

COLUMBINE LOGGING

Scale: 5" / 100'
Measured Depth Log

Well Name Pronghorn 13-43-28HNC

Location SWSW SEC. 28 T5N R61W

State COLORADO

County WELD

Country USA

Rig Number XTREME 20

API Number 05-123-41216-00

AFE # 15145

Region DJ BASIN

Field WATTENBERG

Spud Date 8/6/2015

Drilling Completed 8/8/2015

Surface Coordinates 1250' FSL x 429' FWL (LAT: 40.36801, -104.22205)

Bottom Hole Coordinates 1980' FSL x 470' FEL (LAT: 40.37001, -104.20622) PROJECTED

Ground Elevation 4597'

K.B. Elevation 4614'

Logged Interval 5800' To 10695'

Total Depth 10695'

Formation NIOBRARA C-CHALK

Type of Drilling Fluid H2O, LSND

Operator

Company Bonanza Creek Energy Inc.

Address 410 17th Street, Suite 1500 Denver, CO 80202

Geologist

Name Paul McKay

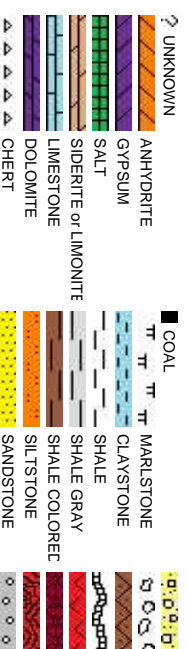
Company Bonanza Creek

Address 410 17TH STREET, SUITE 1500 DENVER, CO 80202

Zone Color Code



Rock Types



Accessories

Fossils

F FOSSIL	— ARGILLACEOUS	↘ GLAUCONITE
GA GASTROPOD	/ ARGILLITE GRAIN	≡ GYPSIFEROUS
Ø OOLITE	B BENTONITE	↑ HEAVY MINERAL
OSTRACOD	BITUMENOUS SUBSTANCE	K KAOLIN
BELEMNITE	BRECCIA FRAGMENTS	TT MARLSTONE
BIOLCLASTIC	↑ CALCAREOUS	≡ MINERAL CRYSTALS
BRACHIOPOD	■ CARBONACEOUS FLAKES	□ NODULES
↑ BRIZOZA	▲ CHITK	● PHOSPHATE PELLET
CEPHALOPOD	§ PLANT REMAINS	P PYRITE
CORAL	§ SCAPHOPOD	田 SALT CAST
GRINOID	III STROMATOPOROID	∴ SANDY
ECHINOID	+ FELDSPAR	↗ SILICEOUS
FISH	● FERRUGINOUS PELLET	.. SILTY
FORAMINIFERA	// ANHYDRITIC	↘ FERRUGINOUS
		↖ 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

Ø ORGANIC	↔ FORMATION TOP	↗ CONNECTION GAS	☒ CRYPTOXLN
P PINPOINT	⚡ GAS SHOW	↘ CONNECTION DOWN	E EARTHY
∇ VUGGY	MINDEPTH MN DEPTH	CASING	FX FINELYXLN

Engineering

● EVEN	↘ NORMAL FAULT	↕ FORMATION TOP
○ QUESTIONABLE	● OIL SHOW	↕ CONNECTION TOP
SPOTTED STAINING	↕ OVERTURNED STRATA	

Rounding

▲ CASING	↗ REVERSE FAULT	▲ ANGULAR	MMS MUDSTONE
▲ CONNECTION (LEFT)	▲ SIDEWALL CORE (LEFT)	R ROUNDED	PS PACKSTONE
▲ CONNECTION (RIGHT)	▲ SIDEWALL CORE (RIGHT)	B SUBANG	WS WACKSTONE
■ CONNECTION GAS	▨ SLIDE	P SUBRND	

Textures

× FRACTURE	↓ CORE - LOST	OS SURVEY	M MODERATE
× INTERCRYSTALLINE	■ CORE - RECOVERED	TRIP GAS	P POOR
Ø INTEROOLITIC	∴ DST INTERVAL	WIRELINE TESTED - LEFT	BS BOUNDSTONE
∇ MOULDIC	↘ FAULT	WIRELINE TESTED - RT	C CHALKY
			W WELL

Porosity

E EARTHY	▲ CONNECTION (LEFT)	■ CORE - RECOVERED
F FINESTRAL	▲ CONNECTION (RIGHT)	∴ DST INTERVAL
F FRACTURE	■ CONNECTION GAS	↘ FAULT
× INTERCRYSTALLINE	↓ CORE - LOST	
Ø INTEROOLITIC	∴ DST INTERVAL	

ding



CO 80202

CONGLOMERATE	CHALK
BRECCIA	SILTY SHALE
TILL	NO SAMPLE
BENTONITE	SHALY SANDSTONE
TUFF	SHALY SILTSTONE
IGNEOUS	
METAMORPHIC	
CEMENT	

ROP
ROP —
GAMMA —

Bit Data
Bit #: 2
Type: VSS13HG
Size: 8.75
Depth In: 787'
Hours: 6.4 hrs
Jets: 7x18
S/N: 4008458

Total Gas & Chromatograph
GAS —
C1 —
C2 —
C3 —
C4 —

Depth Labels

% Lith

Well Bore
TVD —

COLUMBINE LOGGING INC.
RIGGED UP ON 8/7/2015
MANNED 2-PERSON
LOGGING WITH
BLOODHOUND GAS
CHROMATOGRAPH UNIT
#311 BEGAN LOGGING ON
8/7/2015 @ 23:19 MST

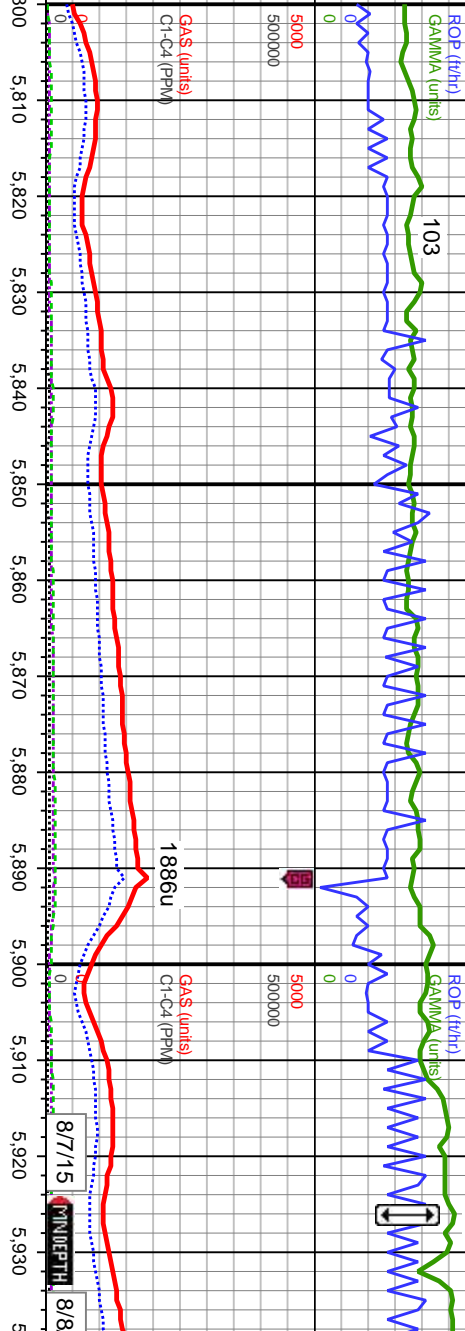
Oil Show

EGMFTS

Images

V/S: 36 WT: 9.4

Sharon Springs Top
5926' MD 5830' TVD



MD: 5,827'
Inclination: 14.18°
Azimuth: 73.23°
TVD: 5,737.68'
VS: 719.93'

MD: 5,921'
Inclination: 26.14°
Azimuth: 77.95°
TVD: 5,825.77'
VS: 727.6'

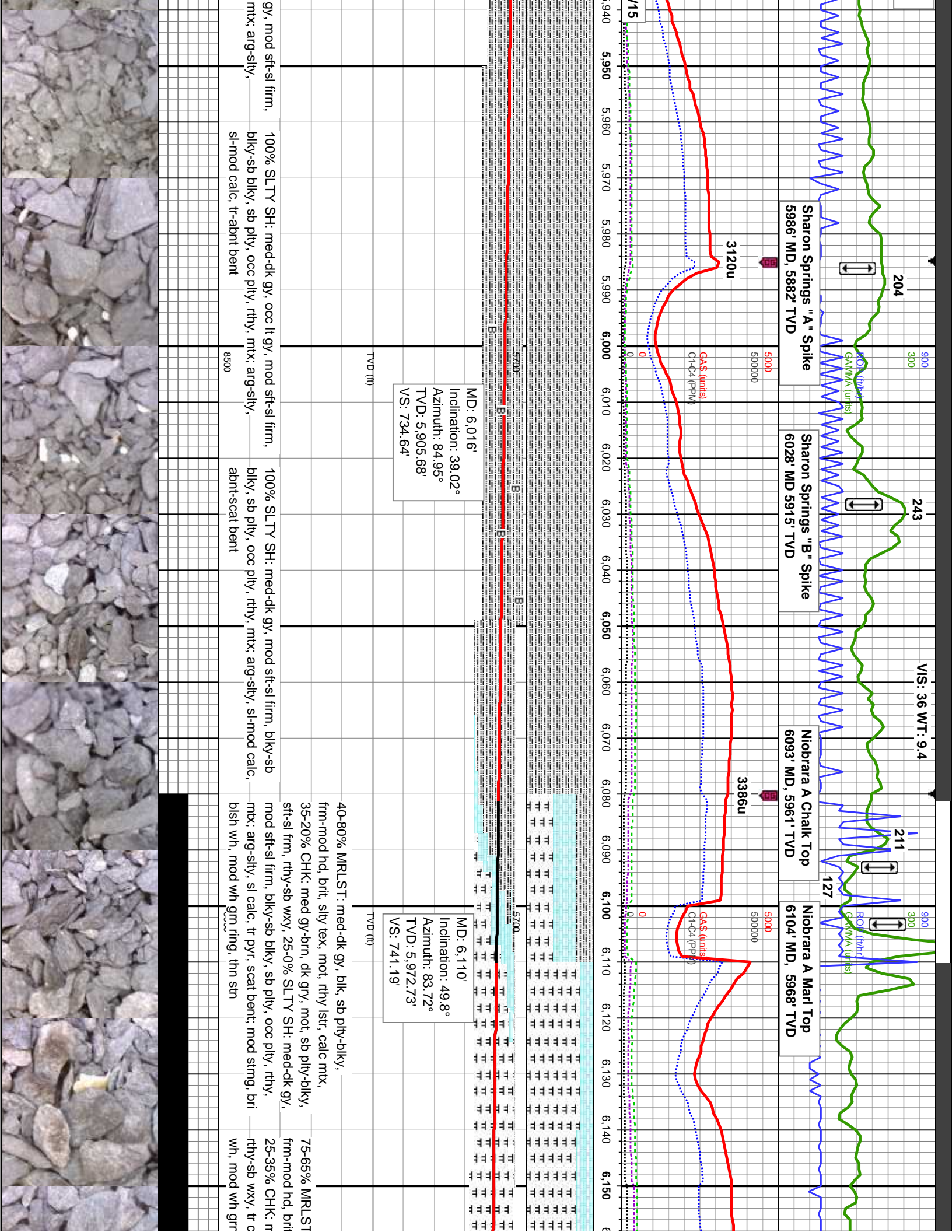
100% SLTY SH: med-dk gy, lt gy, sft-sl firm,
biky-sb biky, sb pty, occ pty, rthy, mtx;
arg-sly, sl-mod calc

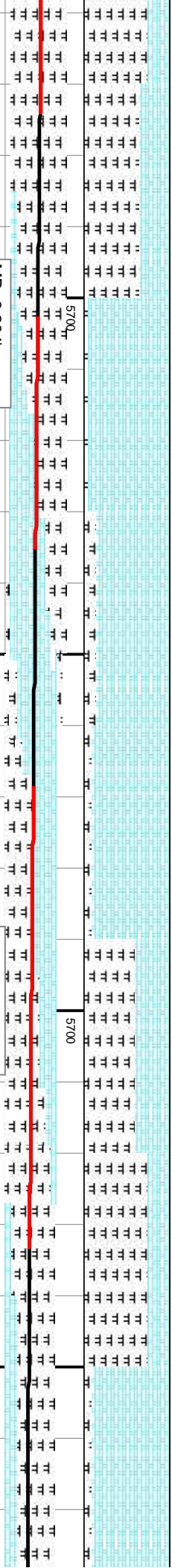
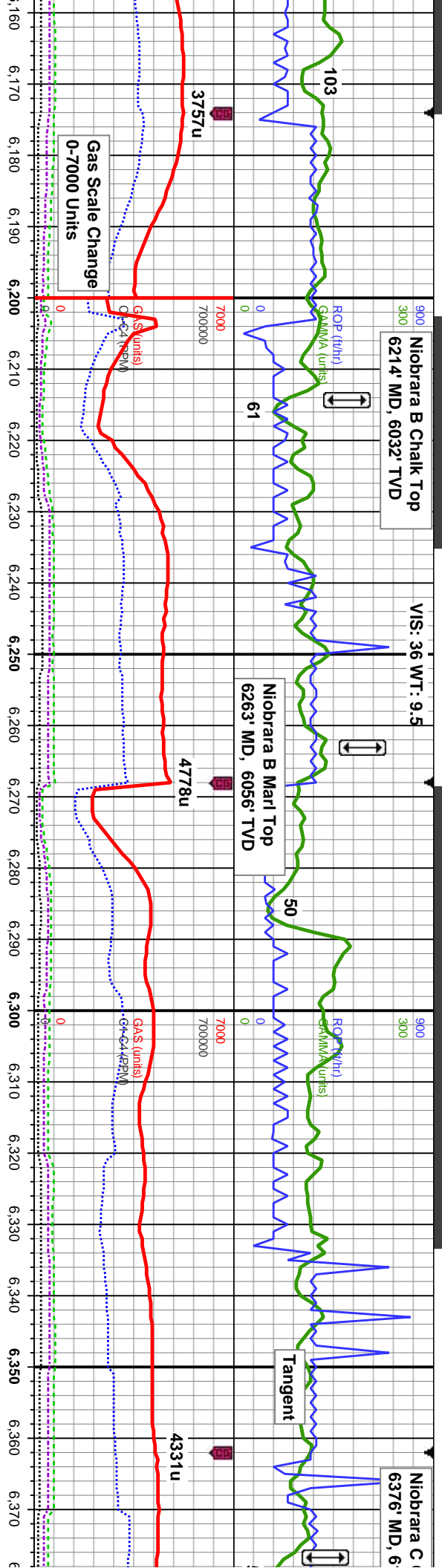
100% SLTY SH: med-dk gy, occ lt gy, mod
sft-sl firm, biky-sb biky, sb pty, occ pty, rthy,
mtx; arg-sly, sl-mod calc

100% SLTY SH: med-dk gy, occ lt
biky-sb biky, sb pty, occ pty, rthy,
sl-mod calc

TVD (ft)

TVD (ft)





MD: 6,204'
Inclination: 58.75°
Azimuth: 83.7°
TVD: 6,027.56'
VS: 749.54'

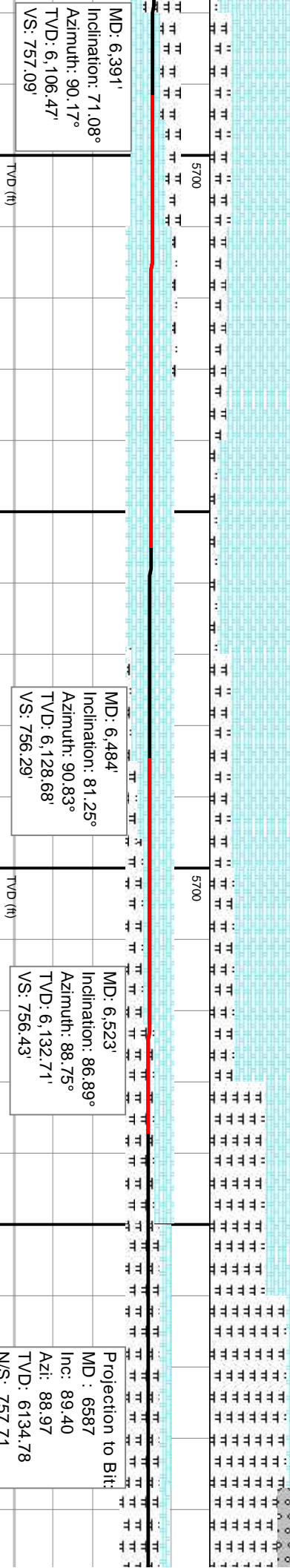
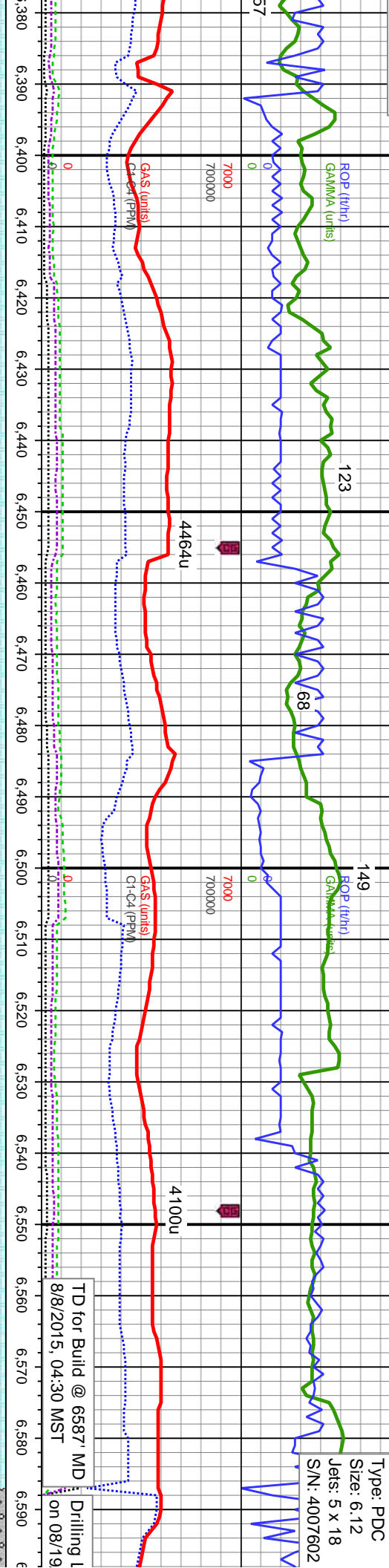
MD: 6,298'
Inclination: 65.11°
Azimuth: 87.8°
TVD: 6,071.79'
VS: 755.6'

95-85% CHK: lt-med gy, occ dk gry-brn, mot, sb
ply-biky, sft-sl frm, rthy-sb wxy, occ cal incl, 5-15%
MRLST: med-dk gy, sb ply-biky, frm-mod hd, brit,
sily tex, mot, rthy lstr, calc mtx, tr fos frags, g chk flr,
g ocl; fast stmg, bri bish wh bri wh grn ring, mod str

90-40% CHK: med gy-dk gry-brn, mot, sb ply-biky,
sft-sl frm, rthy-sb wxy, occ cal incl, 10-60% MRLST:
med-dk gy, sb ply-biky, frm-mod hd, brit, sily tex, mot,
rthy lstr, calc mtx, tr cal and fos frags; fast stmg, bri
bish wh bri wh grn ring, mod str

75-10% MRLST: med-dk gy, blk, sb ply-biky,
frm-mod hd, brit, sily tex, mot, rthy lstr, calc mtx, cal
incl, 25-90% CHK: lt-med gy, occ dk gry, mot, sb
ply-biky, sft-sl frm, rthy-sb wxy, tr imbd cal, tr cal
frags, fr chk flr, g ocl; fast stmg, bri bish wh, bri wh
grn ring, thk str





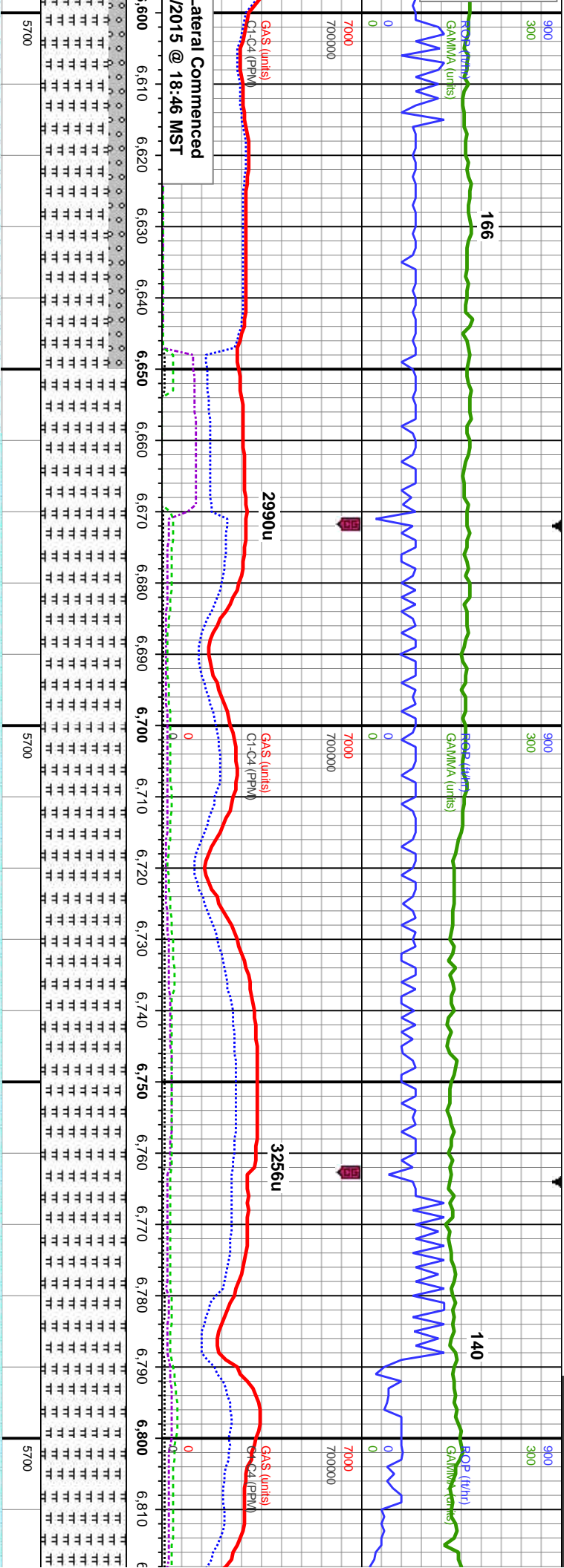
MD: 6,391' Inclination: 71.08° Azimuth: 90.17° TVD: 6,106.47' VS: 757.09'	75-80% CHK: lt-med gy, occ dk gry, mot, sb pty-blky, sft-sl frm, rthy-sb wxy, abnt imbd cal, 25-20% MRLST: med-dk gy, sb pty-blky, frm-mod hd, brit, silty tex, mot, rthy lstr, calc mtx, scat fos and cal frags, g chk flr, g od; fast stmg, bri blsh wh, bri wh gm ring, thk str
MD: 6,484' Inclination: 81.25° Azimuth: 90.83° TVD: 6,128.68' VS: 756.29'	90-75% CHK: lt-med gy, occ dk gry, mot, sb pty-blky, mod sft-sl frm, rthy-sb wxy, abnt cal incl, 10-25% MRLST: med-dk gy, blk, sb pty-blky, frm-mod hd, brit, silty tex, mot, rthy lstr, calc mtx, occ fos and cal frags, mod chk flr, mod od; fast stmg, bri blsh wh, bri wh gm ring, thk str
MD: 6,523' Inclination: 86.89° Azimuth: 88.75° TVD: 6,132.71' VS: 756.43'	70-35-10% CHK: lt-med gy, occ dk gry, mot, sb pty-blky, mod sft-sl frm, rthy-sb wxy, abnt cal incl, 30-65-90% MRLST: dk gy, blk, sb pty-blky, frm-mod hd, brit, silty tex, mot, rthy lstr, calc mtx, occ-t fos and cal frags; slow-mod stmg, bri blsh wh, fnt wh gm ring, mod sin

Projection to Bit

MD : 6587
Inc: 89.40
Azi: 88.97
TVD: 6134.78
N/S: 757.71
E/W: 300.55
DLS: 3.94

TD for Build @ 6587' MD
8/8/2015, 04:30 MST
Drilling 1 on 08/19





MD: 6.611'
Inclination: 89.51°
Azimuth: 89.8°
TVD: 6,135.47'
VS: 757.55'

MD: 6.703'
Inclination: 89.69°
Azimuth: 89.54°
TVD: 6,136.11'
VS: 758.07'

MD: 6.795'
Inclination: 89.32°
Azimuth: 89.27°
TVD: 6,136.91'
VS: 759.03'

% MRLST: dk gy, blk, sb pty-blky, frm-mod hd, arg-sily tex, mot, rthy lstr, calc mntx, tr cement, tr bent, tr Chk; slow stmg, bri bish wh, fnt yel amb ring, thk str

100% MRLST: dk gy, blk, sb pty-blky, frm-mod hd, arg-sily tex, mot, rthy lstr, calc mntx, tr cement, tr bent, tr Chk; slow stmg, bri bish wh, fnt yel amb ring, thk str

100% MRLST: dk gy, blk, sb pty-blky, frm-mod hd, arg-sily tex, mot, rthy lstr, calc mntx, tr bent, slow stmg, bri bish wh, mod wh grn ring, mod str

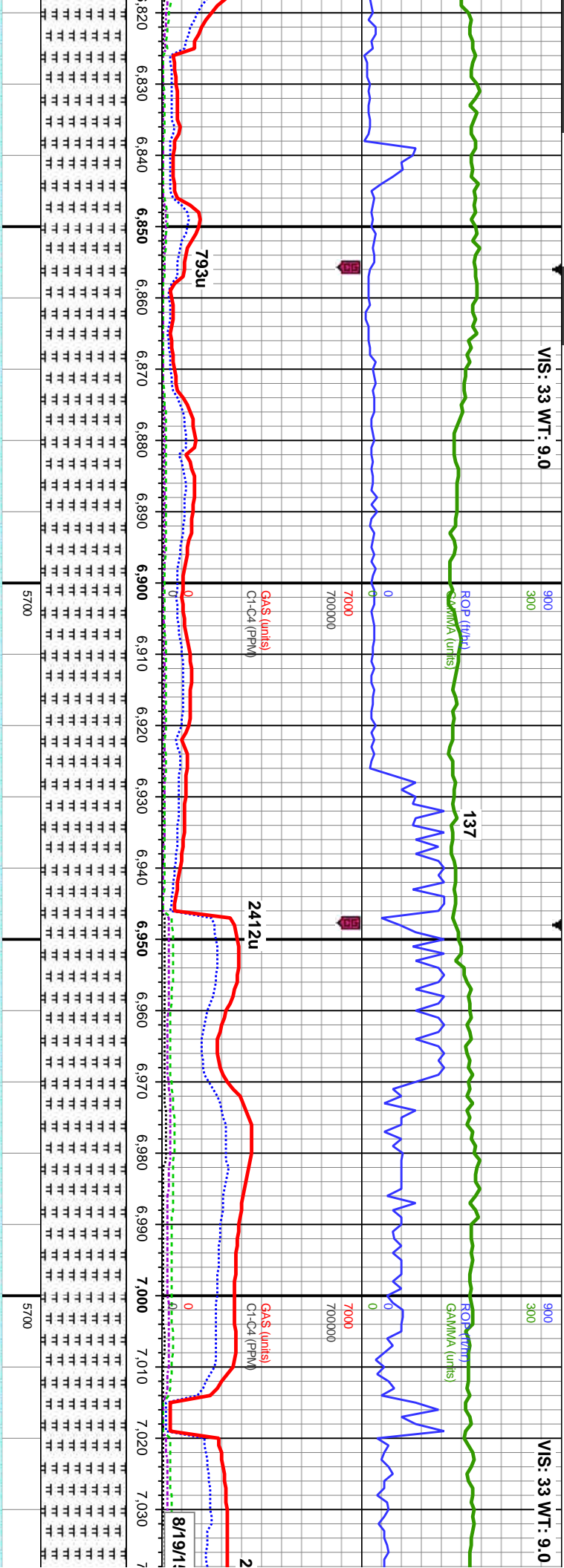
100% MRLST: dk gy, blk, sb pty-blky, frm-mod hd, arg-sily tex, mot, rthy lstr, calc mntx, tr cement, tr bent, tr Chk; slow stmg, bri bish wh, mod wh grn ring, mod str

100% MRLST: dk gy, blk, sb pty-blky, frm-mod hd, arg-sily tex, mot, rthy lstr, calc mntx, tr cement, tr bent, tr Chk; slow stmg, bri bish wh, fnt yel amb ring, thk str



VIS: 33 WT: 9.0

VIS: 33 WT: 9.0



MD: 6,887'
Inclination: 91.11°
Azimuth: 89.77°
TVD: 6,136.56'
VS: 759.8'

MD: 6,980'
Inclination: 91.11°
Azimuth: 89.91°
TVD: 6,134.76'
VS: 760.06'

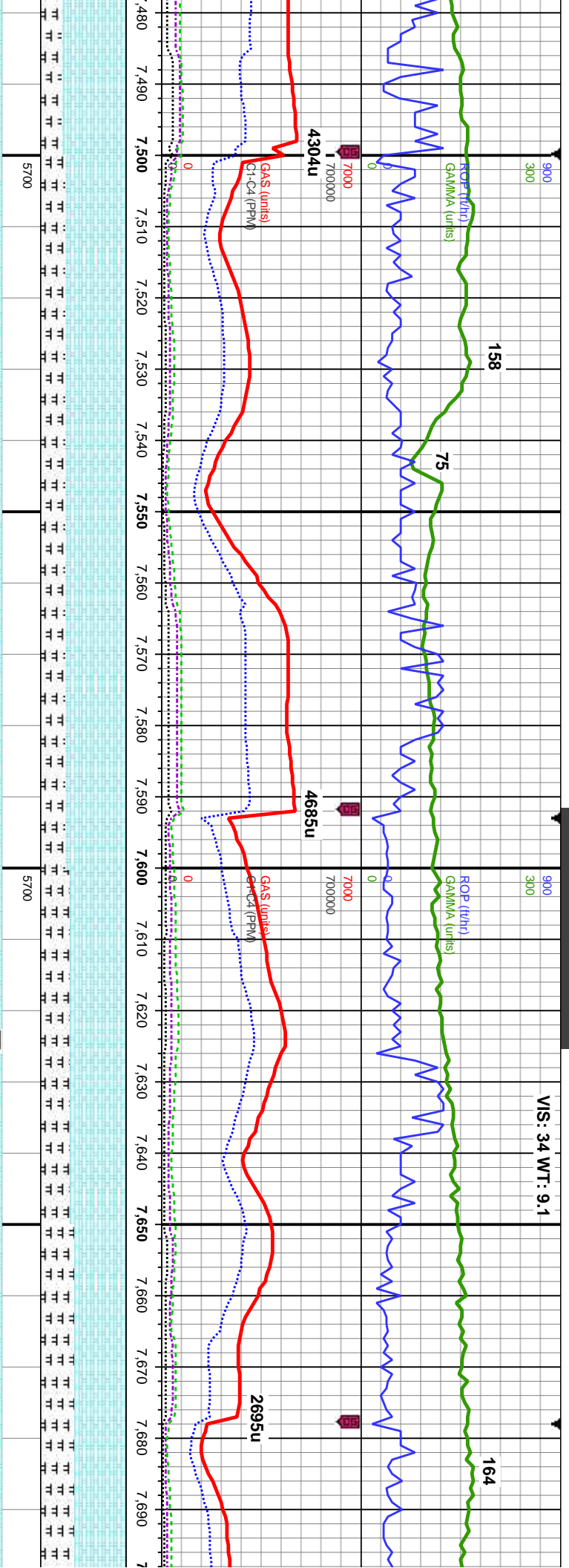
blk gy, blk, sb ply-blky, -sly tex, mot, rthy lst, calc
100% MRLST: dk gy, blk, sb ply-blky, frm-mod hd, arg-sly tex, mot, rthy lst, calc
tr bent, tr chk, fast stmg, bri wh, fnt yel amb ring, thk stn

blk gy, blk, sb ply-blky, -sly tex, mot, rthy lst, calc
100% MRLST: dk gy, blk, sb ply-blky, frm-mod hd, arg-sly tex, mot, rthy lst, calc
tr bent, tr chk, fast stmg, bri wh, fnt yel amb ring, thk stn

blk gy, blk, sb ply-blky, -sly tex, mot, rthy lst, calc
100% MRLST: dk gy, blk, sb ply-blky, frm-mod hd, arg-sly tex, mot, rthy lst, calc
tr bent, tr chk, fast stmg, bri wh, fnt yel amb ring, thk stn

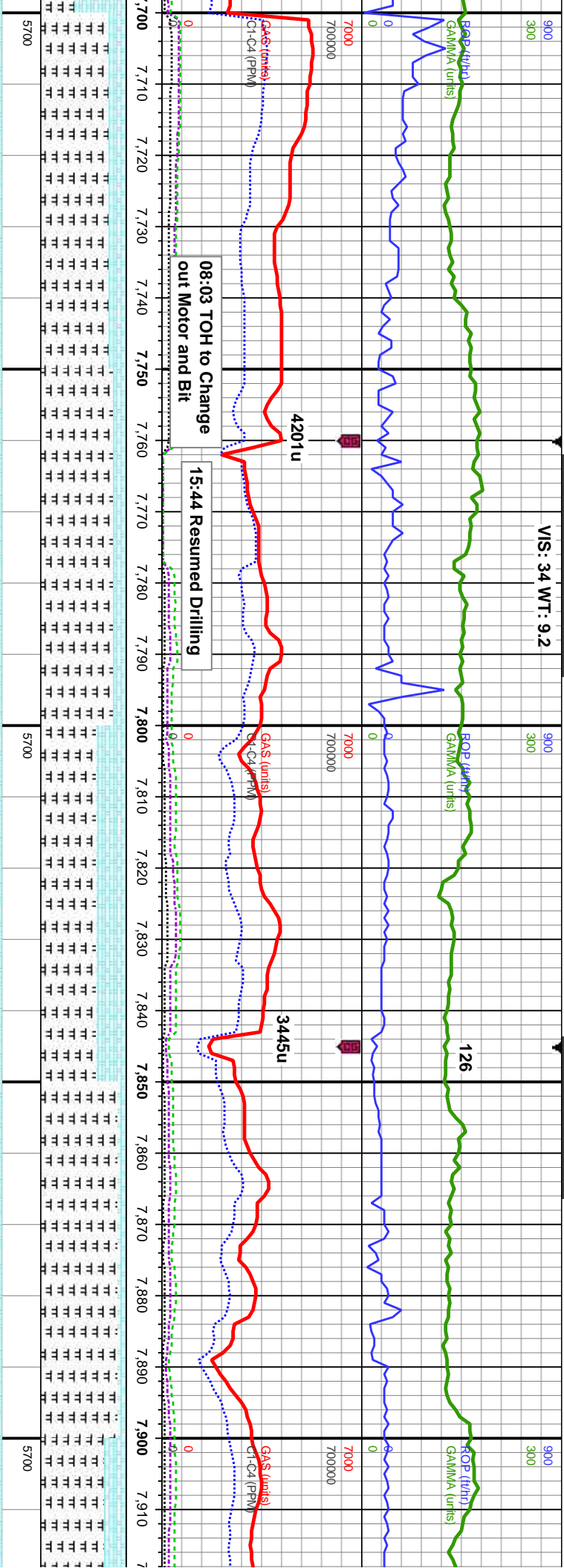
blk gy, blk, sb ply-blky, -sly tex, mot, rthy lst, calc
100% MRLST: dk gy, blk, sb ply-blky, frm-mod hd, arg-sly tex, mot, rthy lst, calc
tr bent, tr chk, fast stmg, bri wh, fnt yel amb ring, thk stn





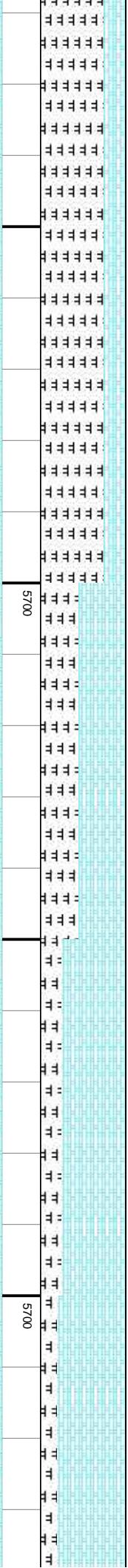
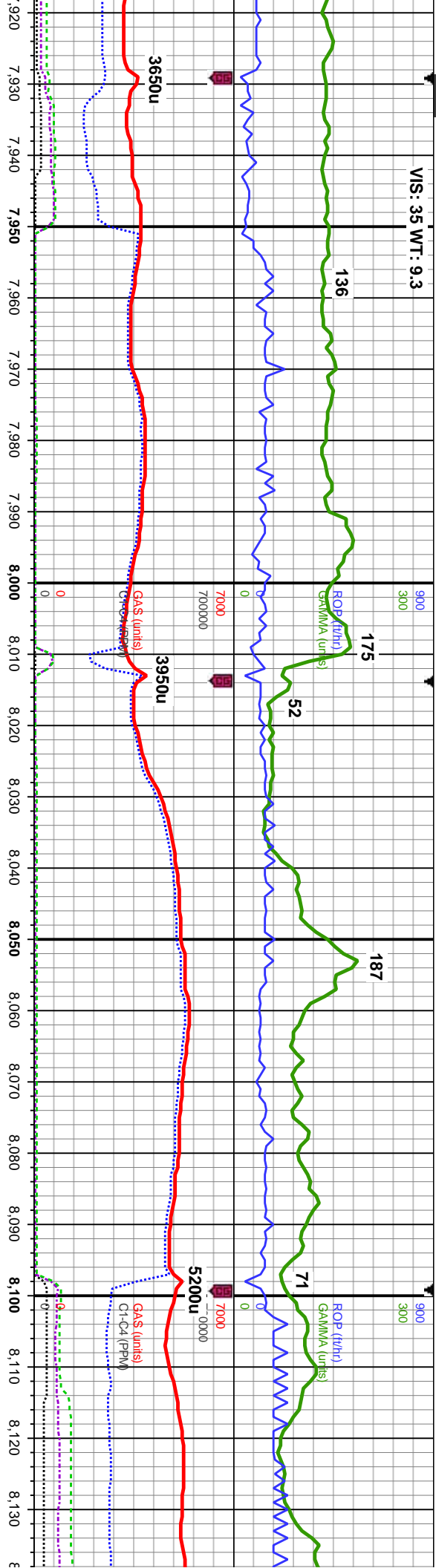
MD: 7.530' Inclination: 89.81° Azimuth: 89.37° TVD: 6,125.72' VS: 759.31'		70% CHK: lt-med gy brn, mot, sb pty-blky, mod sft-sl frm, rthy-sb wxy, 30% MRLST: med-dk gy, blk, sb pty-blky, frm-mod hd, arg-sily tex, mot, rthy lstr, calc mtx, tr cal frags, fast strng, fr bish wh bri wh grm ring, fr stn	70% CHK: med gy brn, mot, sb pty-blky, mod sft-sl frm, rthy-sb wxy, 30% MRLST: med-dk gy, blk, sb pty-blky, frm-mod hd, arg-sily tex, mot, rthy lstr, calc mtx, tr cal frags, fast strng, fr bish wh bri wh grm ring, fr stn	65% CHK: med gy brn, mot, sb pty-blky, mod sft-sl frm, rthy-sb wxy, 35% MRLST: med-dk gy, blk, sb pty-blky, frm-mod hd, arg-sily tex, mot, rthy lstr, calc mtx, tr cal frags, slow-mod strng, mod bish wh bri wh grm ring, fr stn	60% CHK: med gy brn, mot, sb pty-blky, mod sft-sl frm, rthy-sb wxy, 40% MRLST: med-dk gy, blk, sb pty-blky, frm-mod hd, arg-sily tex, mot, rthy lstr, calc mtx, tr cal frags, slow-mod strng, mod bish wh bri wh grm ring, fr stn
TVD (ft)					





99'	on: 89.75° t: 87.8° 125.45'	MD: 7.784' Inclination: 90.12° Azimuth: 89.93° TVD: 6,125.55' VS: 761.86'	65% MRLST: med-dk gy, blk, sb pty-biky, frm-mod hd, arg-sly tex, mot, rthy lstr, calc mtx, 35% CHK: med gy brn, mot, sb pty-biky, mod stf-sl frm, rthy-sb wxy, tr cal frags, tr bent, fast stmg, bri blsh wh, mod yel grn ring, mod stn	90% MRLST: med-dk gy, blk, sb pty-biky, frm-mod hd, arg-sly tex, mot, rthy lstr, calc mtx, 10% CHK: med gy brn, mot, sb pty-biky, mod stf-sl frm, rthy-sb wxy, tr cal frags, tr bent, fast stmg, bri blsh wh, mod yel grn ring, mod stn	75% MRLST: r
80% MRLST: med-dk gy, blk, sb pty-biky, frm-mod hd, arg-sly tex, mot, rthy lstr, calc mtx, 20% CHK: med gy brn, mot, sb pty-biky, mod stf-sl frm, rthy-sb wxy, occ cal frags, slow stmg, fr blsh wh bri wh grm ring, tr stn	85% MRLST: med-dk gy, blk, sb pty-biky, frm-mod hd, arg-sly tex, mot, rthy lstr, calc mtx, 15% CHK: med gy brn, mot, sb pty-biky, mod stf-sl frm, rthy-sb wxy, occ cal and fos frags, slow stmg, fr blsh wh bri wh grm ring, tr stn				





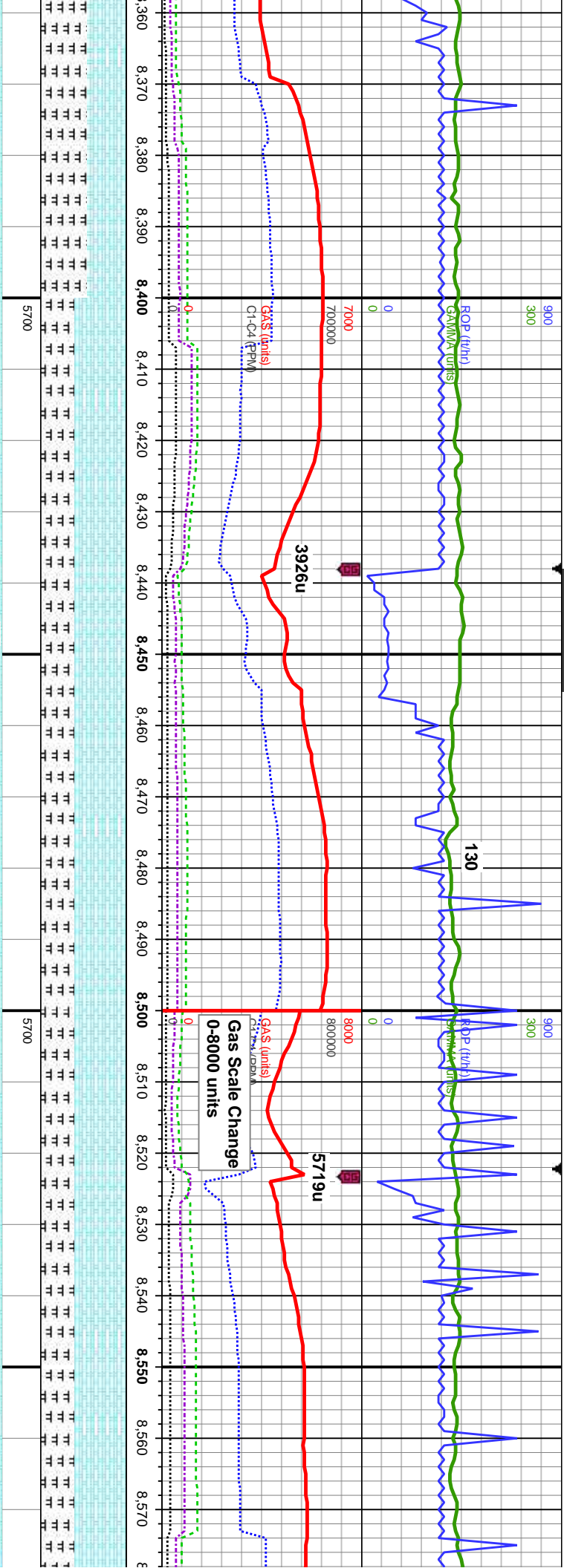
MD: 7.953'
Inclination: 91.75°
Azimuth: 92.49°
TVD: 6,124.05'
VS: 757.23

MD: 8.038'
Inclination: 91.05°
Azimuth: 91.63°
TVD: 6,121.97'
VS: 754.17'

MD: 8.122'
Inclination: 89.85°
Azimuth: 91.93°
TVD: 6,121.31'
VS: 751.57'

med-dk gy, blk, sb pty-blky, arg-sily tex, mot, rthy lstr, calc
med gy brn, occ dk gy, mod sft-sl frm, rthy-sb
ting, bri blsh wh, fnt yel
75% MRLST: med-dk gy, blk, sb pty-blky, frm-mod hd, arg-sily tex, mot, rthy lstr, calc
mtx, 25% CHK: med gy brn, occ dk gy, mod, sb pty-blky, mod sft-sl frm, rthy-sb
wxy, mod-fast stmg, bri blsh wh, fnt yel
amb ring, mod sin
55% CHK: wht-frm, mot, sb pty-blky, mod sft-sl frm, rthy-sb wxy, 45% MRLST: med-dk gy, blk, sb pty-blky, frm-mod hd, arg-sily tex, mot, rthy lstr, calc
mtx, tr cal frags, mod chk
flor, fast stmg, bri blsh wh, bri wh grn ring, thk sin
75% CHK: wht-frm, mot, sb pty-blky, mod sft-sl frm, rthy-sb wxy, 25% MRLST: med-dk gy, blk, sb pty-blky, frm-mod hd, arg-sily tex, mot, rthy lstr, calc
mtx, tr cal frags, g chk flor, fast stmg, bri blsh wh, bri wh grn ring, thk sin
80% CHK: lt-med gy, occ dk gy, mod pty-blky, mod sft-sl frm, rthy-sb wxy
MRLST: med-dk gy, blk, sb pty-blky, frm-mod hd, arg-sily tex, mot, rthy lstr, calc
mtx, scat cal frags, g chk flor, fast stmg, bri blsh wh, fnt yel
amb ring, thk sin





MD: 8,371'
Inclination: 90.37°
Azimuth: 90.96°
TVD: 6,119.04'
VS: 743.93'

RLST: med-dk gy, blk, sb pty-biky, mod hd, arg-sly tex, mot, rthy lstr, calc 55% CHK: med gy, occ dk gy, mot, sb frm-mod hd, arg-sly tex, mot, rthy lstr, calc mtx, scat cal and fos frags, tr imbd cal, tr pyr, mod-fast stmg, bri blsh wh, grn ring, tr sin

60% CHK: med gy, occ dk gy, mot, sb pty-biky, mod sft-sl frm, rthy-sb wxy, 40% MRLST: med-dk gy, blk, sb pty-biky, frm-mod hd, arg-sly tex, mot, rthy lstr, calc mtx, scat cal and fos frags, tr imbd cal, tr pyr, mod-fast stmg, bri blsh wh, mod yel grn ring, thn stn

MD: 8,462'
Inclination: 91.57°
Azimuth: 90.89°
TVD: 6,117.6'
VS: 742.56'

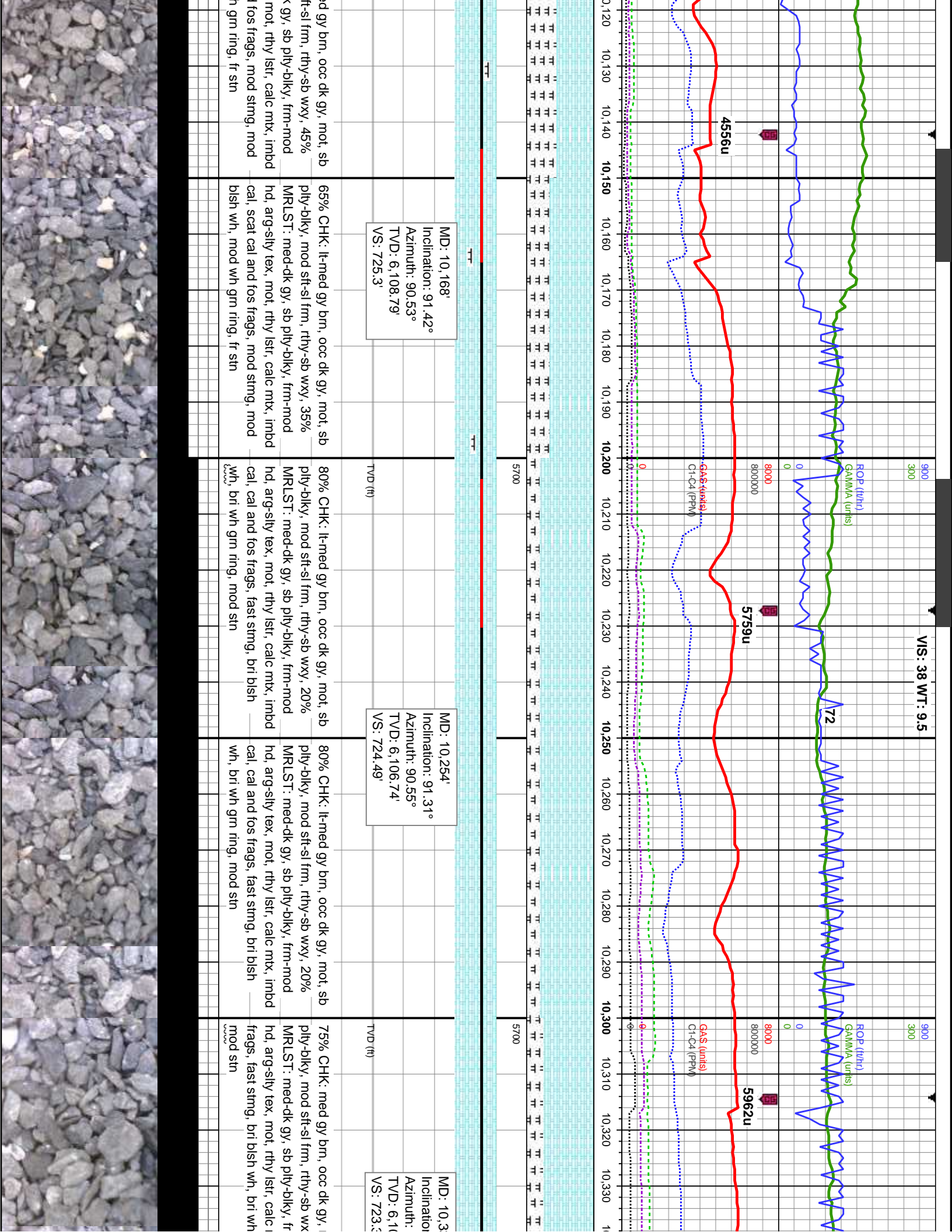
60% CHK: med gy, occ dk gy, mot, sb pty-biky, mod sft-sl frm, rthy-sb wxy, 40% MRLST: med-dk gy, blk, sb pty-biky, frm-mod hd, arg-sly tex, mot, rthy lstr, calc mtx, scat cal and fos frags, tr imbd cal, tr pyr, mod-fast stmg, bri blsh wh, mod yel grn ring, thn stn

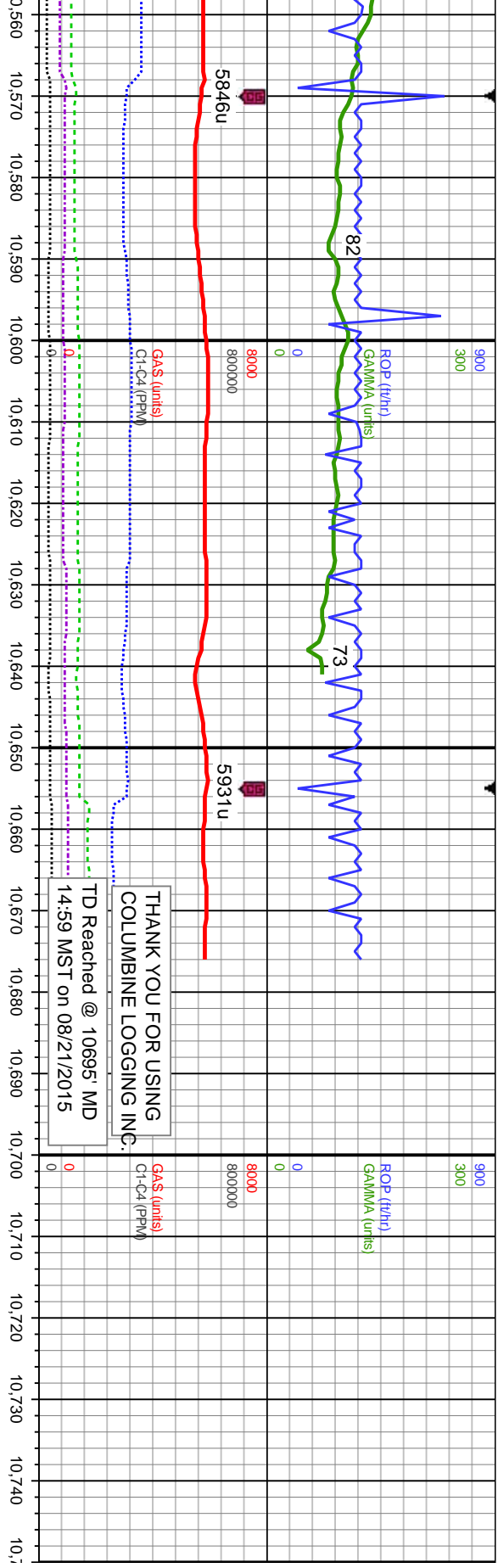
MD: 8,547'
Inclination: 91.38°
Azimuth: 91.19°
TVD: 6,115.41'
VS: 741.02'

60% CHK: med gy, occ dk gy, mot, sb pty-biky, mod sft-sl frm, rthy-sb wxy, 40% MRLST: med-dk gy, blk, sb pty-biky, frm-mod hd, arg-sly tex, mot, rthy lstr, calc mtx, tr cal and fos frags, tr imbd cal, fast stmg, bri blsh wh, mod yel grn ring, thn sin

60% CHK: med gy, occ dk gy, mot, sb pty-biky, mod sft-sl frm, rthy-sb wxy, 40% MRLST: med-dk gy, blk, sb pty-biky, frm-mod hd, arg-sly tex, mot, rthy lstr, calc mtx, tr cal and fos frags, tr imbd cal, fast stmg, bri blsh wh, mod yel grn ring, thn sin







5700		5700	
MD: 10,636' Inclination: 88.06° Azimuth: 89.79° TVD: 6,106.91' VS: 724.14'		MD: 10,695' Inclination: 88.06° Azimuth: 89.79° TVD: 6,108.91' VS: 724.36'	
Projection to Bit		Projection to Bit	
90% CHK: lt-med gy brn, occ dk gy, mot, sb xy, mod sft-sl frm, rthy-sb wxy, 20% T: med-dk gy, sb pty-blky, frm-mod -sly tex, mot, rthy lstr, calc mtx, fos fast stmg, bri blsh wh, bri wh grn ring, brn		90% CHK: lt-med gy brn, occ crm, mot, sb pty-blky, mod sft-sl frm, rthy-sb wxy, 10% MRLST: med-dk gy, sb pty-blky, frm-mod hd, arg-sly tex, mot, rthy lstr, calc mtx, v fast stmg, bri blsh wh, bri wh grn ring, thk stn grm ring, thk stn	
TVD (ft)		TVD (ft)	
8500		8500	

