357.01°
VS: 100.6'

WOB: 37klbs
RPM: 70
SPM: 210
SPP: 4,130psi

MW IN: 9.65
VIS IN: 41
MW OUT: 9.65
VIS OUT: 39

MD: 8,253'
TVD: 7,160.94'
INC: 92.02°
AZM: 357.1°
VS: 194.42'

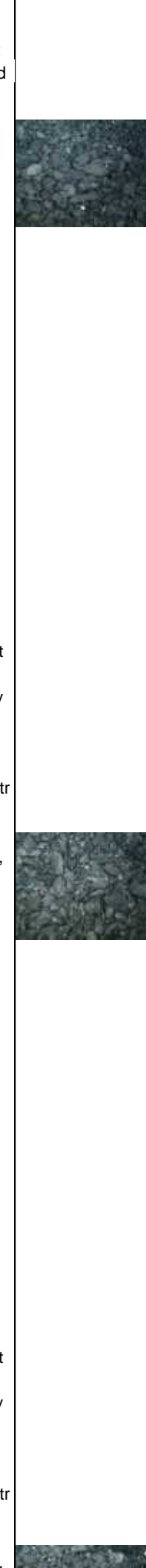
MINDEPTH 5/31/18

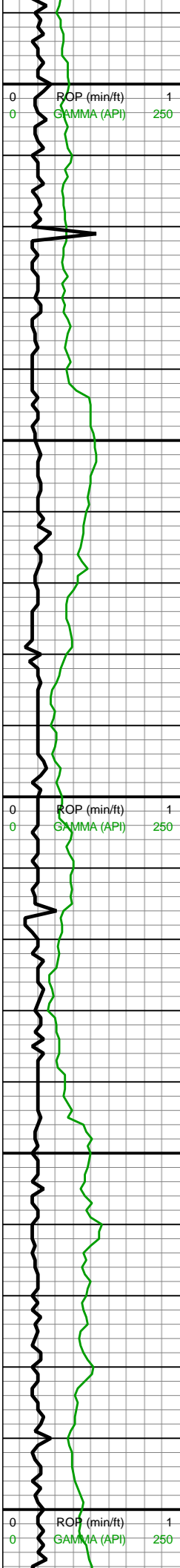


mod calc wi brn mrly
resdl; CHK (50%): lt
gyshbn-med gyshbn, rr lt
gy, sb frm-frm, sft ip, mod
fis sb ang-sb blk cy ctngs
wi predy sm arg tex, sl
sly ip, rr gt forams & tr
inoc fos frags, tr vf
pyr-ptch pyr strg, med-hi
calc

8100-8200 CHK (75%): lt
gy-lt gyshbn-med gy-occ
dk gy, occ-com f wh chky
incl & forams, sft-sb
frm-frm-brit, mod fis sb
rd-sb blk cy ctngs, sm
arg-sl sly tex, tr tn bent, tr
vf pyr, hi calc; MRLST
(25%): dk gy-v dk gy,
frm-hd-brit, sm sl sly tex,
occ intbdd wi chky incl,
mod calc wi brn mrly
resdl

8200-8300 CHK (80%): lt
gy-lt gyshbn-med gy-occ
dk gy, occ-com f wh chky
incl & forams, sft-sb
frm-frm-brit, mod fis sb
rd-sb blk cy ctngs, sm
arg-sl sly tex, tr tn bent, tr
vf pyr, hi calc; 20%
MRLST: dk gy-v dk gy,
frm-hd-brit. sm sl sly tex.





8,290
8,300
8,310
8,320
8,330
8,340
8,350
8,360
8,370
8,380
8,390
8,400
8,410
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8,430
8,440
8,450
8,460
8,470
8,480
8,490
8,500

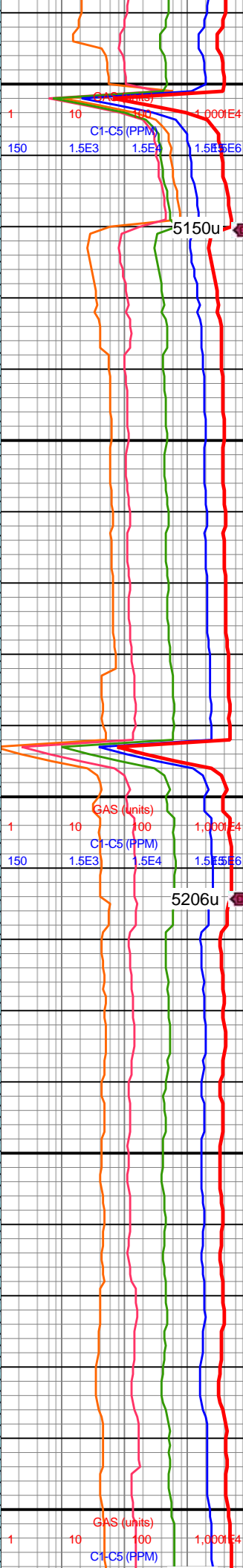
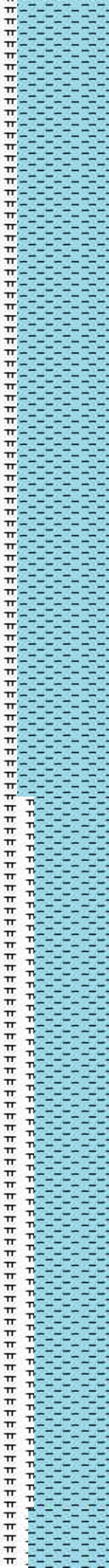
MW IN: 9.65
VIS IN: 41
MW OUT: 9.7
VIS OUT: 38

MD: 8,348'
TVD: 7,157.37'
INC: 92.29°
AZM: 357.01°
VS: 289.18'

WOB: 35klbs
RPM: 70
SPM: 206
SPP: 4,120psi

MD: 8,443'
TVD: 7,153.65'
INC: 92.2°
AZM: 356.74°
VS: 383.92'

Fix top drive

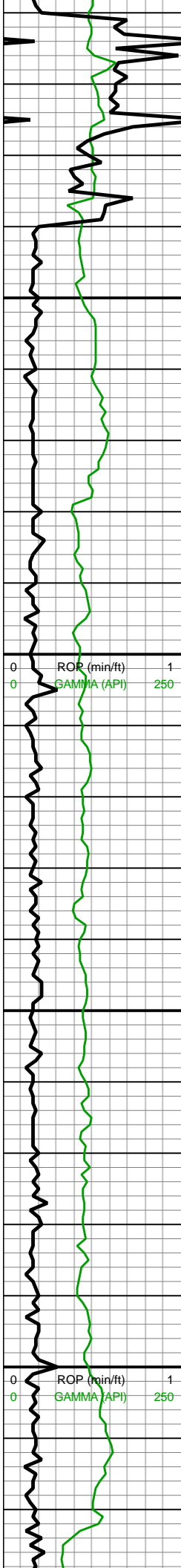


occ intbdd wi chky incl,
mod calc wi brn mrly
resdl

8300-8400 CHK (80%): lt
gy-lt gyshbn-med gy-occ
dk gy, occ-com f wh chky
incl & forams, sft-sb
frm-frm-brit, mod fis sb
rd-sb blkly ctngs, sm
arg-sl slty tex, tr tn bent, tr
vf pyr, hi calc; 20%
MRLST: dk gy-v dk gy,
frm-hd-brit, sm sl slty tex,
occ intbdd wi chky incl,
mod calc wi brn mrly
resdl

8400-8500 CHK (65%):
lt-med gy, gyshbn ip,
sft-sb frm-frm, brit ip,
l-mod fis rd-sb rd-sb
blkly-bkly ctngs, sm arg-sl
slty tex, tr forams & bent,
tr pp pyr, med-hi calc;
MRLST (35%): med
gyshbn-dk gy-dk gyshbn,
predy med frm-frm-brit,
sb frm ip, mod fis sb
blkly-bkly ctngs, sm arg-sl
slty tex, mod calc wi brn
mrly resdl





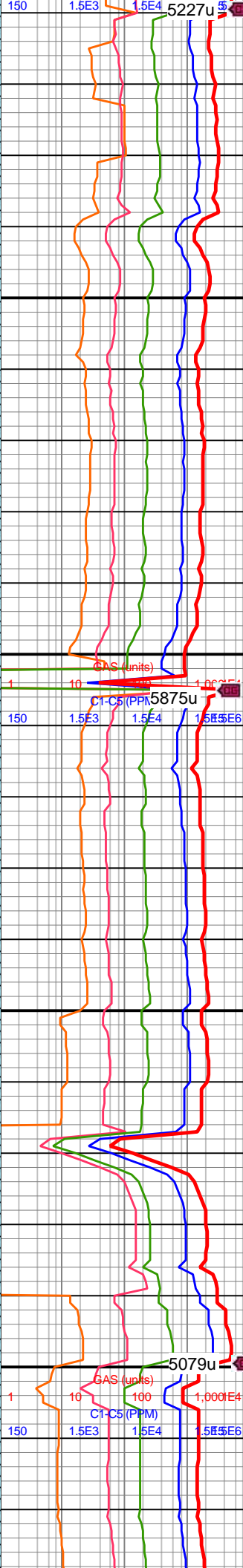
MD: 8,538'
TVD: 7,149.97'
INC: 92.24°
AZM: 0.79°
VS: 478.79'

MW IN: 9.65
VIS IN: 40
MW OUT: 9.6
VIS OUT: 38

WOB: 10klbs
RPM: 72
SPM: 208
SPP: 3,330psi

MD: 8,633'
TVD: 7,146.15'
INC: 92.37°
AZM: 0.44°
VS: 573.71'

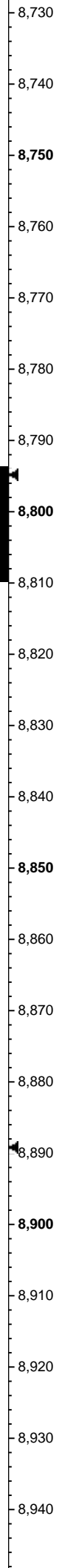
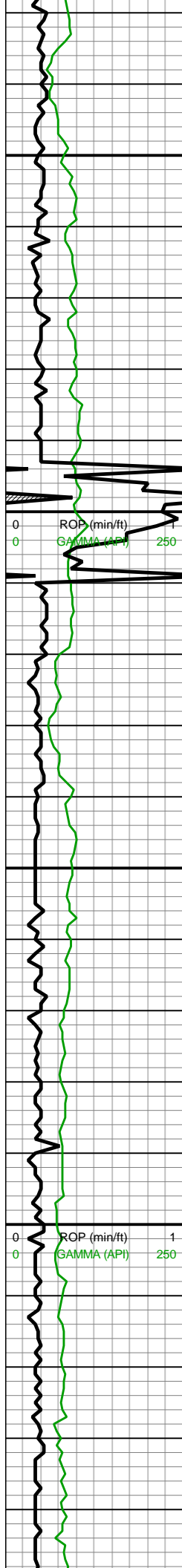
MD: 8,727'
TVD: 7,142.32'
INC: 92.29°



8500-8600 CHK (70%): lt gy-lt gyshbn, occ dk gy wi chky vn, sft-sb frm-frm-brit, mod fis sb ang-sb blk cy ctngs wi predy sm arg tex, sl slty ip, rr c wh forams, tr mict cal, med-hi calc; MRLST (30%): gyshbn-dk gy, occ dk gy wi intbdd chky vn, frm-hd-brit, sm sl slty tex, mod calc wi brn mrly resdl

8600-8700 CHK (55%): med gy-gyshbn-dk gy wi occ f wh chky incl ip, occ dk gy wi chky vn, sft-sb frm-frm-brit, mod fis sb ang-sb blk cy ctngs, am arg-sl slty tex, rr c wh forams, tr mict cal, tr bent, med-hi calc; MRLST (45%): dk gy-v dk gy, gyshbn ip, frm-hd-brit, sm sl slty tex, mod calc wi brn mrly resdl





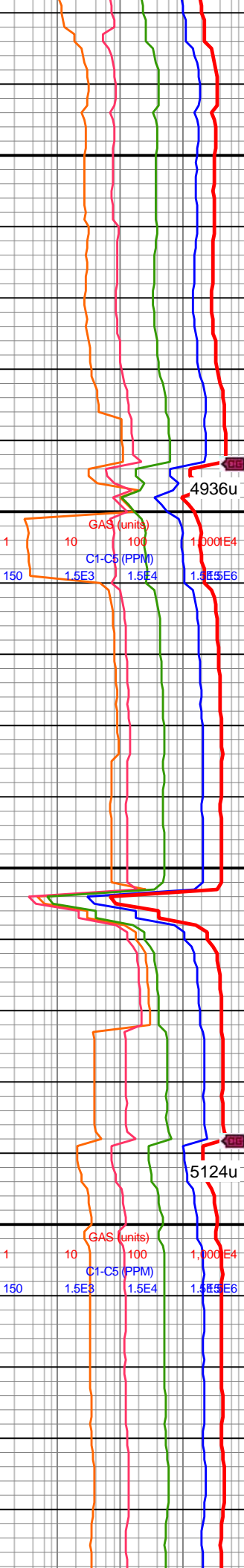
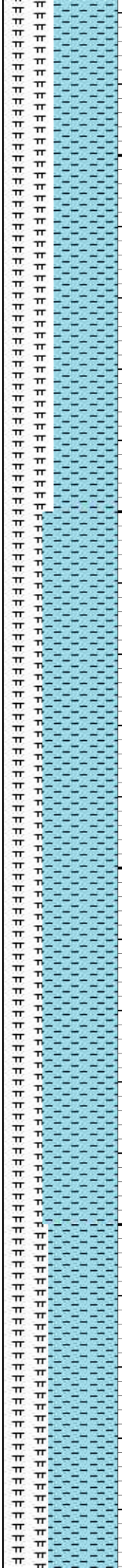
AZM: 359.65°
VS: 667.63'

MW IN: 9.65
VIS IN: 41
MW OUT: 9.6
VIS OUT: 39

WOB: 41klbs
RPM: 0
SPM: 210
SPP: 3,850psi

MD: 8,822'
TVD: 7,140.64'
INC: 89.74°
AZM: 0.35°
VS: 762.61'

MD: 8,916'
TVD: 7,141.65'
INC: 89.03°
AZM: 358.85°
VS: 856.59'



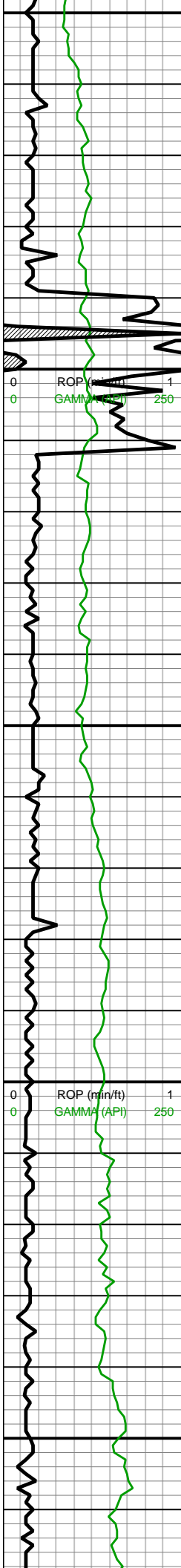
8700-8800 CHK (55%): lt gyshbn-med gyshbn, rr lt gy, sb frm-frm, sft ip, mod fis sb ang-sb blkly ctngs wi predy sm arg tex, sl slty ip, rr gt forams & tr inoc fos frags, tr vf pyr-ptch pyr strg, med-hi calc; MRLST (45%): gyshbn-dk gy, frm-hd, occ sft, predy brit, sm sl slty tex, mod calc wi brn mrlly resdl

4936u

8800-8900 CHK (65%): med gy, lt gy ip, frm, brit, sb blkly mod fis ctngs, blkly ip, f-elong wh chky incl ip, hi calc; MRLST (35%): dk gy, dk gyshbn ip, sb frm-frm, brit ip, mod fis sb blkly-blky, slty tex, rr vf pyr, mod calc

5124u





MW IN: 9.6+
VIS IN: 38
MW OUT: 9.6
VIS OUT: 39

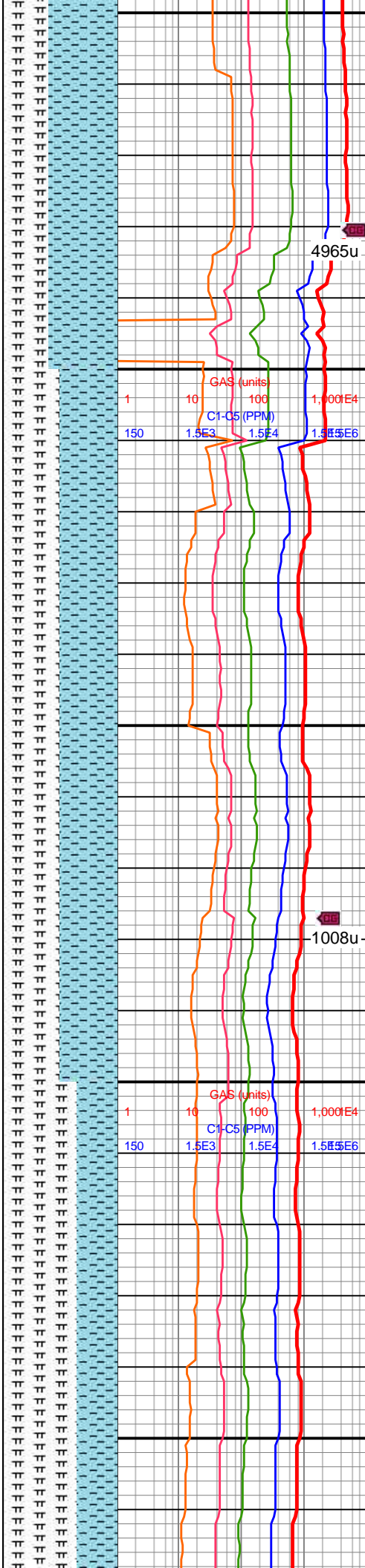
WOB: 40.6klbs
RPM: 0
SPM: 206
SPP: 3,847psi

MD: 9,011'
TVD: 7,143.69'
INC: 88.51°
AZM: 0.17°
VS: 951.55'

On Buster

MD: 9,105'
TVD: 7,146.57'
INC: 87.98°
AZM: 360°
VS: 1,045.5'

MW IN: 9.7+
VIS IN: 39
MW OUT: 9.6+
VIS OUT: 39



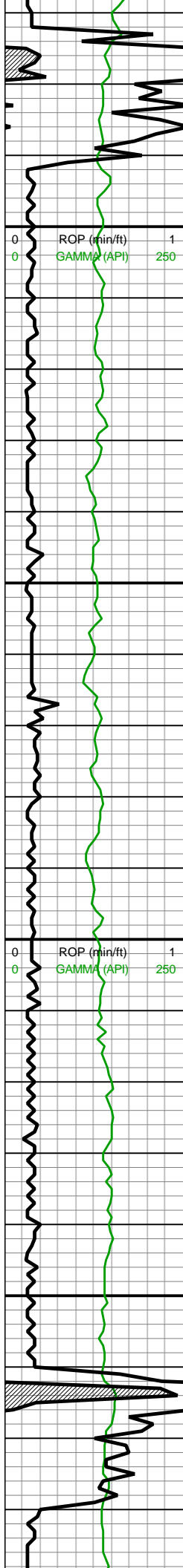
8900-9000 CHK (60%):
med gy, gyshbn, sb tab
ctngs, frm, brit, tr vf lam,
hi calc, scat inoc fos
frags; MRLST (40%): dk
gy, dk gyshbn, sb tab-blky
ctngs, brit, sl hd, tr CHK
intbds, tr pp mic pyr, hi
calc

4965u

1008u

9000-9100 MRLST
(50%): predy dk gy-dk
gyshbn, sl slty-sm tex,
frm-sl hrd, blky-sb tab, tr
imbd/pp pyr, tr lam CHK,
v calc; CHK (50%): med
brn, dk gyshbn, mot,
frm-sl sft, blky-sb splt,
chky tex, v calc

9100-9200 MRLST



MD: 9,200'
TVD: 7,148.09'
INC: 90.18°
AZM: 0.79°
VS: 1,140.48'

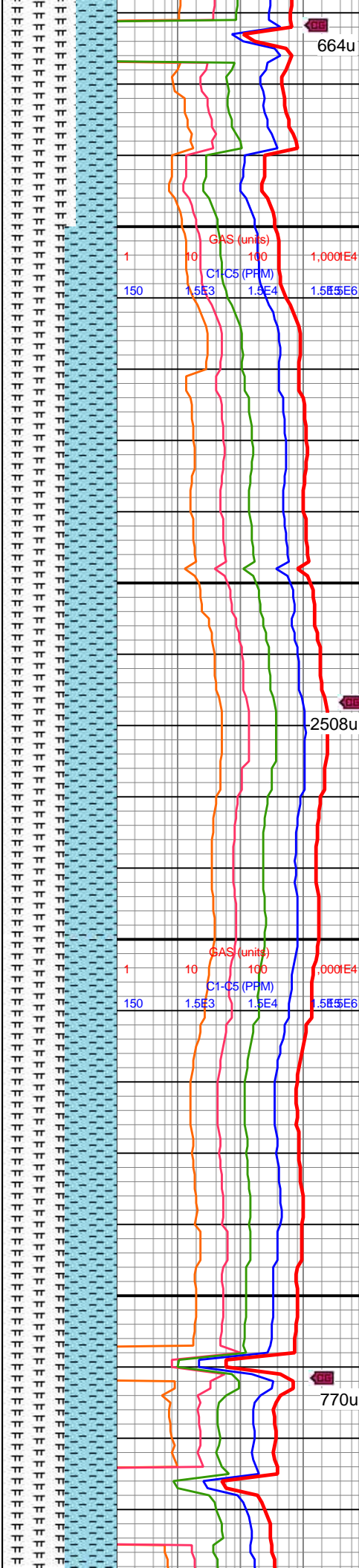
WOB: 35.6klbs
RPM: 71
SPM: 207
SPP: 4,422psi

MW IN: 9.8
VIS IN: 40
MW OUT: 9.6+
VIS OUT: 38

MD: 9,294'
TVD: 7,148.09'
INC: 89.82°
AZM: 359.91°
VS: 1,234.48'

MW IN: 9.8
VIS IN: 40
MW OUT: 9.7+
VIS OUT: 38

MD: 9,389'
TVD: 7,146.89'

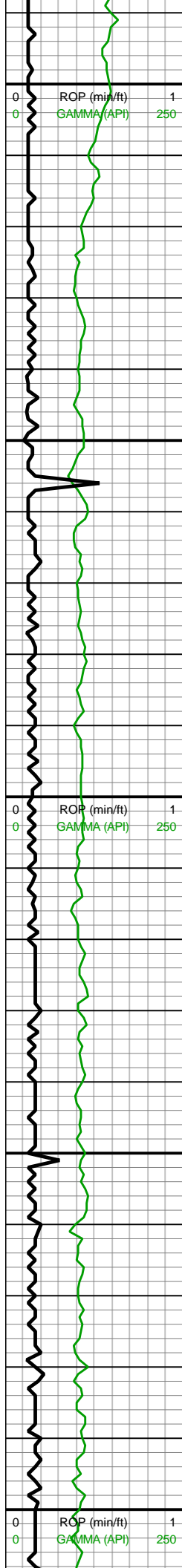


(65%): predy dk gy, occ
dk gyshbn, sft-sb frm-frm,
brit ip, mod fis sb
blky-blky ctngs, slty arg
tex, tr vf pyr & micmica, tr
c pyr strg ip, mod calc;
CHK (35%): med-dk gy
wi occ f wh chky incl, frm,
brit, mod fis sb blky-blky,
hi calc

9200-9300 MRLST
(55%): dk gy, dk gyshbn
ip, sb frm-frm, brit ip,
mod fis sb blky-blky, slty
tex, mod calc wi brn mrlly
resdl; CHK (45%): med
gy-dk gy, frm, brit, sb blky
mod fis ctngs, blky ip, hi
calc

9300-9400 MRLST
(55%): dk gy-dk gyshbn,
sb blky-splt ctngs, brit, sl
hd-frm, mnr CHK intbds,
tr pp mic pyr, mod calc;
CHK (45%): med





INC: 91.63°
AZM: 0.61°
VS: 1,329.47'

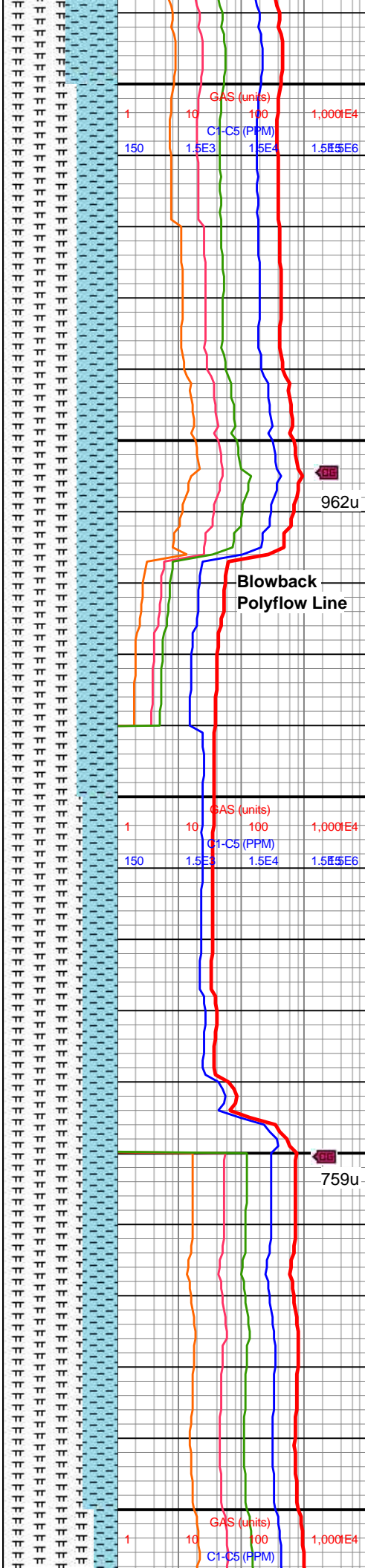
WOB: 36.6klbs
RPM: 70
SPM: 204
SPP: 4,453psi

MW IN: 9.7+
VIS IN: 40
MW OUT: 9.7+
VIS OUT: 39

MD: 9,484'
TVD: 7,144.63'
INC: 91.1°
AZM: 359.91°
VS: 1,424.44'

MD: 9,579'
TVD: 7,143.5'
INC: 90.26°
AZM: 359.21°
VS: 1,519.42'

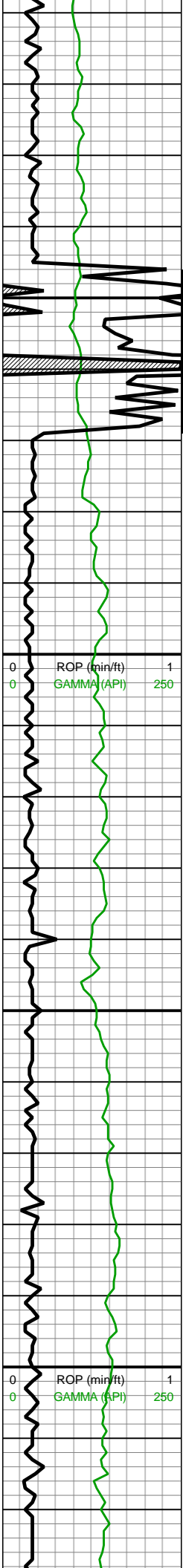
WOB: 35.2klbs
RPM: 70
SPM: 205
SPP: 4,529psi



brn-gyshbn, mot, sl
frm-frm, sb blk-yl tab
ctngs, brit, tr CHK incl,
mnr vf lam, v calc;

9400-9500 CHK (65%):
lt gy-med gy, wh chky incl,
sb frm-frm-brit, mod fis,
sb blk-yl blk-yl ctngs, sl slty
tex, hi calc; MRLST
(35%): dk gyshbn, frm, sb
blk-yl sb ang, l-mod fis
ctngs, slty-sl rgh mot tex,
arg, com CHK intbd lam,
mod calc

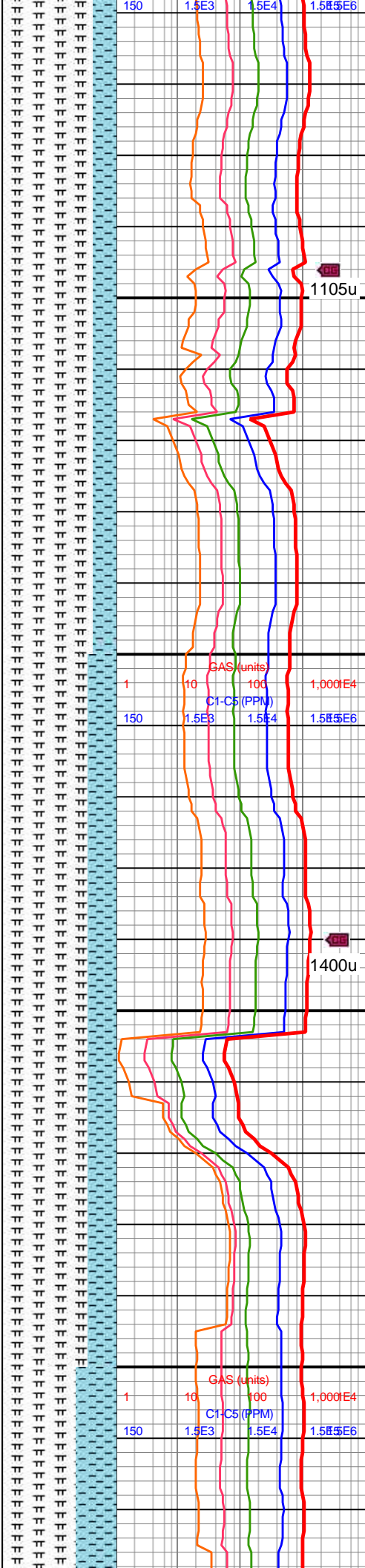
9500-9600 MRLST
(70%): v dk gy-dk gyshbn
ip, frm-v frm, blk-yl, v calc,
rgh tex, mot-stri, sme fy
lam, tr pp pyr; CHK
(30%): dk gy-brn, com lt
gy-mot, blk-yl, sft, fri, chky
tex, occ stri, rr mic fos



MD: 9,673'
TVD: 7,142.07'
INC: 91.49°
AZM: 1.23°
VS: 1,613.4'

MD: 9,768'
TVD: 7,139.41'
INC: 91.71°
AZM: 0.52°
VS: 1,708.36'

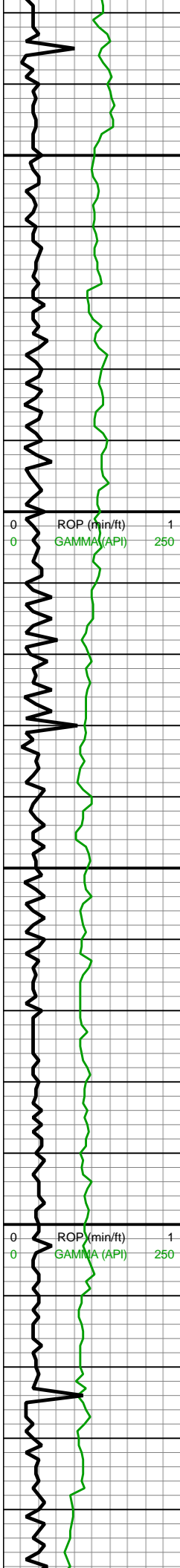
WOB: 35.5klbs
RPM: 70
SPM: 204
SPP: 4,509psi



9600-9700 MRLST
(80%): med-v dk gry,
predy blkly wi com lamn, v
brit-hrd, micmica, hily
calc; CHK (20%) pred
ltgy-occ gyshbn wi sme
com lt thn chky lamn, sb
blkly-blky, frm, rgh tex wi
rr-pp pyr, hily calc

9700-9800 MRLST
(75%): dk gy, dk gyshbn,
sb tab-blky ctngs, brit, sl
hd, tr CHK intbds, tr pp
mic pyr, mod calc; CHK
(25%): med gy, gyshbn,
sb tab ctngs, frm, brit, tr vf
lam, hi calc, scat pyrc
nod & cal vns





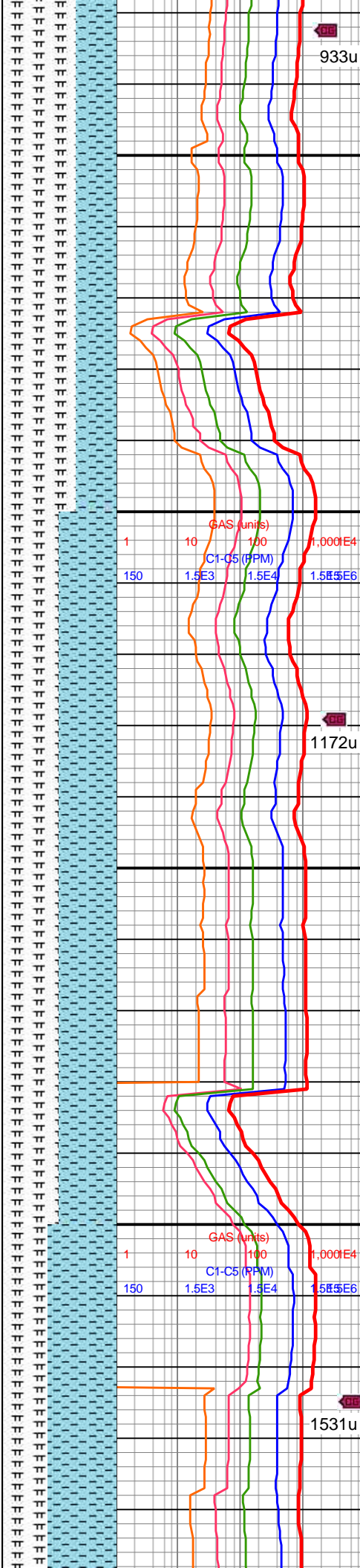
MW IN: 9.7+
VIS IN: 41
MW OUT: 9.7+
VIS OUT: 40

MD: 9,863'
TVD: 7,136.72'
INC: 91.54°
AZM: 0.52°
VS: 1,803.32'

MD: 9,958'
TVD: 7,134.35'
INC: 91.32°
AZM: 0.35°
VS: 1,898.29'

WOB: 36.6kbs
RPM: 70
SPM: 204
SPP: 4,504psi

MD: 10,052'



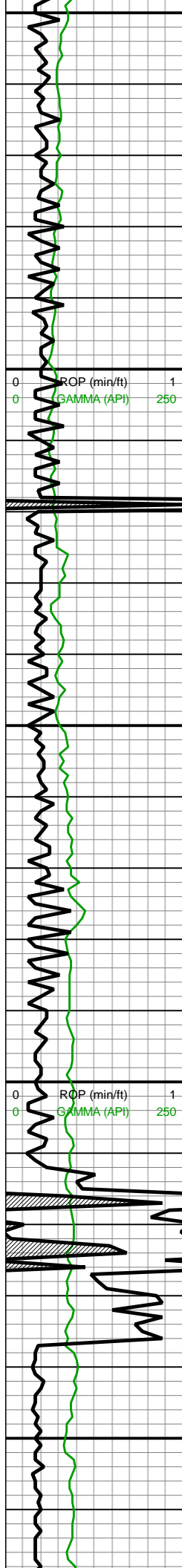
933u

9800-9900 MRLST
(65%): dk gy-dk gyshbn,
sl hd-v frm, mod fis, sb
blky-tab ctngs, sm arg
tex, mod calc, tr pp mic
pyr; CHK (35%): med
brn-gyshbn, frm-sft, mod
fis, tab-sb blky, tr free
CHK, v calc

1172u

9900-10000 CHK (50%):
pred lt gy-lt brn, sme med
gy-brn, rr lam, frm, sl sft
ip, blky, v calc, rr fos incl,
tr pp pyr, scat cal vns &
frac fl cal; MRLST (50%):
pred v dk gy-blk, occ
gyshbn, frm-v frm, blky,
calc, rgh tex

1531u



TVD: 7,132.54'
INC: 90.88°
AZM: 359.91°
VS: 1,992.28'

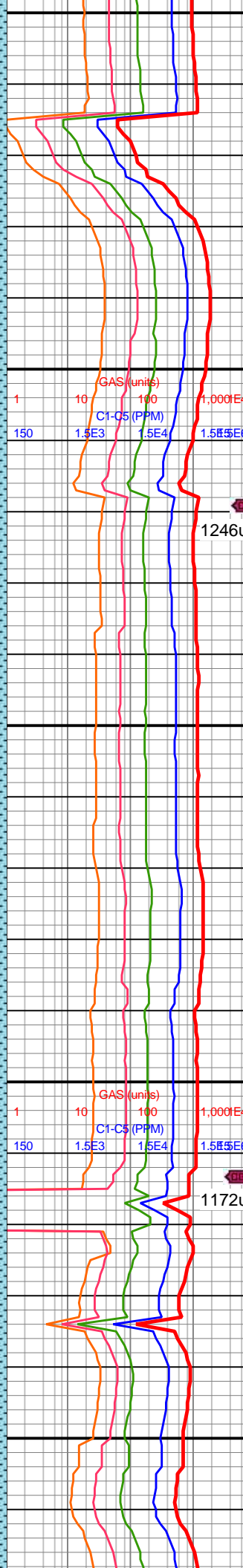
MW IN: 9.8
VIS IN: 41
MW OUT: 9.8
VIS OUT: 39

MD: 10,146'
TVD: 7,131.03'
INC: 90.97°
AZM: 359.65°
VS: 2,086.26'

WOB: 28.5klbs
RPM: 70
SPM: 205
SPP: 4,486psi

MW IN: 9.8
VIS IN: 41
MW OUT: 9.7+
VIS OUT: 38

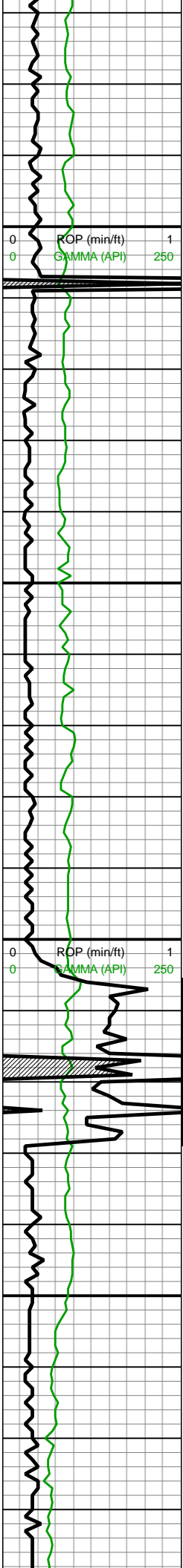
MD: 10,241'
TVD: 7,130.44'
INC: 89.74°
AZM: 2.37°
VS: 2,181.24'



10000-10100 CHK
(60%): pred lt-med gry wi
lt brn, sme sl med gy-brn,
frm-sl brit, sub blkyl-sl
sub ang, sl sft ip, v calc,
rr fos incl, tr pyr, scat cal
vns & frac fl cal; MRLST
(40%): v dk gy-blk, occ
gyshbn, frm-v frm, blkyl,
calc, sl rgh tex wi tr
micmica

10100-10200 CHK
(80%); pred lt gy-gyshbn
wi occ med brn, sub
blkyl-blkyl wi rr plty, v
frm-frm, rr lam, scatt
pp-occ pyr; MRLST (20%)
pred med-dk gy wi sme v
dk gry, occ plty-blkyl, v hrd,
sme pp pyr, com
micmica





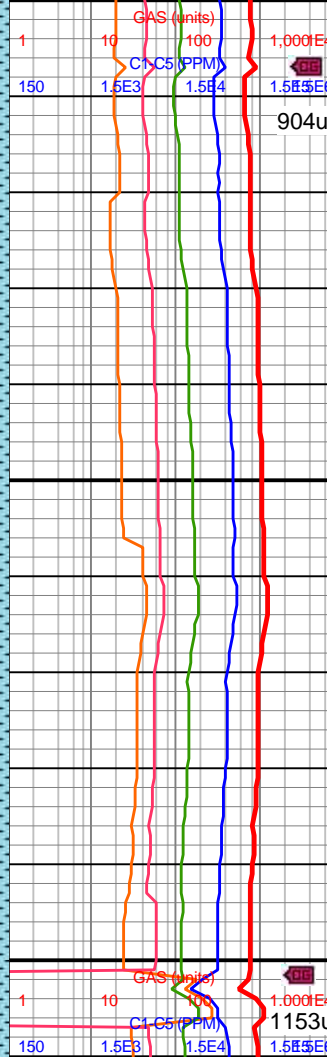
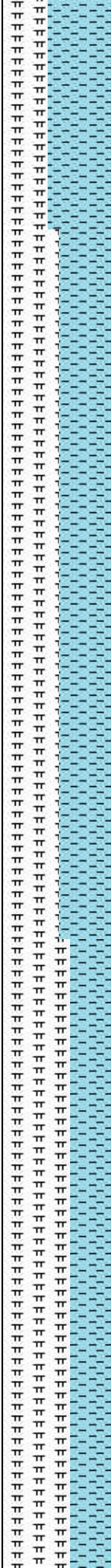
10,270
10,280
10,290
10,300
10,310
10,320
10,330
10,340
10,350
10,360
10,370
10,380
10,390
10,400
10,410
10,420
10,430
10,440
10,450
10,460
10,470
10,480

MD: 10,336'
TVD: 7,130.4'
INC: 90.31°
AZM: 3.07°
VS: 2,276.17'

WOB: 37.5klbs
RPM: 71
SPM: 207
SPP: 4,684psi

MD: 10,430'
TVD: 7,131.18'
INC: 88.73°
AZM: 359.29°
VS: 2,370.13'

MW IN: 9.7+
VIS IN: 39
MW OUT: 9.8
VIS OUT: 39

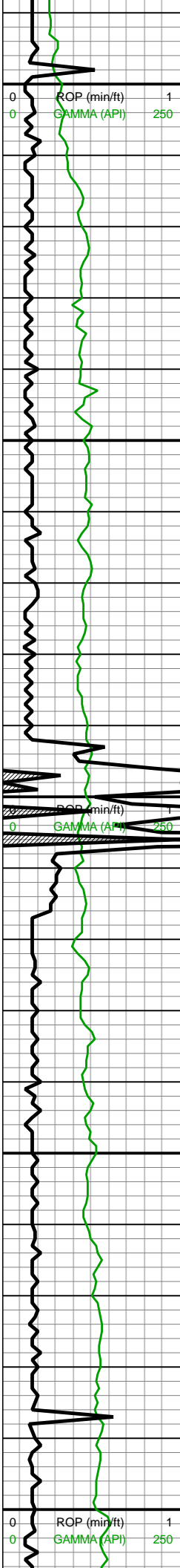


10200-10300 CHK
(60%): pred lt-med gry wi
lt brn, sme sl med gy-brn,
frm-sl brit, sub blkyl-sl
plty, sl sft ip, v calc, tr pyr,
scat cal vns & frac fl cal;
MRLST (40%): v dk
gy-blk, occ gyshbn, frm-v
frm, blkyl, calc, sl rgh tex
wi com micmica

10300-10400 CHK
(50%): pred lt gy-lt brn,
sme med gy-brn, rr lam,
frm, sl sft ip, sb blkyl wi
sme sl sb ang & rr plty, v
calc, tr pp pyr; MRLST
(50%): pred v dk gy-blk,
occ gyshbn, frm-v frm, sb
blkyl-sl rnd, calc, rgh tex,
hi micmica

10400-10500 MRLST
(60%) pred med gry wi
sme dk gry, v hrd, sme sl
lt gy chky lam, occ





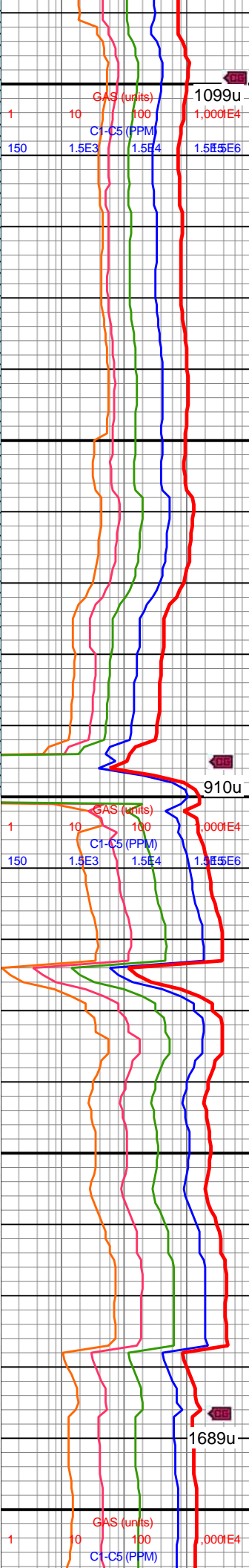
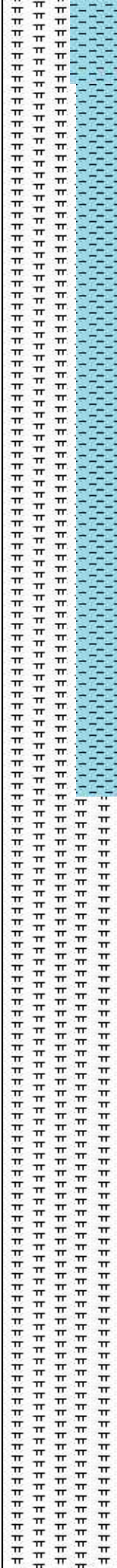
10,490
10,500
10,510
10,520
10,530
10,540
10,550
10,560
10,570
10,580
10,590
10,600
10,610
10,620
10,630
10,640
10,650
10,660
10,670
10,680
10,690
10,700

MD: 10,526'
TVD: 7,133.65'
INC: 88.33°
AZM: 358.68°
VS: 2,466.07'

Off Buster
WOB: 50.7klbs
RPM: 0
SPM: 206
SPP: 4,227psi

MD: 10,620'
TVD: 7,135.77'
INC: 89.08°
AZM: 360°
VS: 2,560.03'

MW IN: 9.7+
VIS IN: 38
MW OUT: 9.8+
VIS OUT: 38

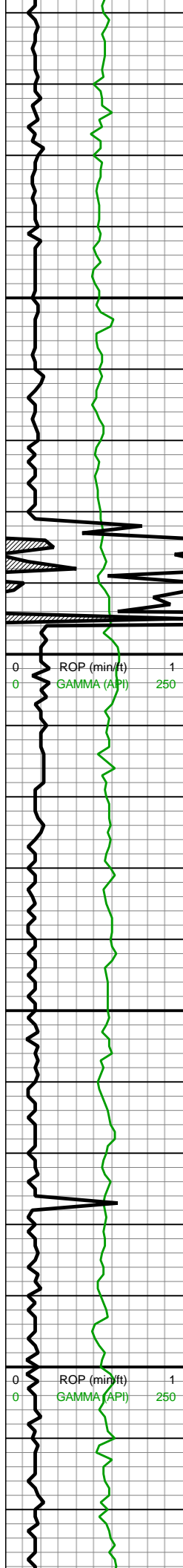


micmica; CHK (40%)
lt-med gysbn wi sme
med brn, sub blk-y-pty,
frm-sl brit, occ-rr lam

10500-10600 MRLST
(65%) pred med gry wi
occ drk gy, frm-hrd, rr-occ
pp pyr, sme micmica;
CHK (35%) pred lt gy-lt
bnshgy, v sft-sft, sb
blk-y-sme pty, com pp
pyr, occ scat pyrc nod;

10600-10700 MRLST
(100%) med-pred dk
gry,sl brit-hrd, v pty-pty,
occ micmica wi sme
pp-tr pyr, rr chk lam





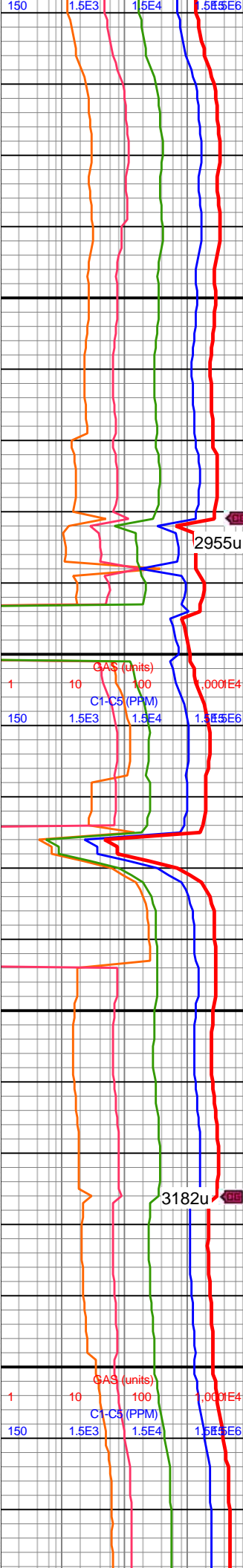
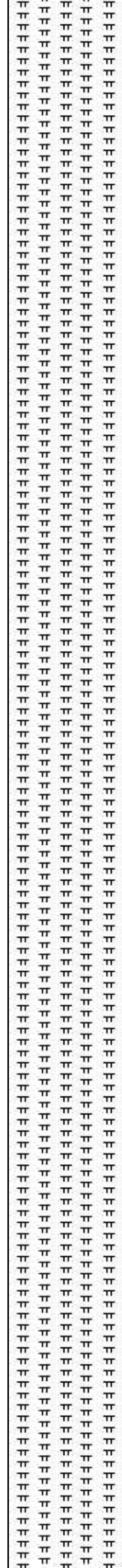
MD: 10,715'
TVD: 7,137.48'
INC: 88.86°
AZM: 360°
VS: 2,655.01'

WOB: 36.6klbs
RPM: 70
SPM: 204
SPP: 4,474psi

MD: 10,810'
TVD: 7,138.97'
INC: 89.34°
AZM: 359.29°
VS: 2,749.98'

MW IN: 9.8
VIS IN: 38
MW OUT: 9.75
VIS OUT: 37

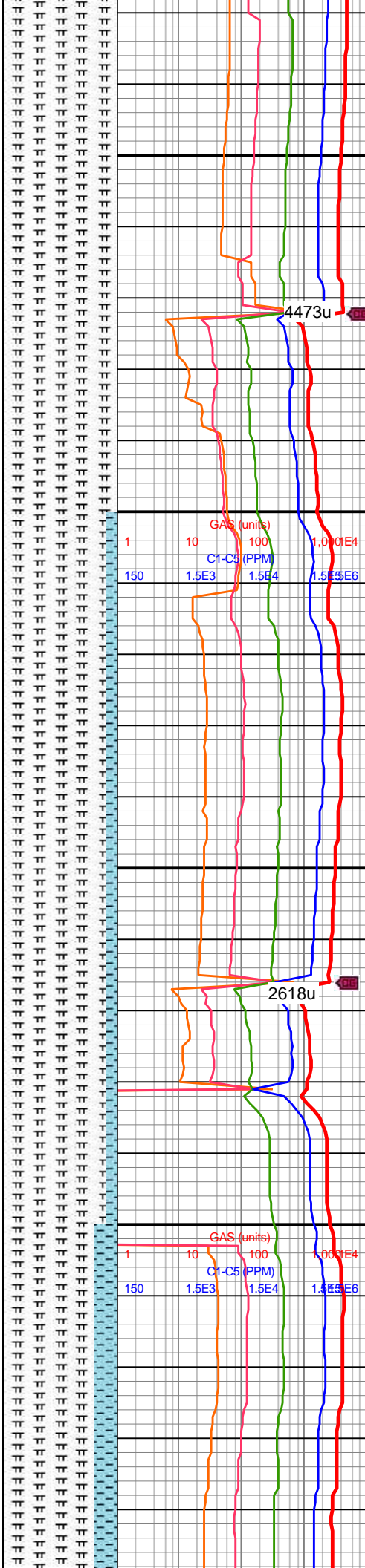
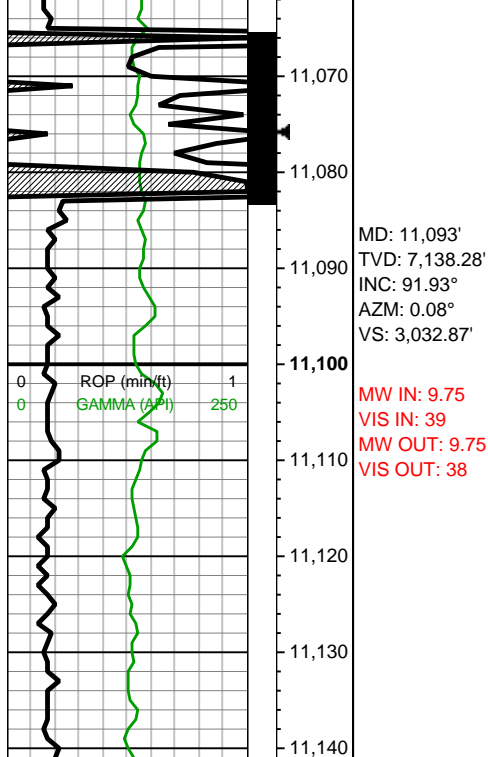
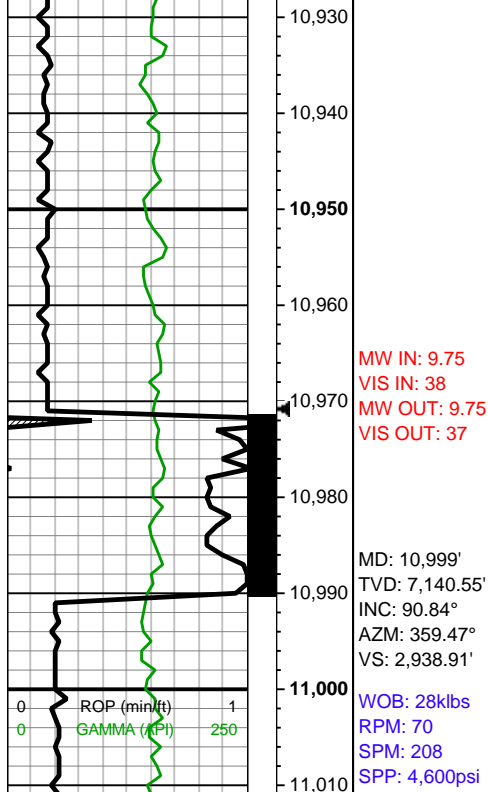
MD: 10,904'
TVD: 7,140.37'
INC: 88.95°
AZM: 358.68°
VS: 2,843.94'



10700-10800 MRLST
(100%) med-pred dk gy,
sub blk-v plty, v frm-frm,
tr pyr wi rr micmica

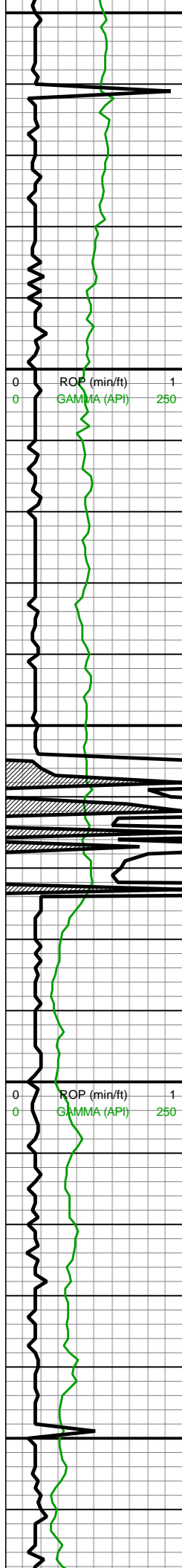
10800-10900 MRLST
(100%) pred med-dk gy
wi sme v dk gry, occ
plty-blky, v hrd, sme pp
pyr, com micmica





10900-11000 MRLST
(100%) pred med-dk gy
wi sme v dk gry, pred
med-dk gry wi sme dk
gry, v hrd-hrd, sme pp
pyr, occ micmica, tr-pp
pyr

11000-11100 MRLST
(90%): gyshbn-dk gy,
frm-hd, occ sft, predy brit,
sm sl slty tex, rr-tr tn bent,
mod calc wi brn mrly
resdl; CHK (10%): lt gy-lt
gyshbn, l fis sft-sb
frm-frm mod fis rd-sb
rd-sb blkly ctngs wi predy
sm arg tex, sl slty ip, tr-rr
ptch pyr strg, med-hi calc



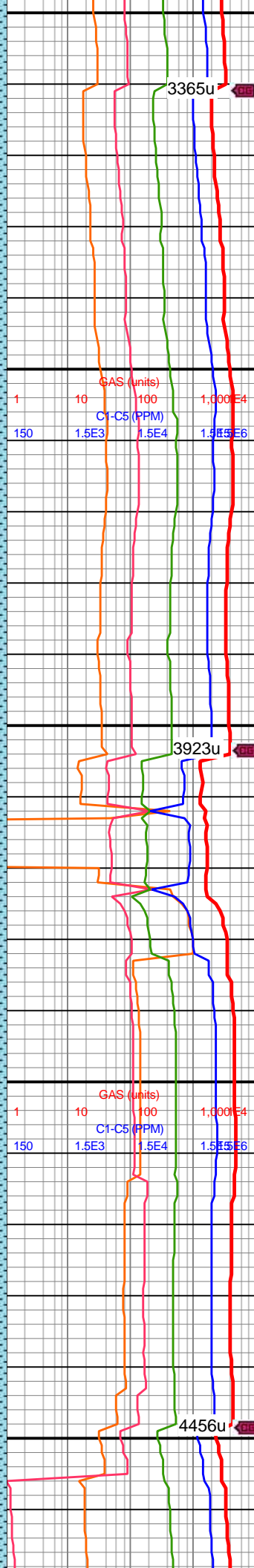
11,150
11,160
11,170
11,180
11,190
11,200
11,210
11,220
11,230
11,240
11,250
11,260
11,270
11,280
11,290
11,300
11,310
11,320
11,330
11,340
11,350
11,360

MD: 11,187'
TVD: 7,135.4'
INC: 91.58°
AZM: 359.56°
VS: 3,126.82'

WOB: 39klbs
RPM: 72
SPM: 206
SPP: 4,770psi

MW IN: 9.8
VIS IN: 39
MW OUT: 9.75
VIS OUT: 38

MD: 11,282'
TVD: 7,131.5'
INC: 93.12°
AZM: 359.38°
VS: 3,221.72'



11100-11200 MRLST
(80%): dk gy-v dk gy,
frm-hd-brit, mod fis sb
blky-blky ctngs, sm sl slty
tex, dk gy sh wi occ brn
mrly incl, mod calc wi brn
mrly resdl; CHK (20%): lt
gy-lt gyshbn, l fis sft-sb
frm-frm mod fis rd-sb
rd-sb blky ctngs wi predy
sm arg tex, sl slty ip, tr-rr
ptch pyr strg, med-hi calc

11200-11300 CHK
(70%): lt gy-lt
gyshbn-med gy-dk gy wi f
wh chky incl thru, sft-sb
frm-frm-brit, mod fis sb
rd-sb blky ctngs, sm
arg-sl slty tex, tr vf pyr, hi
calc; 30% MRLST: dk
gy--dk gyshbn-v dk gy,
frm-hd-brit, sm sl slty tex,
occ intbdd wi chky incl,
occ sp wi c brn mrly incl,
mod calc wi brn resdl

11300-11400 CHK
(80%): lt gy-lt
avshbn-med av-dk av.



11,370
11,380
11,390
11,400
11,410
11,420
11,430
11,440
11,450
11,460
11,470
11,480
11,490
11,500
11,510
11,520
11,530
11,540
11,550
11,560
11,570
11,580

MD: 11,377'
TVD: 7,126.07'
INC: 93.43°
AZM: 359.12°
VS: 3,316.55'

WOB: 39klbs
RPM: 71
SPM: 206
SPP: 4,800psi

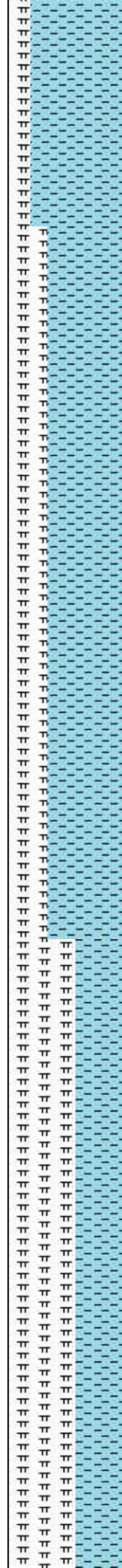
Bulk sample caught for analysis

MD: 11,471'
TVD: 7,120.42'
INC: 93.47°
AZM: 0.35°
VS: 3,410.37'

Bulk sample caught for analysis

MD: 11,566'
TVD: 7,115.72'
INC: 92.2°
AZM: 1.75°
VS: 3,505.24'

MW IN: 9.8
VIS IN: 39
MW OUT: 9.8
VIS OUT: 38



11,370
11,380
11,390
11,400
11,410
11,420
11,430
11,440
11,450
11,460
11,470
11,480
11,490
11,500
11,510
11,520
11,530
11,540
11,550
11,560
11,570
11,580

GAS (units)
C1-C5 (PPM)

4310u

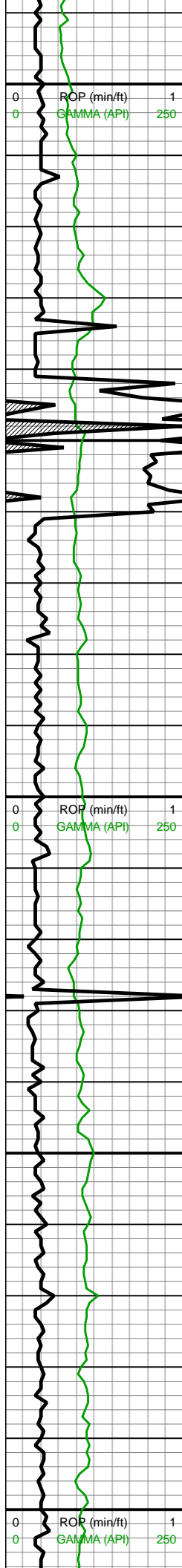
3919u

sft-sb frm-frm-brit, mod
fis sb rd-sb blk cy ctngs wi
f wh chky incl thru, sm
arg-sl slty tex, tr vf pyr, hi
calc; MRLST (20%): dk
gy--dk gyshbn-v dk gy,
frm-hd-brit, sm sl slty tex,
occ intbdd wi chky incl,
occ sp wi c brn mrly incl,
mod calc wi brn resdl

11400-11500 CHK
(65%): predy med gy,
sme lt gy, occ dk gy wi f
wh chky incl, sft-sb
frm-frm-brit l-mod fis sb
rd-sb blk cy ctngs, sm
arg-sl slty tex, rr bent, tr
cal fos frags, tr vf pyr, hi
calc; 35% MRLST: dk
gy-dk gyshbn-v dk gy,
frm-hd-brit, mod fis sb
blk cy-bkly ctngs, sm arg
tex, sl slty ip, mod calc wi
brn resdl

11500-11600 MRLST
(60%) : dk gy-dk gyshbn-v
dk gy, frm-hd-brit, mod fis
sb blk cy-bkly ctngs, sm
arg tex, sl slty ip, rr bent,
tr cal fos frags, mod calc
wi brn mrly resdl; 40%
CHK: lt gy-med gy, occ dk
gy mrly-chky intbds wi f
wh chky incl ip, sft-sb
frm-frm-brit, mod fis sb





11,590
11,600
11,610
11,620
11,630
11,640
11,650
11,660
11,670
11,680
11,690
11,700
11,710
11,720
11,730
11,740
11,750
11,760
11,770
11,780
11,790
11,800

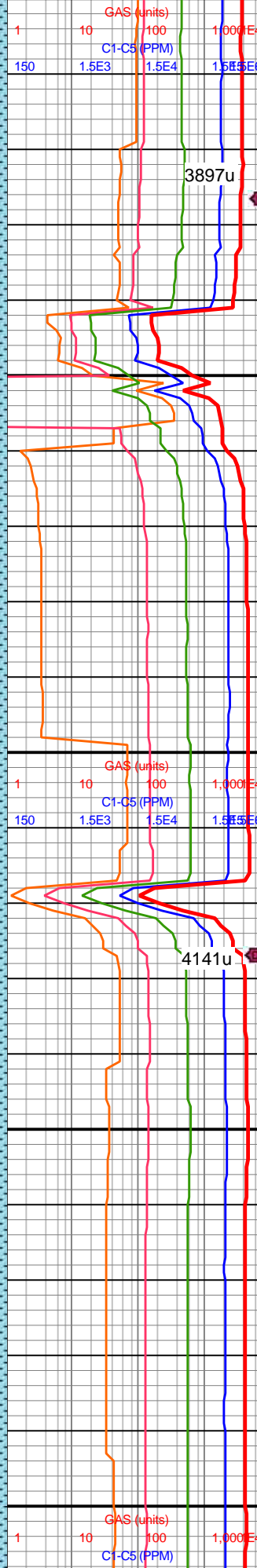
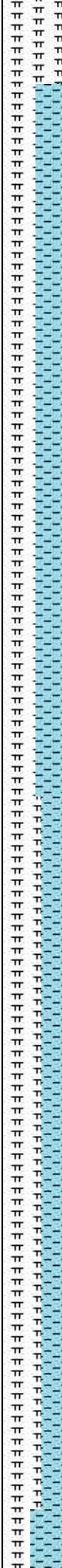
WOB: 37klbs
RPM: 72
SPM: 209
SPP: 4,780psi

MD: 11,660'
TVD: 7,114.24'
INC: 89.6°
AZM: 2.19°
VS: 3,599.19'

MD: 11,756'
TVD: 7,115.31'
INC: 89.12°
AZM: 1.49°
VS: 3,695.16'

MW IN: 9.75
VIS IN: 39
MW OUT: 9.8
VIS OUT: 38

WOB: 37klbs
RPM: 71
SPM: 104
SPP: 2,160psi

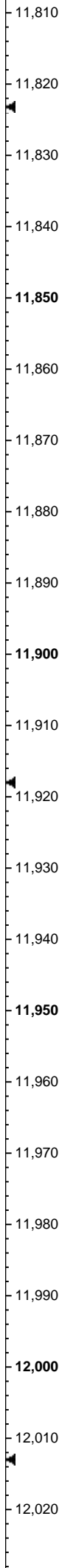
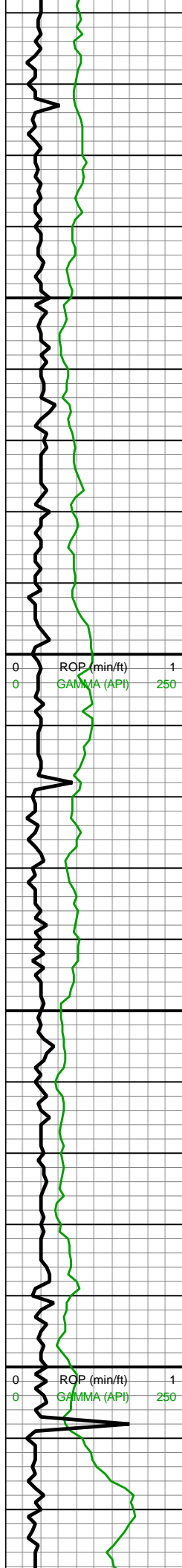


frm-frm-brit l-mod fis sb
rd-sb blk cy ctngs, sm
arg-sl slty tex, tr vf pyr, hi
calc

11600-11700 CHK
(70%): predy med gy,
sme dk gy wi f wh chky
incl, occ lt gy ip, sb
frm-frm-brit l-mod fis sb
rd-sb blk cy ctngs, sm
arg-sl slty tex, rr bent, tr
fos frags, tr vf pyr, hi calc;
MRLST (30%): dk gy-dk
gyshbn-v dk gy, rr brn, sb
frm-frm, hd & brit ip, mod
fis sb blk cy-blky ctngs,
sm-sl slty tex, mod calc
wi brn mrly resdl

11700-11800 CHK
(65%): med gy, sme dk
gy wi f wh chky incl, occ lt
gy ip, sb frm-frm-brit
l-mod fis sb rd-sb blk cy
ctngs, sm arg-sl slty tex,
rr bent, tr fos frags, tr vf
pyr, hi calc; 35% MRLST:
dk gy-dk gyshbn-v dk gy,
rr brn, sb frm-frm, hd &
brit ip, mod fis sb
blk cy-blky ctngs, sm-sl slty
tex, mod calc





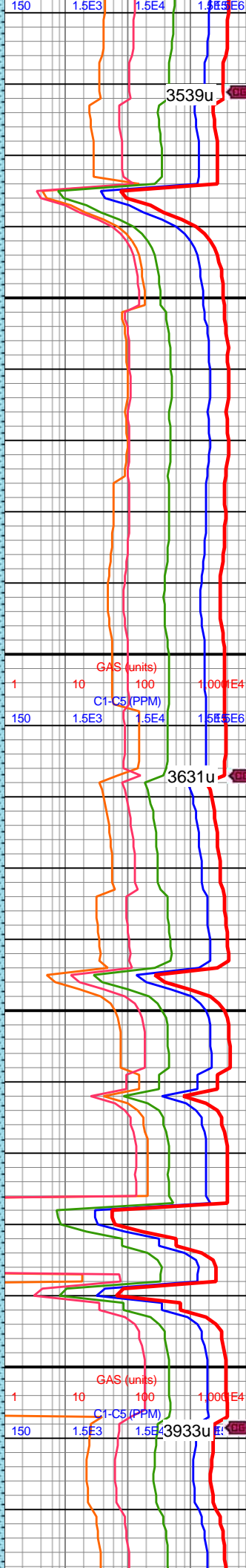
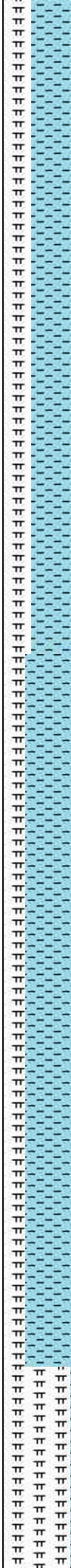
MD: 11,850'
TVD: 7,116.07'
INC: 89.96°
AZM: 2.72°
VS: 3,789.11'

MINDEPTH 6/1/18

MD: 11,945'
TVD: 7,116.07'
INC: 90.04°
AZM: 2.46°
VS: 3,884.05'

Bulk sample
caught for
analysis

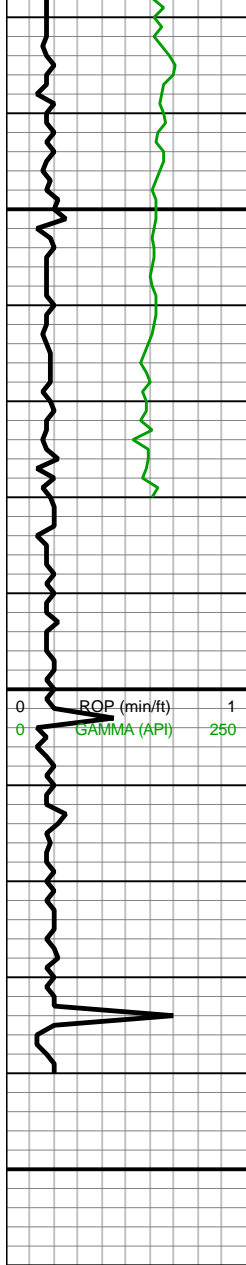
WOB: 39klbs
RPM: 71
SPM: 208
SPP: 4,910psi



11800-11900 CHK
(75%): lt gy-lt
gyshbn-med gy-med
gyshbn, sme dk gy wi f
wh chky incl ip grd to
mrlst, l-mod fis sb rd-sb
blky ctngs, sb
frm-frm-brit, predy sm arg
tex, sl slty ip, occ f wh
chky incl, tr vf pyr, hi calc;
MRLST (25%): dk gy-dk
gyshbn-v dk gy, predy
frm-brit, mod fis sb
blky-blky ctngs, sm-sl slty
tex, occ chky incl, pp pyr
ip, mod calc wi brn mrlly
resdl

11900-12000 CHK
(80%): lt gy-lt
gyshbn-med gy-med
gyshbn, sme dk gy, com
vf-u f wh chky incl ip,
l-mod fis sb rd-sb blky
ctngs, sb frm-frm-brit,
predy sm arg tex, sl slty
ip, tr vf pyr, hi calc;
MRLST (20%): pred dk
gy-v dk gy, occ gyshbn,
frm-brit mod fis sb
blky-blky ctngs, sm-sl slty
tex, tr vf pyr, mod calc wi
brn mrlly resdl





MD: 12,040'
TVD: 7,115.7'
INC: 90.4°
AZM: 3.34°
VS: 3,978.96'

MD: 12,073'
TVD: 7,115.58'
INC: 90.04°
AZM: 3.69°
VS: 4,011.91'

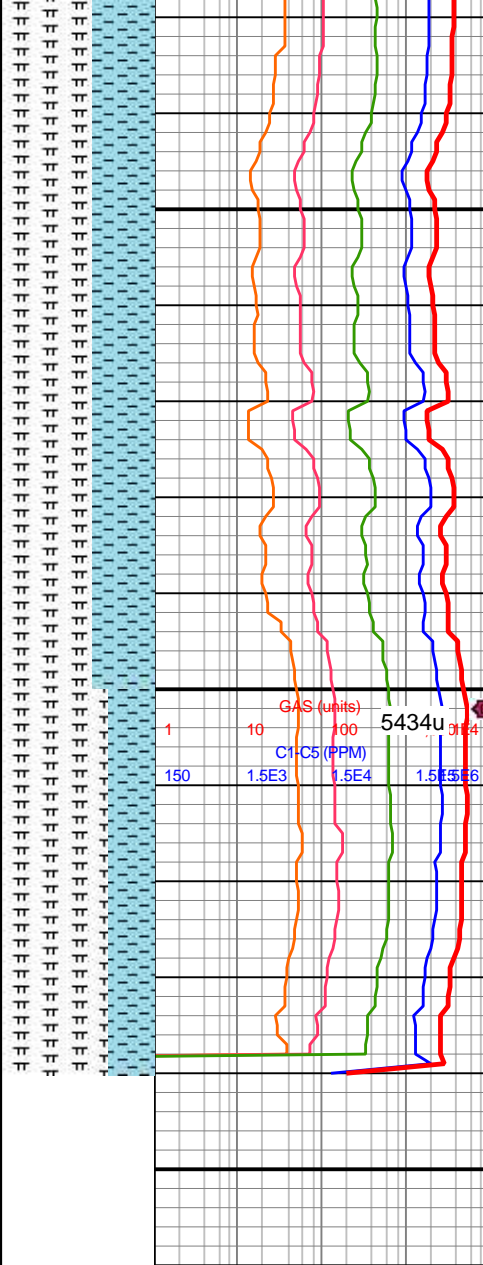
Bulk sample caught for analysis

MD: 12,140'
TVD: 7,115.53'
INC: 90.04°
AZM: 3.69°
VS: 4,078.81'

Bit projection

MD: 12,140'
TVD: 7,115.53'
INC: 90.04°
AZM: 3.69°
VS: 4,078.81'

Reach TD @ 01:05hrs on 6/1/18



12000-12100 MRLST (60%) : brn-dk gy-v dk gy, frm-hd-brit, mod fis sb blkyl-bkyl ctngs, sm arg-sl slty tex, rr forams, mod calc wi brn mrly resdl; 40% CHK: lt gy-med gy-dk gy wi occ f wh chky incl, sb frm-frm-brit l-mod fis sb rd-sb blkyl ctngs, sm arg-sl slty tex, tr vf pyr, hi calc

12100-12140 MRLST (70%): predy dk gy-v dk gy, com brn-gyshbn, mod fis sb blkyl-bkyl ctngs, sb frm mrl wi sm arg tex-frm-hd-brit ctngs wi sl slty tex, rr forams, mod calc wi brn mrly resdl; CHK (30%): med gy-dk gy wi occ f wh chky incl, rr lt gy ctngs, sb frm-frm-brit l-mod fis sb rd-sb blkyl ctngs, sm arg-sl slty tex, tr vf pyr, hi calc

