



Scale: 5" / 100'
Measured Depth Log

Well Name Wells Ranch AA21-65-1HN(HORZ)

Location SEC 21;T6N;R63W

State COLORADO

Country USA

API Number 05-123-37599

Region DJ BASIN

Spud Date 2/10/2014

Surface Coordinates LAT: 40.46789°N

LONG: 104.43412°W

1100' FSL

521' FEL

Bottom Hole Coordinates 2310' FSL

535' FWL

Ground Elevation 4730'

K.B. Elevation 4754'

Logged Interval 5990' To 11080'

Total Depth 11080'

Formation NIOBRARA "B" CHALK

Type of Drilling Fluid MUD;WATER;POLY

County WELD
Rig Number H&P 322

Field WATTENBERG

Drilling Completed 2/16/2014

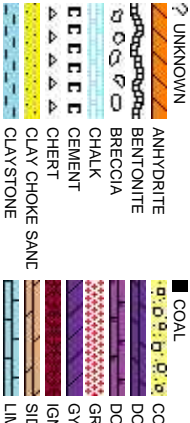
Company NOBLE ENERGY INC.

Address 1625 BROADWAY
DENVER, CO 80202
(303) 228-4000

Name JOHN READY; MIKE GR

Company COLUMBINE LOGGING I

Address 2385 S. LIPAN ST
DENVER, COLORADO 80
(303) 289-7764



Operator

Geologist

Rock Types

TT	TT	TT	TT	MARLSTONE
TT	TT	TT	TT	METAMORPHIC
X	X	X	X	NO SAMPLE
X	X	X	X	SALT
X	X	X	X	SANDSTONE
X	X	X	X	SALT-PEPPER SAND
X	X	X	X	SHALE
X	X	X	X	SHALE COLORED
X	X	X	X	SHALE GRAY
X	X	X	X	SHALY SANDSTONE
X	X	X	X	SHALY SILTSTONE
X	X	X	X	SILTSTONE
X	X	X	X	TUFF
X	X	X	X	WELDED TUFF

Accessories

Fossils	GASTROPOD	ARGILLITE GRAIN	HEAVY MINERAL	ANHYDRITE STRINGER
	INOCERAMUS	B BENTONITE	K KAOLIN	BENTONITE STRINGER
	ALGAE	O OOLITE	BITUMENOUS SUBSTANCE	M MARLSTONE
	AMPHIPORA	O OSTRACOD	BRECCIA FRAGMENTS	MICACEOUS
	BELEMNITE	P PELECYPOD	C CALCAREOUS	MINERAL CRYSTALS
	BIOCLASTIC	P PELLET	CARBONACEOUS FLAKES	N NODULES
	BRACHIOPOD	P PISOLITE	C CHERT	PHOSPHATE PELLETS
	BRYOZOA	P PLANT REMAINS	T THIN BEDS	P PYRITE
	CEPHALOPOD	S PLANT SPORES	D DOLOMITIC	S SALT CAST
	CORAL	S SCAPHOPOD	F FELDSPAR	S SANDY
	CRINOID	S STROMATOPOROID	F FERRUGINOUS PELLET	S SILTY
	E ECHINOID			T TUFFACEOUS
	F FISH	Minerals	F FERRUGINOUS	T TUFFACEOUS
	F FORAMINIFERA	A ANHYDRITIC	G GLAUCONITE	
	F FOSSIL	A ARGILLACEOUS	G GYPSIFEROUS	Stringer

Other Symbols

Oil Show	P PINPOINT	W WIRELINE TESTED - LEFT	E EARTHY
	V VUGGY	W WIRELINE TESTED - RT	F FINELY XLN
		F FORMATION TOP	G GRAINSTONE
	D DEAD	G GAS SHOW	L LITHOGRAPHIC
	E EVEN	O OIL SHOW	M MICRO XLN
	Q QUESTIONABLE		
	B BIT		
	S SPOTTED STAINING	C CONNECTION (UP)	Rounding
		C CONNECTION (DOWN)	A ANGULAR
		MN DEPTH (DOWN)	PS PACKSTONE
Porosity	C CONNECTION GAS	N NORMAL FAULT	R ROUNDED
	C CONNECTION GAS (LEFT)	O OVERTURNED STRATA	S SUBANG
	T TRIP GAS	R REVERSE FAULT	S SUBRND
	T TRIP GAS (LEFT)	C CASING	
F FRACTURE	I INTERCRYSTALLINE	S SIDEWALL CORE (LEFT)	Textures
	I INTEROOLITIC	D DOWN TIME GAS	P POOR
	M MOLDIC	D DOWN TIME GAS (LEFT)	M MODERATE
	O ORGANIC	C CORE - LOST	W WELL
		C CORE - RECOVERED	
		S SLIDE	
		S SURVEY	
		C CRYPTOXLN	

Slide/Rotate

Began Build @ 5990' MD:
1505 hrs, 02/12/2014

ROP
ROF
GAMMA

LOG CONTINUED FROM: WELLS
RANCH AA21-65-1HN(VERT).mplot

3k BEGIN 50' SAMPLE INTERVALS

Total Gas & Chromatograph

GAS
C1
C2
C3
C4

COLUMBINE LOGGING INC. RIGGED UP
ON 02/10/2014 MANNED 2-PERSON
LOGGING WITH BLOODHOUND GAS
CHROMATOGRAPH UNIT #0315

Depth Labels

% Lith

Well Bore
TVD

Oil Show

Images

MUD WT 10.0 VIS 35

100

99

1967u

2121u
C1: 66.0%
C2: 12.0%
C3: 16.0%
C4: 6.0%

100% SLTY SH: m-dk gy occ gy brn, pty -
sb pty firm-slt, rthy-sl silty

100% SLTY SH: m-dk gy occ gy brn, pty -
sb pty firm-slt, rthy-sl silty

100% SLTY SH: m-dk gy occ gy brn
sb pty firm-slt, rthy-sl silty

MD: 6,026'
TVD: 5,883.9'
Inclination: 10.43°
Azimuth: 20.78°
VS: -91.57'

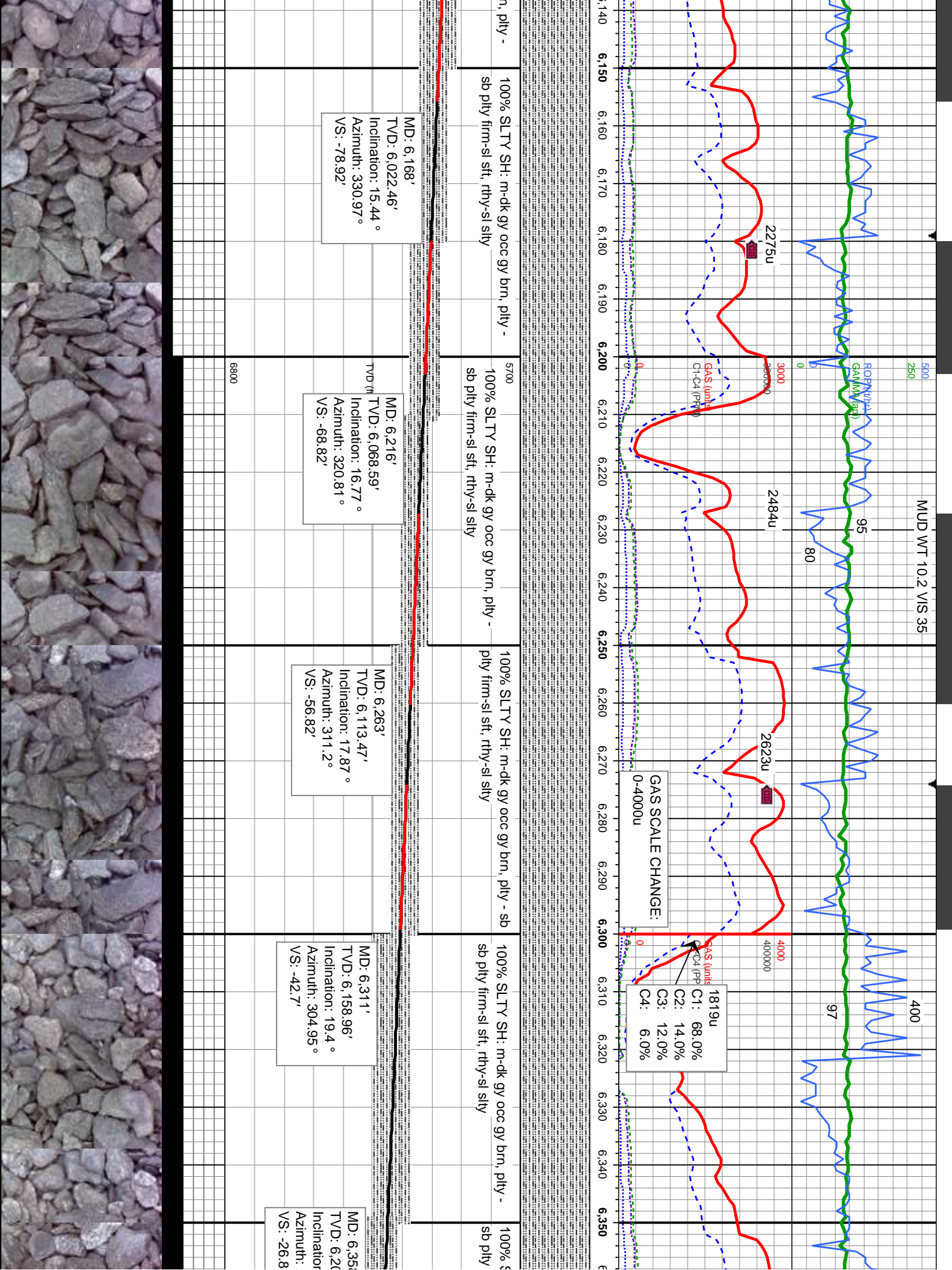
MD: 6,073'
TVD: 5,930.11'
Inclination: 10.87°
Azimuth: 1.97°
VS: -90.96'

MD: 6,121'
TVD: 5,977'
Inclination: 13.99°
Azimuth: 339.95°
VS: -86.57'

BHA #2
Bit Size: 8.750
Manufacturer: HDBS
Model: MMD55M
Serial Number: 12204543
Nozzles: 5x16

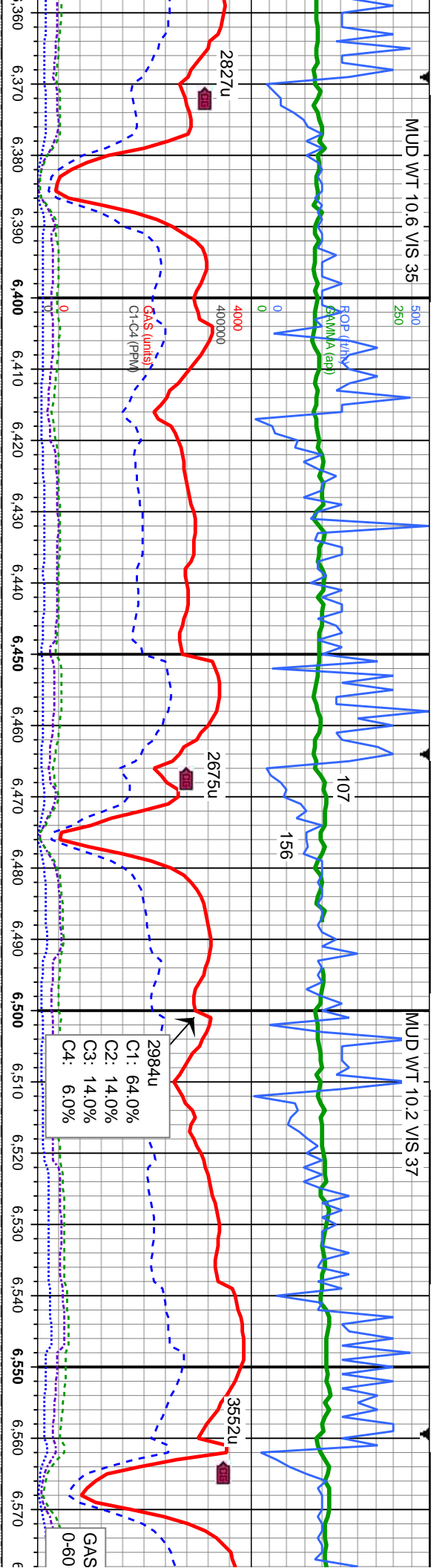
Motor Number: 2
Manufacturer: Sperry Drilling
Model: Sperry Drill
Serial Number: 675-1028
Bend: 2.0

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MUD WT 10.6 VIS 35

MUD WT 10.2 VIS 37



SLTY SH: m-dk gy occ gy brn, pty -
firm-sft, rthy-sl sily

5700
95% SLTY SH: med gy - gy, occ dk gy, mod
sft - mod firm, sb pty - sb blk, shy - sily tex,
non calc
5% SHY SS: wh - lt gy sme s&p, f gr, sb rd-
sb ang, fr srt, fri, mod por, arg cnt, occ biot

90% SLTY SH: med gy - gy, occ dk gy, mod
sft - mod firm, sb pty - sb blk, shy - sily tex,
non calc
10% SHY SS: wh - lt gy sme s&p, f gr, sb
rd- sb ang, fr srt, fri, mod por, arg cnt

95% SLTY SH: med gy - gy, occ dk gy, mod
sft - mod firm, sb pty - sb blk, shy - sily tex,
non calc
5% SHY SS: wh - lt gy sme s&p, f gr, sb rd-
sb ang, fr srt, fri, mod por, arg cnt

90% SLTY SH: med gy - gy, occ dk gy, mod
sft - mod firm, sb pty - sb blk, shy - sily tex,
non calc
10% SHY SS: wh - lt gy sme s&p, f gr, sb rd-
sb ang, fr srt, fri, mod por, arg cnt

MD: 6,406'
TVD: 6,246.97'
Inclination: 25.58 °
Azimuth: 287.19 °
VS: -7.8'

MD: 6,453'
TVD: 6,288.49'
Inclination: 30.27 °
Azimuth: 283.29 °
VS: 14.19'

MD: 6,500'
TVD: 6,327.8'
Inclination: 36.17 °
Azimuth: 281.68 °
VS: 39.9'

MD: 6,547'
TVD: 6,364.71'
Inclination: 40.29 °
Azimuth: 282.52 °
VS: 68.93'

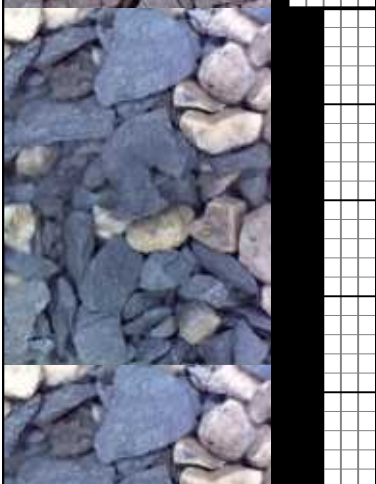


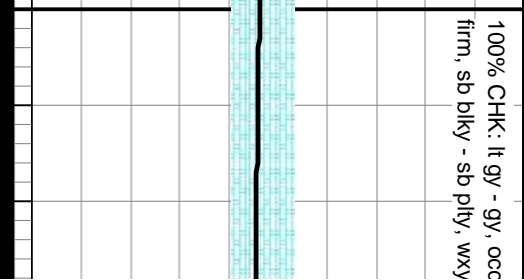
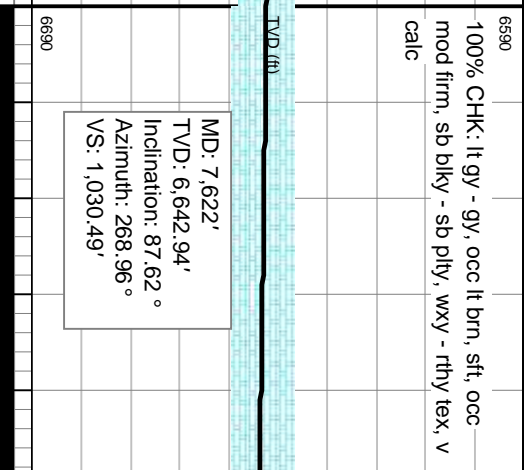
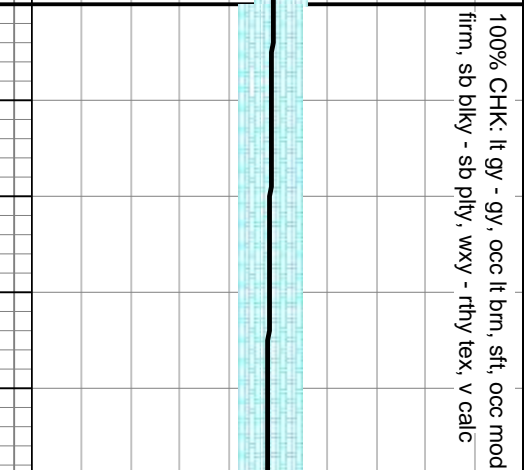
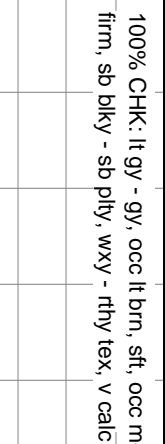
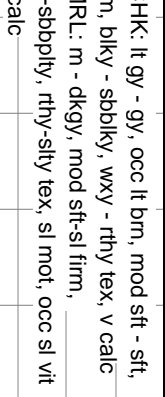


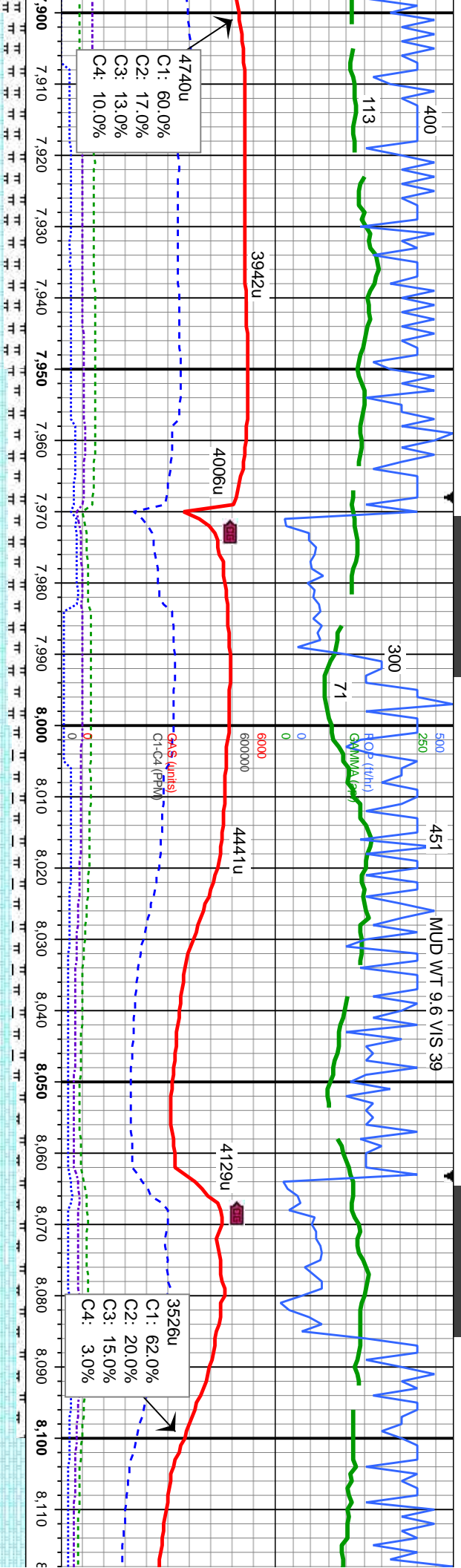
50% MRL:	med-dk gy, mod sft-sl frm, sb
biky-sb pfty,	rthy-silty
40% SLTY SH:	lt-med gy, dk gy-blk ip, mod
sft-frm,	sb pfty-sb
100% CHK:	lt-med gy, gy brn, sft, occ mod
frm,	sb biky-sb pfty
MD: 6,73	
TVD: 6,4	
Inclinatio:	
Azinuth:	
VS: 209	

Logger Top: A CHALK
6740' MD, 6494' TVD

Logger
6771' N







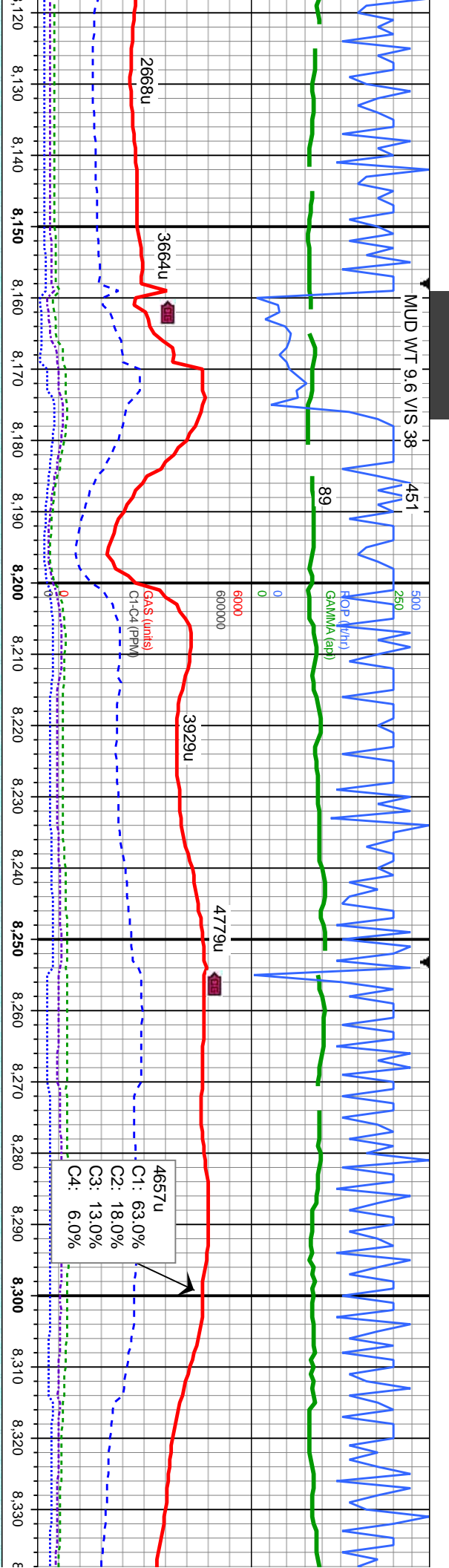
75% CHK: It gy - gy, occ It brn, mod sft - sft, occ firm, biky - sbblky, wxy - rthy tex, v calc 25% MRL: m - dkgy, mod sft-sl firm, sbblky-sbbply, rthy-slty tex, sl mot, occ sl vit lstr, v calc	80% CHK: It gy - gy, occ It brn, mod sft - sft, occ firm, biky - sbblky, wxy - rthy tex, v calc 20% MRL: m - dkgy, mod sft-sl firm, sbblky-sbbply, rthy-slty tex, sl mot, occ sl vit lstr, v calc	6530 85% CHK: It gy - gy, occ It brn, mod sft - sft, occ firm, biky - sbblky, wxy - rthy tex, v calc 15% MRL: m - dkgy, mod sft-sl firm, sbblky-sbbply, rthy-slty tex, sl mot, occ sl vit lstr, v calc	90% CHK: It gy - gy, occ It brn, mod sft - sft, occ firm, biky - sbblky, wxy - rthy tex, v calc 10% MRL: m - dkgy, mod sft-sl firm, sbblky-sbbply, rthy-slty tex, sl mot, occ sl vit lstr, v calc	100% CHK: It gy, mod firm, sb blk calc
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The figure displays a geological map with a grid overlay. Three borehole locations are identified by letters D, S, and VS. Each location has a corresponding box containing its coordinates and other parameters:

- D:** 7,906' MD; 6,644.27' TVD; 91.45° Incination; 269.67° Azimuth; 1,303.82' VS.
- S:** 8,001' MD; 6,642.43' TVD; 90.77° Incination; 270.03° Azimuth; 1,395.39' VS.
- VS:** 8,096' MD; 6,641.97' TVD; 89.78° Incination; 269.95° Azimuth; 1,487.05' VS.

A red vertical line is drawn across the map, passing between the S and VS locations. The grid consists of squares, and the axes are labeled with values like 6690 and 6690.



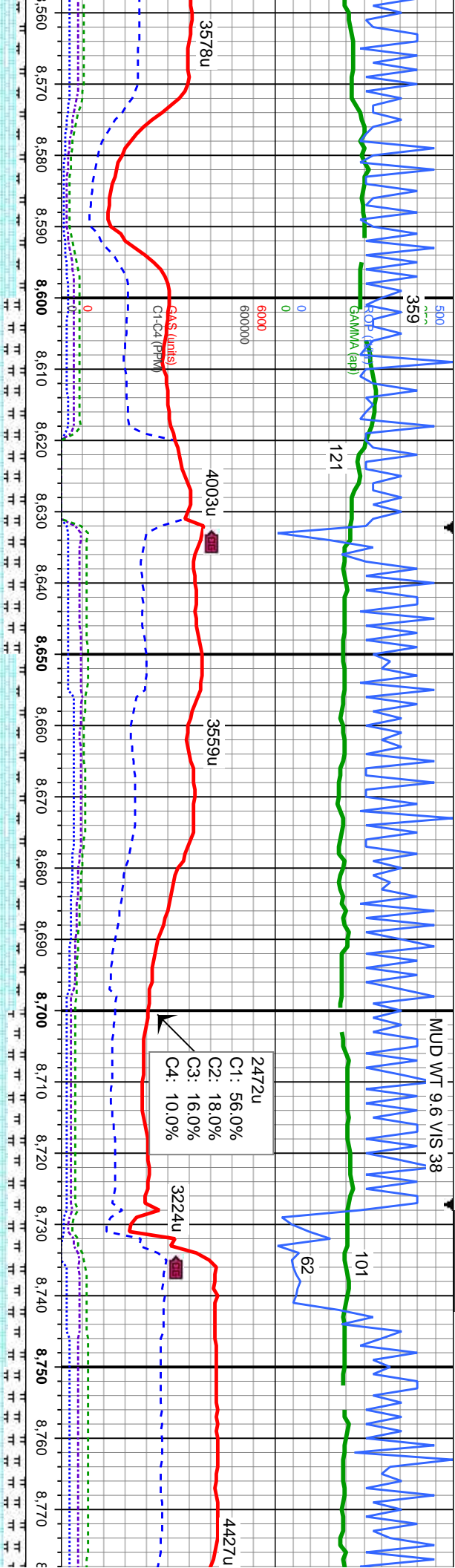


100% CHK: lt gy - gy, occ lt brn, sft, occ mod firm, sb blkly - sb pily, wxy - rthy tex, v calc	100% CHK: lt gy - gy, occ lt brn, sft, occ mod firm, sb blkly - sb pily, wxy - rthy tex, v calc	100% CHK: lt gy - gy, occ lt brn, sft, occ mod firm, sb blkly - sb pily, wxy - rthy tex, v calc	100% CHK: lt gy - gy, occ lt brn, sft, occ mod firm, sb blkly - sb pily, wxy - rthy tex, v calc
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MD: 8,191'
TVD: 6,643.2'
Inclination: 88.73°
Azimuth: 269.65°
VS: 1,578.61'

MD: 8,286'
TVD: 6,643.89'
Inclination: 90.43°
Azimuth: 269.92°
VS: 1,670.17'





HK: lt gy - gy, occ lt brn, mod sft - sft,
n, blkly - sbblky, wxy - rthy tex, v calc
MRL: m - dkgy, mod sft-sl firm,
sbblply, rthy-slty tex, sl mot, v calc

6530
75% CHK: lt gy - gy, occ lt brn, mod sft - sft,
occ firm, blkly - sbblky, wxy - rthy tex, v calc
25% MRL: m - dkgy, mod sft-sl firm,
sbblky-sbblply, rthy-slty tex, sl mot, v calc

90% CHK: lt gy - gy, occ lt brn, mod sft - sft,
occ firm, blkly - sbblky, wxy - rthy tex, v calc
10% MRL: m - dkgy, mod sft-sl firm,
sbblky-sbblply, rthy-slty tex, sl mot, v calc

80% CHK: lt gy - gy, occ lt brn, mod sft - sft,
occ firm, blkly - sbblky, wxy - rthy tex, v calc
20% MRL: m - dkgy, mod sft-sl firm,
sbblky-sbblply, rthy-slty tex, sl mot, v calc

75% CHK: lt gy - gy, occ
occ firm, blkly - sbblky, wxy - rthy tex, v calc
25% MRL: m - dkgy, mod sft-sl firm,
sbblky-sbblply, rthy-slty tex, sl mot, v calc

TVD (ft)

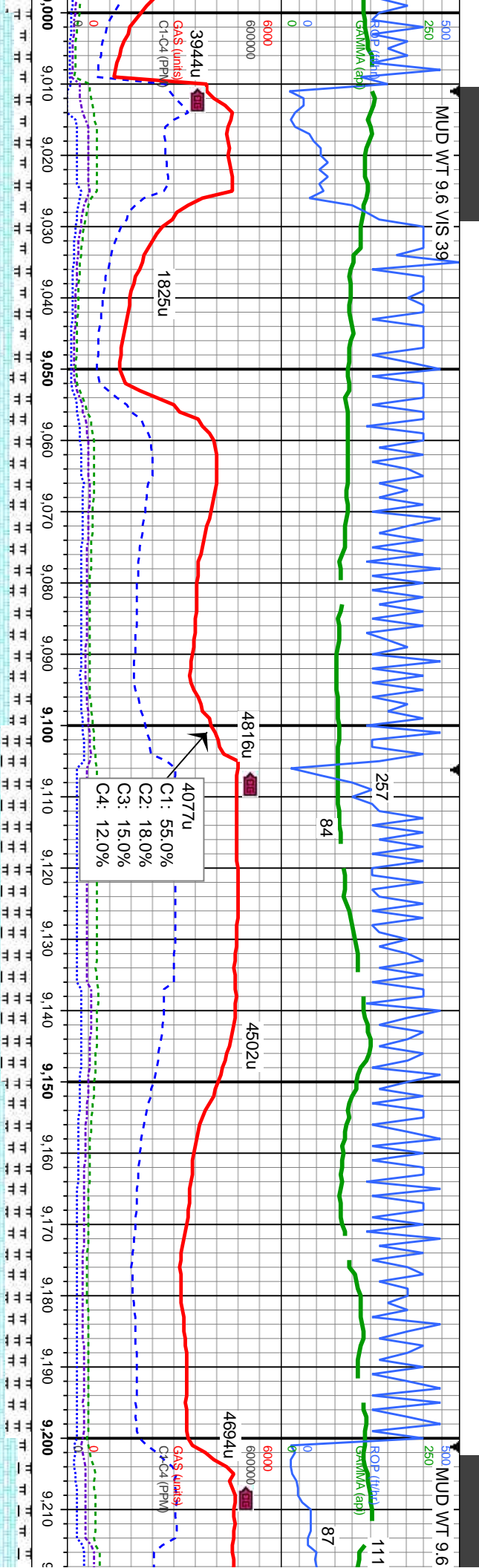
MD: 8,570'
TVD: 6,649.58'
Inclination: 88.61 °
Azimuth: 269.31 °
VS: 1,942.61'

6630

MD: 8,665'
TVD: 6,650.93'
Inclination: 89.75 °
Azimuth: 270.48 °
VS: 2,034.22'

MD: 8,759'
TVD: 6,651.01'
Inclination: 90.15 °
Azimuth: 271.32 °
VS: 2,125.29'

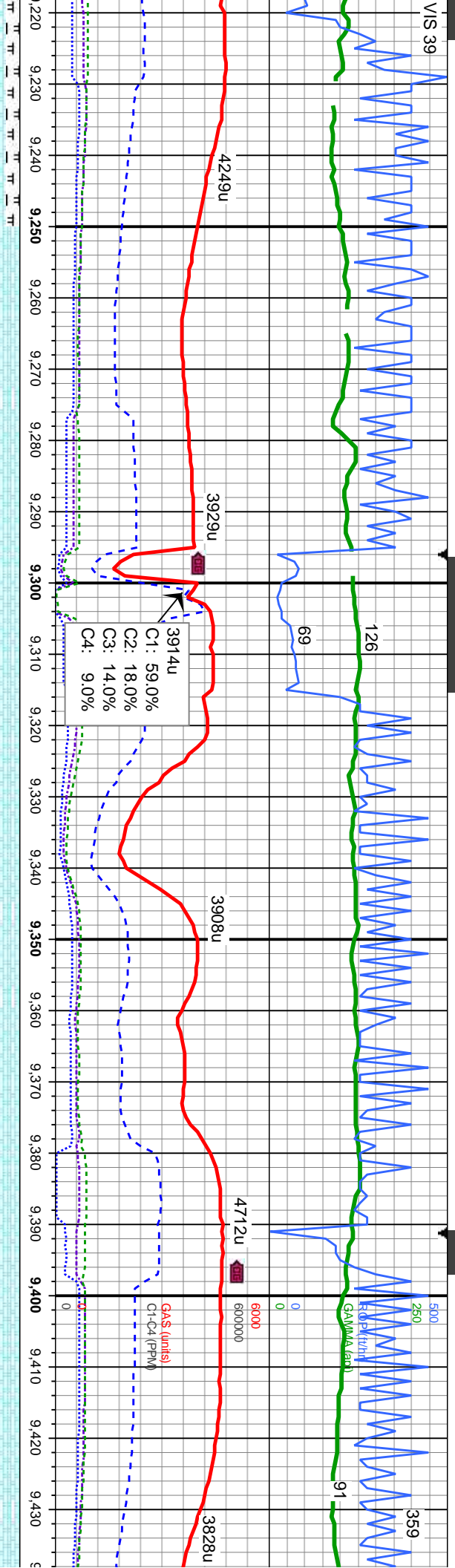




6530	-80% CHK: lt gy - gy, occ lt brn, mod sft - sft, occ firm, blkly - sbblky, wxy - rthy tex, v calc 20% MRL: m - dkgy, mod sft-sl firm, sbblky-sbblply, rthy-slty tex, sl mot, v calc ; some calc frac	75% CHK: lt gy - gy, occ lt brn, mod sft - sft, occ firm, blkly - sbblky, wxy - rthy tex, v calc 25% MRL: m - dkgy, mod sft-sl firm, sbblky-sbblply, rthy-slty tex, sl mot, v calc ; some calc frac	65% CHK: lt gy - gy, occ lt brn, mod sft - sft, occ firm, blkly - sbblky, wxy - rthy tex, v calc 35% MRL: m - dkgy, mod sft-sl firm, sbblky-sbblply, rthy-slty tex, sl mot, v calc ; some calc frac	70% CHK: lt gy - gy, occ lt brn, mod sft - sft, occ firm, blkly - sbblky, wxy - rthy tex, v calc 30% MRL: m - dkgy, mod sft-sl firm, sbblky-sbblply, rthy-slty tex, sl mot, v calc ; some calc frac	6530	85% CHK: lt gy occ firm, blkly - 15% MRL: m - sbblky-sbblply,
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6630	MD: 9,044' TVD: 6,649.45' Inclination: 90.62° Azimuth: 267.65° VS: 2,400.8'	MD: 9,139' TVD: 6,647.79' Inclination: 91.39° Azimuth: 267.99° VS: 2,491.43'	6630
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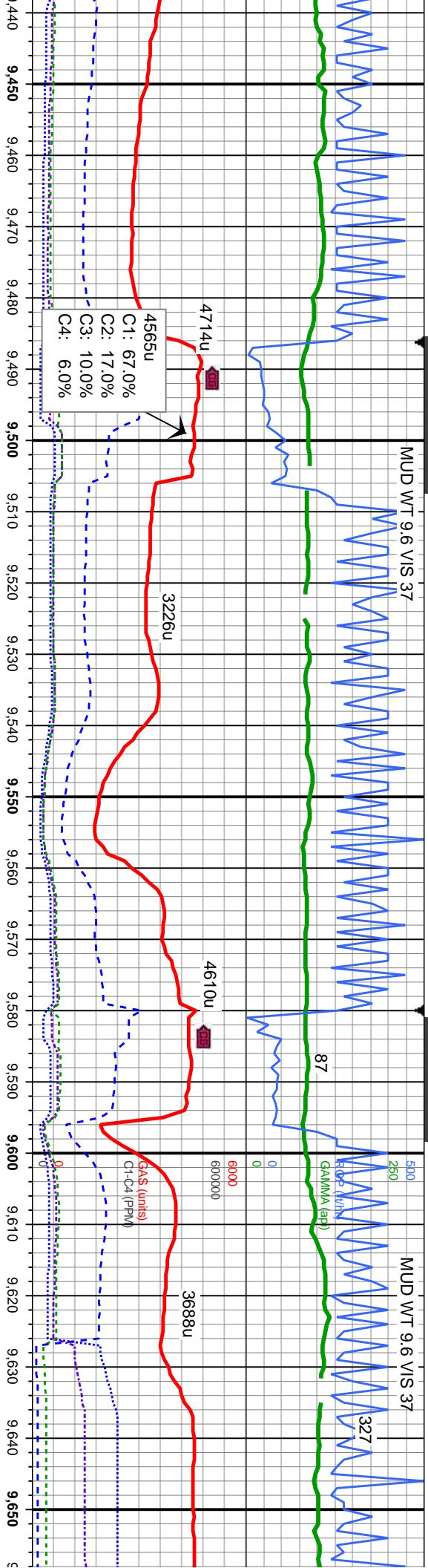
Depth (ft)	Description
9,220 - 9,250	- gy, occ lt brn, mod sft - sft, ssbblky, wxy - rthy tex, v calc
9,250 - 9,280	100% CHK: lt gy - gy, occ lt brn, mod sft - sft, occ firm, blkly - sbblky, wxy - rthy tex, v calc
9,280 - 9,300	- gy, occ lt brn, mod sft - sft, ssbblky, wxy - rthy tex, v calc
9,300 - 9,320	100% CHK: lt gy - gy, occ lt brn, mod sft - sft, occ firm, blkly - sbblky, wxy - rthy tex, v calc
9,320 - 9,350	- gy, occ lt brn, mod sft - sft, ssbblky, wxy - rthy tex, v calc
9,350 - 9,380	100% CHK: lt gy - gy, occ lt brn, mod sft - sft, occ firm, blkly - sbblky, wxy - rthy tex, v calc
9,380 - 9,400	- gy, occ lt brn, mod sft - sft, ssbblky, wxy - rthy tex, v calc
9,400 - 9,430	100% CHK: lt gy - gy, occ lt brn, mod sft - sft, occ firm, blkly - sbblky, wxy - rthy tex, v calc

MD: 9,234'
TVD: 6,646.21'
Inclination: 90.52°
Azimuth: 269.28°
VS: 2,582.45'

MD: 9,329'
TVD: 6,646.03'
Inclination: 89.69°
Azimuth: 267.7°
VS: 2,673.41'

MD: 9,424'
TVD: 6,645.7'
Inclination: 90.71°
Azimuth: 268.15°
VS: 2,764.11'

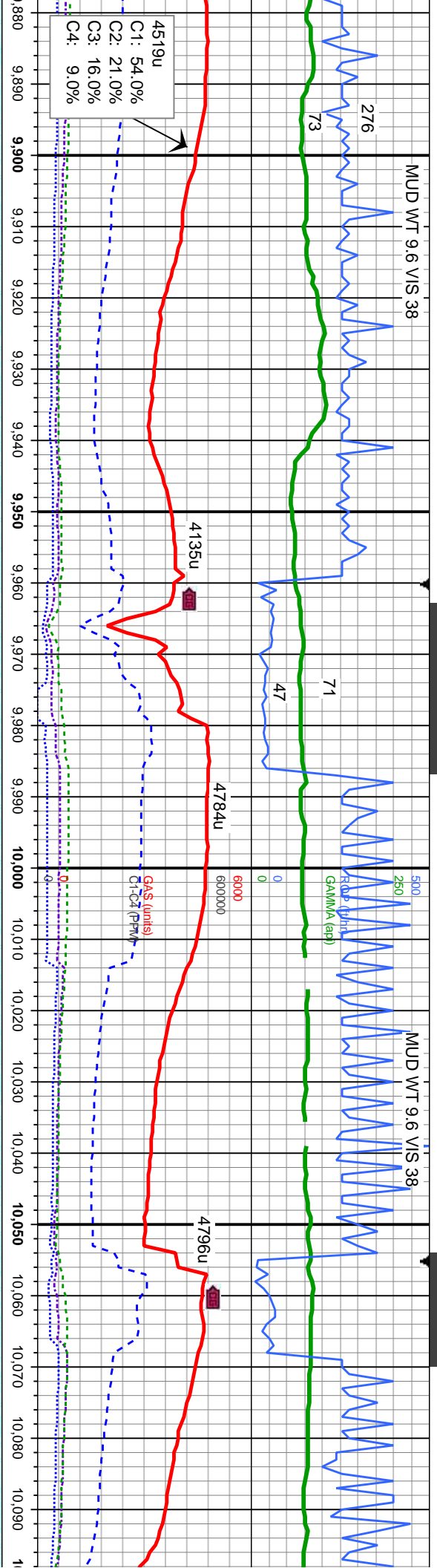




Condition	100% CHK: It gy - gy, occ It brn, mod sft - sft, occ firm, blkly - sbblkly, wxy - rthy tex, v calc	100% CHK: It gy - gy, occ It brn, mod sft - sft, occ firm, blkly - sbblkly, wxy - rthy tex, v calc	100% CHK: It gy - gy, occ It brn, mod sft - sft, occ firm, blkly - sbblkly, wxy - rthy tex, v calc	100% CHK: It gy - gy, occ It brn, mod sft - sft, occ firm, blkly - sbblkly, wxy - rthy tex, v calc
Condition	100% CHK: It gy - gy, occ It brn, mod sft - sft, occ firm, blkly - sbblkly, wxy - rthy tex, v calc	100% CHK: It gy - gy, occ It brn, mod sft - sft, occ firm, blkly - sbblkly, wxy - rthy tex, v calc	100% CHK: It gy - gy, occ It brn, mod sft - sft, occ firm, blkly - sbblkly, wxy - rthy tex, v calc	100% CHK: It gy - gy, occ It brn, mod sft - sft, occ firm, blkly - sbblkly, wxy - rthy tex, v calc

	TVD (ft)
MD: 9,518' TVD: 6,645.37' Inclination: 89.69 ° Azimuth: 269.05 ° VS: 2,854.17'	
MD: 9,613' TVD: 6,646.67' Inclination: 88.73 ° Azimuth: 268.01 ° VS: 2,945.14'	6690



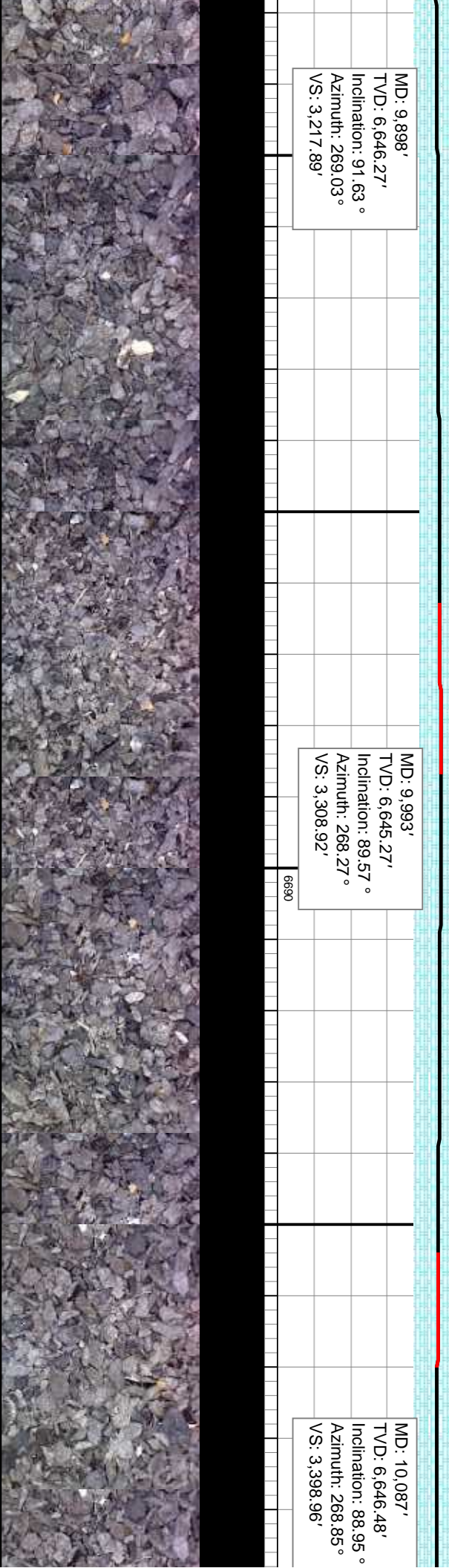


lt brn, mod sft - wxy - rthy tex, v	100% CHK: lt gy - gy, occ lt brn, mod sft - sft, occ firm, blkly - sbblkly, wxy - rthy tex, v calc	100% CHK: lt gy - gy, occ lt brn, mod sft - occ firm, blkly - sbblkly, wxy - rthy tex, v calc	100% CHK: lt gy - gy, occ lt brn, mod sft - occ firm, blkly - sbblkly, wxy - rthy tex, v calc	100% CHK: lt gy - gy, occ lt brn, mod sft - occ firm, blkly - sbblkly, wxy - rthy tex, v calc
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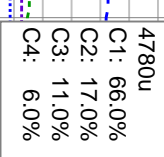
MD: 9,898'
TVD: 6,646.27'
Inclination: 91.63 °
Azimuth: 269.03 °
VS: 3,217.89'

MD: 9,993'
TVD: 6,645.27'
Inclination: 89.57 °
Azimuth: 268.27 °
VS: 3,308.92'

MD: 10,087'
TVD: 6,646.48'
Inclination: 88.95 °
Azimuth: 268.85 °
VS: 3,398.96'



MUD WT 9.6 VIS 39



2984u
C1: 56.0%
C2: 19.0%
C3: 16.0%
C4: 9.0%

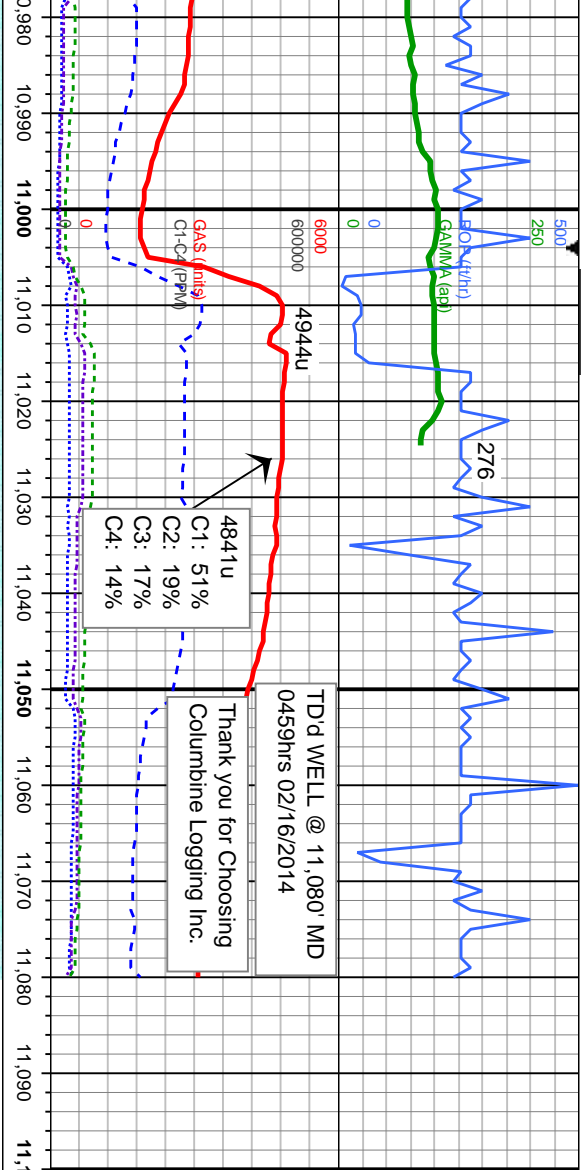
[illegible]

MD: 10,657'
TVD: 6,656.82'
Inclination: 89.88 °
Azimuth: 269.58 °
VS: 3,948.72'

MD: 10,753'
TVD: 6,657.5'
Inclination: 89
Azimuth: 267.
VS: 4 040 66'

1





lt brn, mod sft - wxy - rthy tex, v	6530	100% CHK: lt gy - gy, occ lt brn, mod sft - sft, occ firm, blkly - sblkly, wxy - rthy tex, v calc	100% CHK: lt gy - gy, occ lt brn, mod sft - sft, occ firm, blkly - sblkly, wxy - rthy tex, v calc
		MD: 11,018' TVD: 6,655.39' Inclination: 91.08 ° Azimuth: 268.06 ° VS: 4,293.02'	MD: 11,080' TVD: 6,654.3' Inclination: 91.08 ° Azimuth: 268.06 °
	6630		

