

# Décollement Consulting Inc.



Scale: 5" / 100'  
Measured Depth Log

**Well Name** State Pronghorn 41-32-31MRLNB\_Lateral

**Location** NE/NE Section 32, T5N - R61W

**State** CO

**County** Weld

**Country** USA

**Rig Number** Xtreme 22

**API Number** 05-123-42352

**Field** Wattenberg

**Geographic Region** D.J. Basin

**Drilling Completed** 11/19/2015

**Spud Date** 11/14/2015

**Surface Coordinates** 1251 FNL x 706 FEL (Lat: 40.36259, -104.22605)

**Bottom Hole Coordinates** 674 FNL x 2221 FEL (Lat: 40.36259, -104.25014)

**Ground Elevation** 4,565

**K.B. Elevation** 4,582

**Logged Interval** 6,650 **To** 13,250

**Total Depth** 13,250

**Formation** Niobrara "B" Chalk

**Type of Drilling Fluid** Water Based Mud

## Operator

**Address** Bonanza Creek Energy, Inc.

410 17th Street, Suite 1500  
Denver, Colorado 80202

## Geologist

**Name** Dan Kabala & Brian Spitzmiller

**Company** Decollement Consulting Inc.

**Address** 13300 Braun Rd.

Golden, CO. 80401

## Zone Color Coding

Oil  
Note  
Error


Condensate  
Core  
Water

Gas  
Pressure  
Seal

## Rock Types

Blank

 CEMENT



 MPF

 SHALE S

CHALK













 LIMESTONE  SANDSTONE

 SHALE SF


CPF  MARLSTONE  SHALE

## Accessories


### Fossils

-  ALGAE
-  AMPHIPORA
-  BELEMNITE
-  BIOCLASTIC
-  BRACHIOPOD
-  BRYOZOA
-  CEPHALOPOD
-  CORAL
-  CRINOID
-  ECHINOID
-  FISH
-  FORAMINIFERA

 FOSSIL


 GASTROPOD


 OOLITE


 OSTRACOD

 PELECYPOD


 PELLET

 PISOLITE

 PLANT REMAINS

 PLANT SPORES

 SCAPHOPOD


 STROMATOPOROID

### Minerals


 ANHYDRITE


 ARGILLACEOUS

 ARGILLITE GRAIN

 BENTONITE

 BITUMENOUS SUBSTANCE


 BRECCIA FRAGMENTS

 CALCAREOUS

 CARBONACEOUS FLAKES

 CHERT

 CHERT


 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 (CAL.) STRG




 MARLSTONE (DOL.) STRG

 SANDSTONE STRINGER

 SHALE STRINGER

 SILTSTONE STRINGER

# Other Symbols

 ORGANIC       FORMATION TOP       L LITHOGRAPHIC

## Oil Show

 PINPOINT       GAS SHOW      **Rounding**       MICROXLN

DEAD       VUGGY       MNDEPTH MN DEPTH       ANGULAR       MUDSTONE

EVEN       NORMAL FAULT       ROUNDED       PACKSTONE





QUESTIONABLE      **Engineering**       OIL SHOW       SUBANG       WACKESTONE

SPOTTED STAINING       BIT       OVERTURNED STRATA       SUBRAND

 CASING       REVERSE FAULT

**Porosity**       CONNECTION (LEFT)       SIDEWALL CORE (LEFT)      **Textures**       MODERATE

EARTHY       CONNECTION (RIGHT)       SIDEWALL CORE (RIGHT)       BOUNDSTONE       POOR

ENESTRAL       CONNECTION GAS       SLIDE       CHALKY       WELL

RACTURE       CORE - LOST       SURVEY       CRYPTOXLN

INTERCRYSTALLINE       CORE - RECOVERED       TRIP GAS       EARTHY

INTEROOLITIC       DST INTERVAL       WIRELINE TESTED - LEFT       FINELYXLN

MOLDIC       FAULT       WIRELINE TESTED - RT       GRAINSTONE

Depth



Total Gas & Chromatography

**GAS** — **C1** — **C2** - - - **C3** - - - **iC4** - - - **nC4** — **CO2** - - -

**Total Gas Calibration**  
1% Methane = 100u

**Gas Chromatograph Calibration**  
C1 = 1.0% Methane = 10,000ppm  
C2 = 1.0% Ethane = 10,000ppm  
C3 = 1.0% Propane = 10,000ppm  
iC4 = 1.0% Iso-Butane = 10,000ppm  
nC4 = 1.0% N-Butane = 10,000ppm

Black = Slide  
White = Rotate

Running Through Gas Buster

**C1: 57.2%**  
**C2: 16.7%**  
**C3: 18.6%**  
**iC4: 5.2%**  
**nC4: 0.0%**

**GAS (units)**  
C1 (PPM)  
C2 (PPM)  
C3 (PPM)  
iC4 (PPM)  
nC4 (PPM)  
CO2 (percent)

**GAS (units)**  
C1 (PPM)  
C2 (PPM)  
C3 (PPM)  
iC4 (PPM)  
nC4 (PPM)  
CO2 (percent)

5378u

74

MM: 9.0 VIS: 35

**WOB 26**  
**RPM 41**  
**SPM 2821**  
**SPM 89/0**

**Curves**  
**ROP** —  
**Gamma** —

Decollement Consulting on location and rigged up with Bloodhound #5726 on 11/16/2015.  
Start logging at 6,650' MD on 11/17/2015 at 13:00 hours.

Depth Labels



Interpretive Lithology



Landed in the "B" Chalk

Target: 6,026' TVD

MD: 6,663'  
Inclination: 88.88°  
Azimuth: 268.33°  
TVD: 6,030.67'  
VS: 190.39'

**Well Bore**  
**TVD** —

Bit #: 3  
Size: 6.125  
Mfr.: VAREL  
Type: VS513DG  
Depth In: 6,599'  
Depth Out: 13,250'  
Hours: 32.7 hrs  
Jets: 5X22  
S/N: 4007599

90% CHK: lt gy/whi, mottld wh, sft- mod frm, occ brlt, sb pily-sb blkly, rthy lstr, v calc, sl brn/bk sn 10% MARL: dk brn/gy, frm-sft, sb pily-sb blkly, rthy lstr, grtly, com mottld carb mat.

90% CHK: lt gy/whi, mottld wh, sft- mod frm, occ brlt, sb pily-sb blkly, rthy lstr, v calc, sl brn/bk sn 10% MARL: dk brn/gy, frm-sft, sb pily-sb blkly, rthy lstr, grtly, com mottld carb mat.

90% CHK: lt gy/whi, mottld wh, sft- mod frm, occ brlt, sb pily-sb blkly, rthy lstr, v calc, sl brn/bk sn 10% MARL: dk brn/gy, frm-sft, sb pily-sb blkly, rthy lstr, grtly, com mottld carb mat.

abn cal frags, rr BENT  
instnt bri blu whi milky cut, thck yllw whi resid ring.

abn cal frags.  
tr BENT SH w pyr nods.  
instnt bri blu whi milky cut, thck yllw whi resid ring.

abn cal frags.  
tr BENT SH w pyr nods.  
instnt bri blu whi milky cut, thck yllw whi r



6,960 6,970 6,980 6,990 7,000 7,010 7,020 7,030 7,040 7,050 7,060 7,070 7,080 7,090 7,100 7,110 7,120 7,130 7,140 7,150 7,160 7,170

1-2' Flare

10000  
1000000  
100

C1: 56.7%  
C2: 17.1%  
C3: 17.4%  
iC4: 5.7%  
nC4: 0.7%  
5446u

GAS (units)  
C1-HC4 (PPH)  
CO2 (percent)

5507u

MW: 9.1 VIS: 35

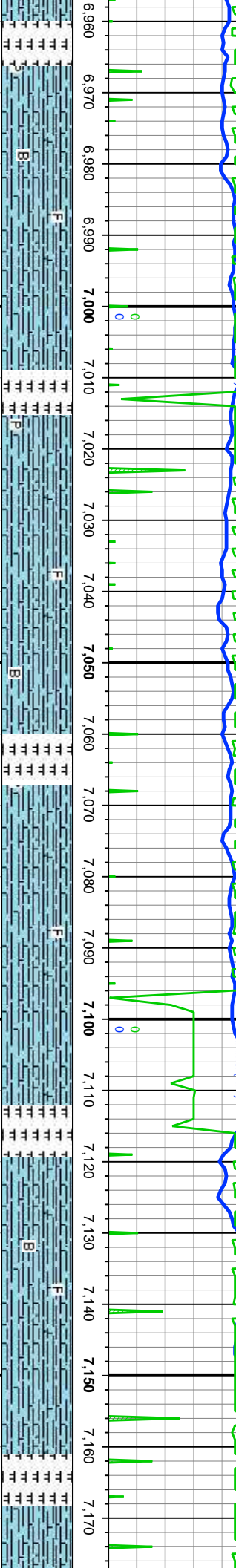
WOB 22  
RPM 80  
SPM 2784  
SPM 89/0

WOB 38  
RPM 9  
SPM 2476  
SPM 89/0

88

87

ROP (ft/hr)  
Gamma (API)



MD: 7.027'  
Inclination: 89.41°  
Azimuth: 269.59°  
TVD: 6,030.53'  
VS: 533.13'

MD: 7.114.84'  
Inclination: 91.08°  
Azimuth: 270.72°  
TVD: 6,030.15'  
VS: 620.71'

HK: lt gy/whi, mottld wh, sft- mod frm, occ  
ply-sb blkly, rthy lstr, v calc, sl brn/bk sin  
MARL: dk brn/gy, frm-sft, sb ply-sb blkly, rthy  
ly, com mottld carb mat.

90% CHK: lt gy/whi, mottld wh, sft- mod frm, occ  
brlt, sb ply-sb blkly, rthy lstr, v calc, sl brn/bk sin  
10% MARL: dk brn/gy, frm-sft, sb ply-sb blkly, rthy  
lstr, grty, com mottld carb mat.

90% CHK: lt gy/whi, mottld wh, sft- mod frm, occ  
brlt, sb ply-sb blkly, rthy lstr, v calc, sl brn/bk sin  
10% MARL: dk brn/gy, frm-sft, sb ply-sb blkly, rthy  
lstr, grty, com mottld carb mat.

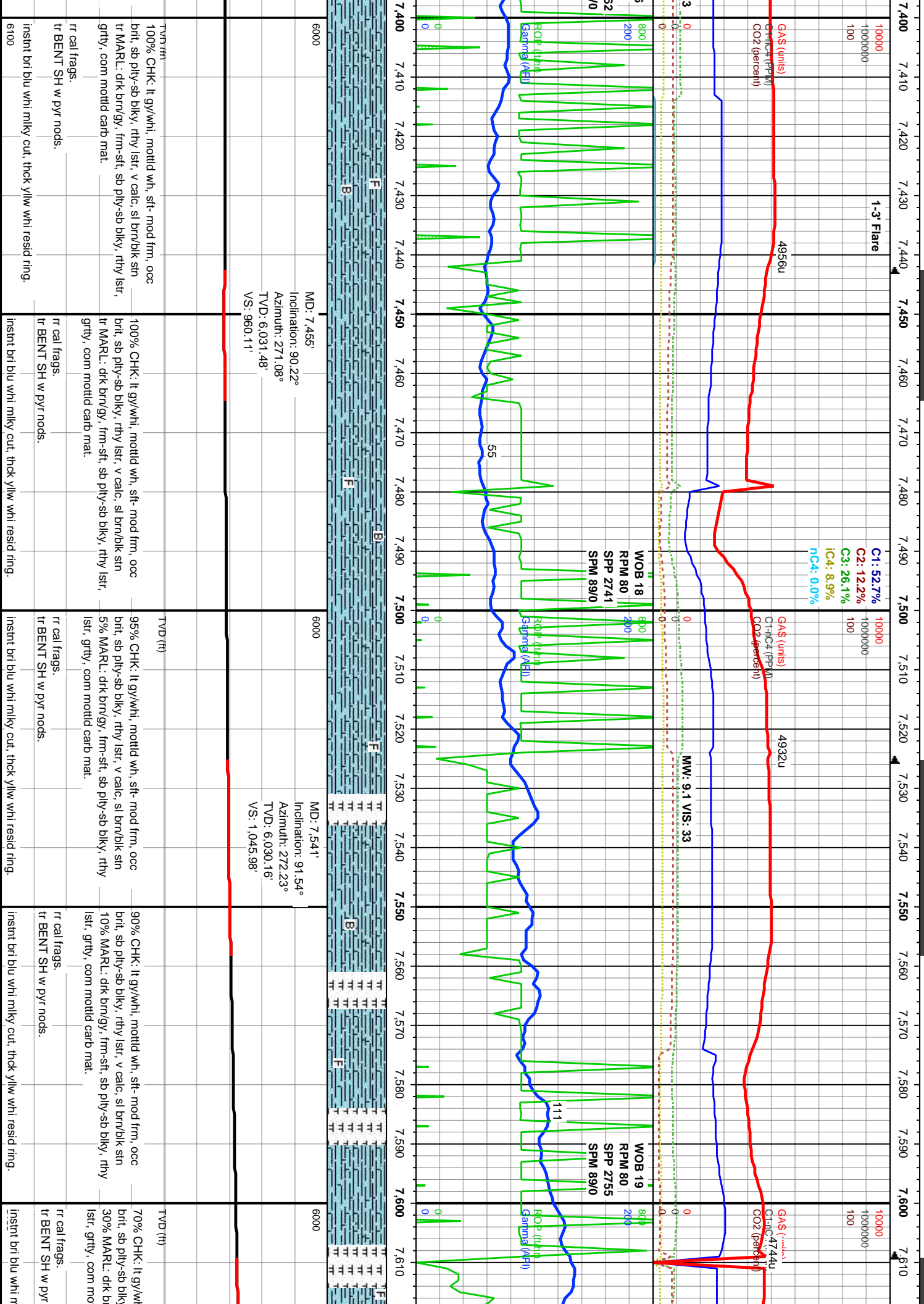
frags.  
T SH w pyr nods.  
instnt bri blu whi mlky cut, thck yllw whi resid ring.

abn cal frags.  
tr BENT SH w pyr nods.  
instnt bri blu whi mlky cut, thck yllw whi resid ring.

abn cal frags.  
tr BENT SH w pyr nods.  
instnt bri blu whi mlky cut, thc









7.620 7.630 7.640 7.650 7.660 7.670 7.680 7.690 7.700 7.710 7.720 7.730 7.740 7.750 7.760 7.770 7.780 7.790 7.800 7.810 7.820 7.830

C1: 60.5%  
C2: 15.8%  
C3: 17.4%  
iC4: 6.3%  
nC4: 0.0%

GAS (units)  
C1+IC4 (PPM)  
CO2 (percent)

MW: 9.1 VIS: 34

WOB 48  
RPM 0  
SPM 2366  
SPM 0/89

ROP (ft/hr)  
Gamma (AFI)

1-4 Flare

GAS (units)  
C1+IC4 (PPM)  
CO2 (percent)

MW: 9.1 VIS: 36

WOB 48  
RPM 0  
SPM 2428  
SPM 0/89

ROP (ft/hr)  
Gamma (AFI)

MD: 7.626'  
Inclination: 92.68°  
Azimuth: 271.77°  
TVD: 6.027.03'  
VS: 1.130.84'

6000

MD: 7.797'  
Inclination: 91.02°  
Azimuth: 268.65°  
TVD: 6.021.51'  
VS: 1.301.24'

6000

il. mottld wh, sft- mod frm, occ  
/ rthy lstr. v calc. sl brn/bk sin  
mngy. frm-sft, sb ply-sb blk, rthy  
mottld carb mat.

60% CHK: lt gy/whi, mottld wh, sft- mod frm, occ  
brlt, sb ply-sb blk, rthy lstr. v calc. sl brn/bk sin  
40% MARL: dk brn/gy, frm-sft, sb ply-sb blk, rthy  
lstr, grty, com mottld carb mat.

50% CHK: lt gy/whi, mottld wh, sft- mod frm, occ  
brlt, sb ply-sb blk, rthy lstr. v calc. sl brn/bk sin  
50% MARL: dk brn/gy, frm-sft, sb ply-sb blk, rthy  
lstr, grty, com mottld carb mat.

60% MARL: dk brn/gy, frm-sft, sb ply-sb blk, rthy  
lstr, grty, com mottld carb mat.  
40% CHK: lt gy/whi, mottld wh, sft- mod frm, occ  
brlt, sb ply-sb blk, rthy lstr. v calc. sl brn/bk sin

70% MARL: dk brn/gy, frm-sft, sb ply-sb blk, rthy  
lstr, grty, com mottld carb mat.  
30% CHK: lt gy/whi, mottld wh, sft- mod frm, occ  
brlt, sb ply-sb blk, rthy lstr. v calc. sl brn/bk sin

rr cal frags.  
tr BENT SH w pyr nods.

rr cal frags.  
rr BENT SH w pyr nods.

rr cal frags.  
rr BENT SH w pyr nods.

instnt brl blu whi milky cut, thck yllw whi resid ring.

V fst brl blu whi milky cut, thck yllw whi resid ring.

V fst brl blu whi milky cut, thck blu whi resid ring.

il. mottld wh, sft- mod frm, occ  
/ rthy lstr. v calc. sl brn/bk sin  
mngy. frm-sft, sb ply-sb blk, rthy  
mottld carb mat.

instnt brl blu whi milky cut, thck yllw whi resid ring.

V fst brl blu whi milky cut, thck yllw whi resid ring.

V fst brl blu whi milky cut, thck blu whi resid ring.

7.840 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

C1: 63.9%  
C2: 15.9%  
C3: 15.8%  
iC4: 6.3%  
nC4: 0.0%

GAS (units)  
CO2 (percent)

4638u

4584u

5257u

MW: 9.1 VIS: 36

WOB 21  
RPM 80  
SPM 2990  
SPM 0/89

WOB 19  
RPM 80  
SPM 2991  
SPM 89/0

ROP (ft/hr)  
Gamma (API)

125

98

MD: 7.888'  
Inclination: 88.12°  
Azimuth: 267.94°  
TVD: 6.022.2'  
VS: 1.391.68'

MD: 7.979'  
Inclination: 88.89°  
Azimuth: 268.8°  
TVD: 6.024.57'  
VS: 1.482.12'

6000

6000

TVD (ft)

TVD (ft)

80% MARL: dk brn/gy, frm-sft, sb pily-sb blk, rthy  
lstr, grty, com mottld carb mat.  
20% CHK: lt gy/whi, mottld wh, sft- mod frm, occ  
brt, sb pily-sb blk, rthy lstr, v calc, sl brn/blk sn

50% MARL: dk brn/gy, frm-sft, sb pily-sb blk, rthy  
lstr, grty, com mottld carb mat.  
50% CHK: lt gy/whi, mottld wh, sft- mod frm, occ  
brt, sb pily-sb blk, rthy lstr, v calc, sl brn/blk sn

60% C

rr cal frags.  
rr BENT SH w pyr nods.

rr cal frags.  
rr BENT SH w pyr nods.

rr cal frags.  
rr BENT SH w pyr nods.

rr cal frags.  
rr BENT SH w pyr nods.

V fst brt blu whi milky cut, thick yllw whi resid ring.

V fst brt blu whi milky cut, thick yllw whi resid ring.

instnt l

id ring.

8.060 8.070 8.080 8.090 8.100 8.110 8.120 8.130 8.140 8.150 8.160 8.170 8.180 8.190 8.200 8.210 8.220 8.230 8.240 8.250 8.260 8.270

C1: 57.3%  
C2: 12.6%  
C3: 20.4%  
iC4: 6.7%  
nC4: 0.6%

10000  
1000000  
100

GA\$ (units)  
C1+C4 (PPM)  
CO2 (percent)

4933u

MW: 9.1 VIS: 36

10000  
1000000  
100

GA\$ (units)  
C1+C4 (PPM)  
CO2 (percent)

5023u

WOB 21  
RPM 80  
SPM 3156  
SPM 890

130

WOB 24  
RPM 80  
SPM 3265  
SPM 890

89

89

MD: 8.070'  
Inclination: 88.34°  
Azimuth: 269.27°  
TVD: 6.026.77'  
VS: 1.572.68'

6000

MD: 8.160'  
Inclination: 89.14°  
Azimuth: 269.94°  
TVD: 6.028.75'  
VS: 1.662.32'

6000

MD: 8.251'  
Inclination: 91.91°  
Azimuth: 271.17°  
TVD: 6.027.91'  
VS: 1.753.09'

6000

CHK: lt gy/whi, mottld wh, sft- mod frm, occ  
brt, sb ply-sb biky, rthy lstr, v calc, sl brn/blk sin  
MARL: dk brn/gy, frm-sft, sb ply-sb biky, rthy  
lstr, grry, com mottld carb mat.

TVD (ft)

80% CHK: lt gy/whi, mottld wh, sft- mod frm, occ  
brt, sb ply-sb biky, rthy lstr, v calc, sl brn/blk sin  
20% MARL: dk brn/gy, frm-sft, sb ply-sb biky, rthy  
lstr, grry, com mottld carb mat.

TVD (ft)

95% CHK: lt gy/whi, mottld wh, sft- mod frm, occ  
brt, sb ply-sb biky, rthy lstr, v calc, sl brn/blk sin  
5% MARL: dk brn/gy, frm-sft, sb ply-sb biky, rthy  
lstr, grry, com mottld carb mat.

TVD (ft)

frags.  
T SH w pyr nods.

fr cal frags.  
tr BENT SH w pyr nods.

fr cal frags.  
tr BENT SH w pyr nods.

instn bri blu whi milky cut, thick blu whi resid ring.

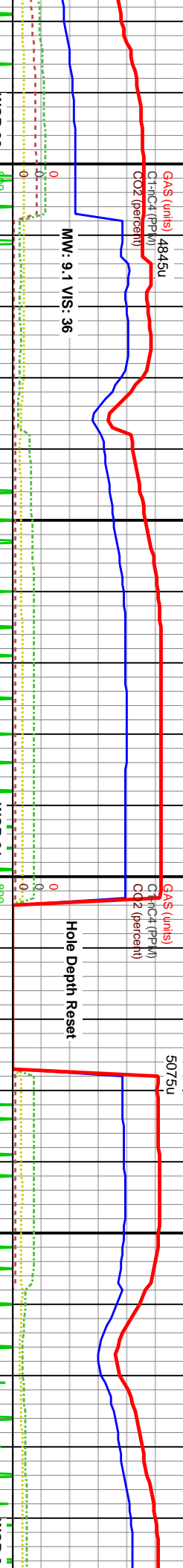
V fst bri blu whi milky cut, thick bluwht resid ring.

instn bri blu whi milky cut, thc

8,280 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 8,420 8,430 8,440 8,450 8,460 8,470 8,480 8,490

C1: 48.1%  
C2: 18.0%  
C3: 24.8%  
iC4: 9.2%  
nC4: 0.0%

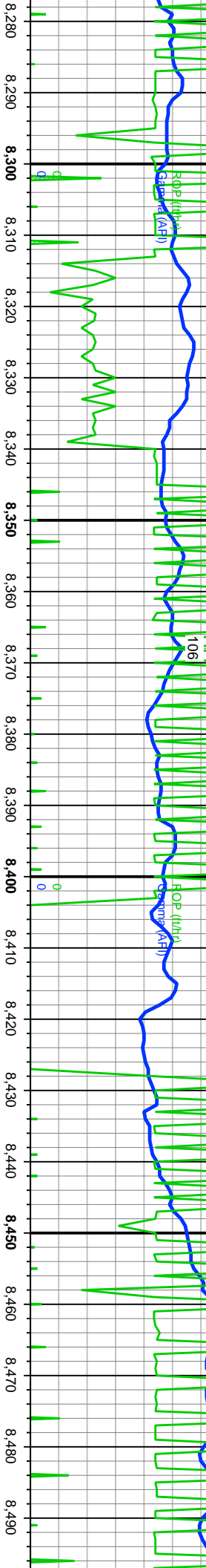
C1: 82.7%  
C2: 0.0%  
C3: 9.9%  
iC4: 7.3%  
nC4: 0.0



WOB 22  
RPM 80  
SPP 3206  
SPM 890

WOB 21  
RPM 80  
SPP 3336  
SPM 890

WOB 2  
RPM 80  
SPP 34  
SPM 89

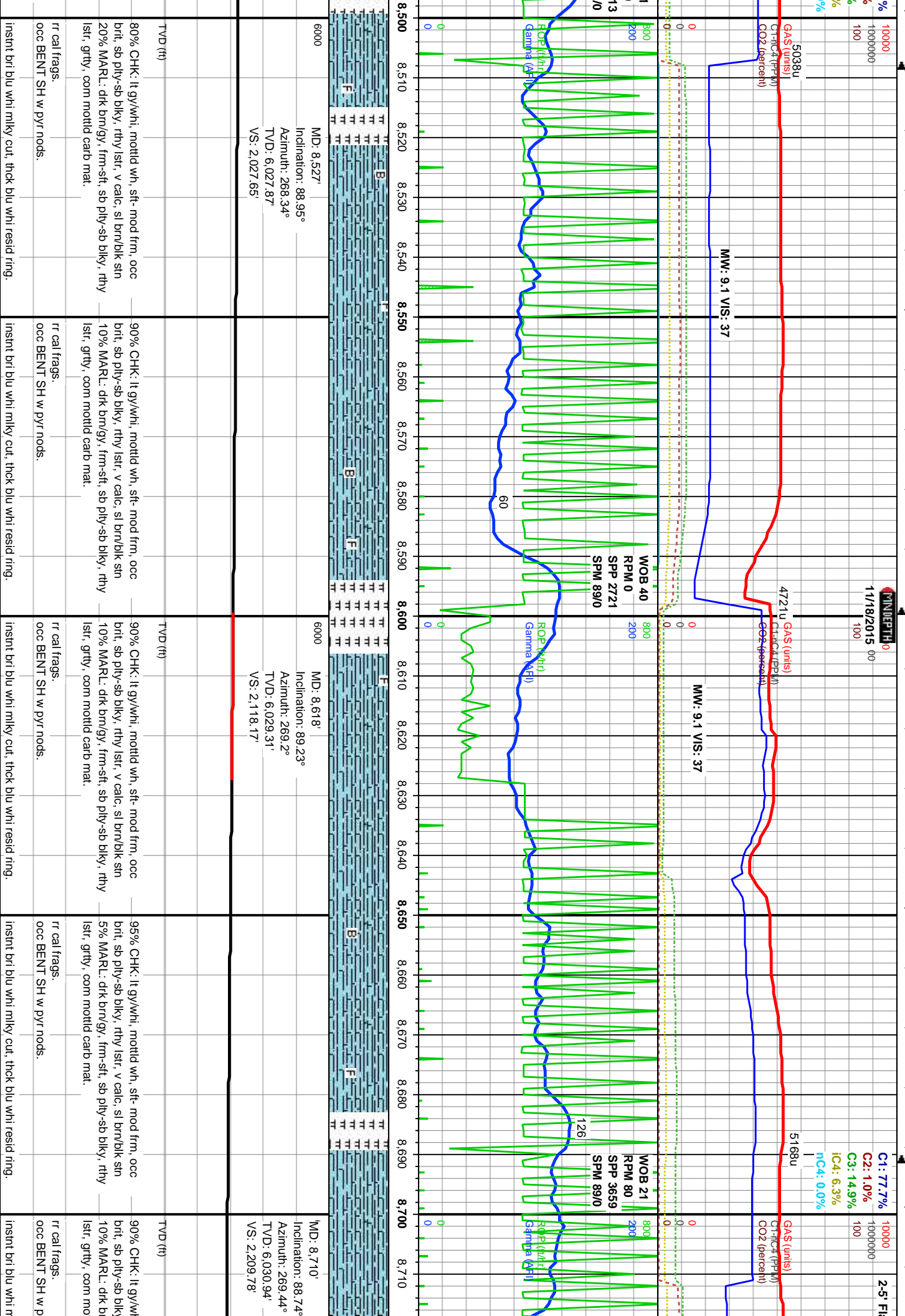


MD: 8,343'  
Inclination: 89.69°  
Azimuth: 268.15°  
TVD: 6,026.63'  
VS: 1,844.73'

MD: 8,435'  
Inclination: 89.91°  
Azimuth: 268.45°  
TVD: 6,026.95'  
VS: 1,936.18'

90% CHK: lt gy/whi, mottld wh, sft- mod frm, occ bri, sb ply-sb biky, rthy lstr, v calc, sl brn/bk sin 10% MARL: dk brn/gy, frm-sft, sb ply-sb biky, rthy lstr, grty, com mottld carb mat. it.	90% CHK: lt gy/whi, mottld wh, sft- mod frm, occ bri, sb ply-sb biky, rthy lstr, v calc, sl brn/bk sin 10% MARL: dk brn/gy, frm-sft, sb ply-sb biky, rthy lstr, grty, com mottld carb mat. rr cal frags. occ BENT SH w pyr nodes.	70% CHK: lt gy/whi, mottld wh, sft- mod frm, occ bri, sb ply-sb biky, rthy lstr, v calc, sl brn/bk sin 30% MARL: dk brn/gy, frm-sft, sb ply-sb biky, rthy lstr, grty, com mottld carb mat. rr cal frags. occ BENT SH w pyr nodes.
instnt bri blu whi blooming cut, thick blu whi resid ring.	instnt bri blu whi milky cut, thick blu whi resid ring.	instnt bri blu whi blooming cut, thick blu whi resid ring.







8.720 8.730 8.740 8.750 8.760 8.770 8.780 8.790 8.800 8.810 8.820 8.830 8.840 8.850 8.860 8.870 8.880 8.890 8.900 8.910 8.920 8.930

are

10000  
1000000  
100

C1: 68.5%  
C2: 12.6%  
C3: 14.2%  
iC4: 4.5%  
nC4: 0.0%

GAS (units)  
C-HC4 (ppm)  
CO2 (percent)

5011u

5486u

WOB 54  
RPM 0  
SPM 3114  
SPM 690

WOB 24  
RPM 80  
SPM 3833  
SPM 890

ROP (t/hr)  
Gamma (AFI)

ROP (t/hr)  
Gamma (AFI)

114

128

MD: 8.801'  
Inclination: 89.63°  
Azimuth: 269.47°  
TVD: 6.032.24'  
VS: 2.300.41'

MD: 8.893'  
Inclination: 89.41°  
Azimuth: 270.18°  
TVD: 6.033.01'  
VS: 2.392.09'

6700

6000



il. mottld wh. sft- mod frm. occ  
brt. rthy lstr. v calc. sl brn/bk sn  
m/gy. frm-sft. sb ply-sb blk. rthy  
mottld carb mat.

90% CHK: lt gy/whi. mottld wh. sft- mod frm. occ  
brt. sb ply-sb blk. rthy lstr. v calc. sl brn/bk sn  
10% MARL: dk brn/gy. frm-sft. sb ply-sb blk. rthy  
lstr. grty. com mottld carb mat.

pyr nods.

rr cal frags.  
occ BENT SH w pyr nods.

ilky cut. thck blu whi resid ring.

instnt bri blu whi milky cut. thck blu whi resid ring.

TVD (ft)

TVD (ft)

60% CHK: lt gy/whi. mottld wh. sft- mod frm. occ  
brt. sb ply-sb blk. rthy lstr. v calc. sl brn/bk sn  
40% MARL: dk brn/gy. frm-sft. sb ply-sb blk. rthy  
lstr. grty. com mottld carb mat.

rr cal frags.  
occ BENT SH w pyr nods.

instnt bri blu whi milky cut. thck blu whi resid ring.

50% CHK: lt gy/whi. mottld wh. sft- mod frm. occ  
brt. sb ply-sb blk. rthy lstr. v calc. sl brn/bk sn  
50% MARL: dk brn/gy. frm-sft. sb ply-sb blk. rthy  
lstr. grty. com mottld carb mat.

rr cal frags.  
occ BENT SH w pyr nods.

instnt bri blu whi milky cut. thck blu whi resid ring.

8,940 8,950 8,960 8,970 8,980 8,990 9,000 9,010 9,020 9,030 9,040 9,050 9,060 9,070 9,080 9,090 9,100 9,110 9,120 9,130 9,140 9,150

10000  
1000000  
100

2-6' Flare

GAS (units)  
C1+C4 (PPM)  
CO2 (percent)

Camp Generator Down

MW: 9.1 VIS: 38

WOB 52  
RPM 0  
SPM 3111  
SPM 89/0

ROP (ft/hr)  
Gamma (AFI)

134

85

WOB 22  
RPM 80  
SPM 3917  
SPM 89/0

ROP (ft/hr)  
Gamma (AFI)

C1: 59.1%  
C2: 17.6%  
C3: 17.4%  
iC4: 5.8%  
nC4: 0.0%

GAS (units)  
C1+C4 (PPM)  
CO2 (percent)

5376u

MD: 8,986'  
Inclination: 90.55°  
Azimuth: 270.17°  
TVD: 6,033.04'  
VS: 2,484.82'

6000

TVD (ft)

60% MARL: dk brn/gy, frm-sft, sb pty-sb biky, rthy  
lstr, grty, com mottld carb mat.  
40% CHK: lt gy/whi, mottld wh, sft- mod frm, occ  
brit, sb pty-sb biky, rthy lstr, v calc, sl brn/bk sn

tr cal frags.  
tr BENT SH w pyr nods.

insnt bri blu whi milky cut, thick blu whi resid ring.

MD: 9,078'  
Inclination: 91.35°  
Azimuth: 269.88°  
TVD: 6,031.51'  
VS: 2,576.52'

6000

Nio B Intermediate Marl Stringer

TVD (ft)

90% CHK: lt gy/whi, mottld wh, sft- mod frm, occ  
brit, sb pty-sb biky, rthy lstr, v calc, sl brn/bk sn  
10% MARL: dk brn/gy, frm-sft, sb pty-sb biky, rthy  
lstr, grty, com mottld carb mat.

tr cal frags.  
occ BENT SH w pyr nods.

insnt bri blu whi milky cut, thick blu whi resid ring.

80% MARL: dk brn/gy, frm-sft, sb pty-sb biky, rthy  
lstr, grty, com mottld carb mat.  
20% CHK: lt gy/whi, mottld wh, sft- mod frm, occ  
brit, sb pty-sb biky, rthy lstr, v calc, sl brn/bk sn

tr cal frags.  
tr BENT SH w pyr nods.

insnt t

firm, occ  
biky, rthy  
biky, rthy

insnt bri blu whi milky cut, thick blu whi resid ring.

9,160 9,170 9,180 9,190 9,200 9,210 9,220 9,230 9,240 9,250 9,260 9,270 9,280 9,290 9,300 9,310 9,320 9,330 9,340 9,350 9,360 9,370

10000  
1000000  
100  
2-6 Flare

C1: 61.8%  
C2: 16.8%  
C3: 16.1%  
iC4: 4.9%  
nC4: 0.2%

GAS (units)  
C-H/C4 (PP4M)  
CO2 (percent)

GAS (units)  
C-H/C4 (PP4M)  
CO2 (percent)

MM: 9.2 VIS: 37

WOB 22  
RPM 80  
SPM 3784  
SPM 890

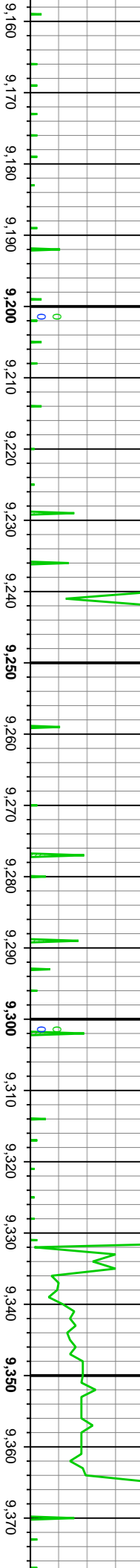
WOB 22  
RPM 80  
SPM 3888  
SPM 890

129

126

ROP (ft/hr)  
Gd/mg (AEI)

ROP (ft/hr)  
Gd/mg (AEI)



MD: 9,170'  
Inclination: 91.6°  
Azimuth: 270.49°  
TVD: 6,029.15'  
VS: 2,668.23'

MD: 9,262'  
Inclination: 89.85°  
Azimuth: 269.45°  
TVD: 6,027.98'  
VS: 2,759.92'

MD: 9,355'  
Inclination: 90.28°  
Azimuth: 271.17°  
TVD: 6,027.88'  
VS: 2,852.67'

80% MARL: dk brn/gy, frm-sft, sb ply-sb biky, rthy  
lstr, grfy, com mottld carb mat.  
20% CHK: lt gy/wht, mottld wh, sft- mod frm, occ  
brit, sb ply-sb biky, rthy lstr, v calc, sl brn/bk sn

90% MARL: dk brn/gy, frm-sft, sb ply-sb biky, rthy  
lstr, grfy, com mottld carb mat.  
10% CHK: lt gy/wht, mottld wh, sft- mod frm, occ  
brit, sb ply-sb biky, rthy lstr, v calc, sl brn/bk sn

80% MARL: dk brn/gy, frm-sft, sb ply-sb biky, rthy  
lstr, grfy, com mottld carb mat.  
20% CHK: lt gy/wht, mottld wh, sft- mod frm, occ  
brit, sb ply-sb biky, rthy lstr, v calc, sl brn/bk sn

70% MARL: dk brn/gy, frm-sft, sb ply-sb biky, rthy  
lstr, grfy, com mottld carb mat.  
30% CHK: lt gy/wht, mottld wh, sft- mod frm, occ  
brit, sb ply-sb biky, rthy lstr, v calc, sl brn/bk sn

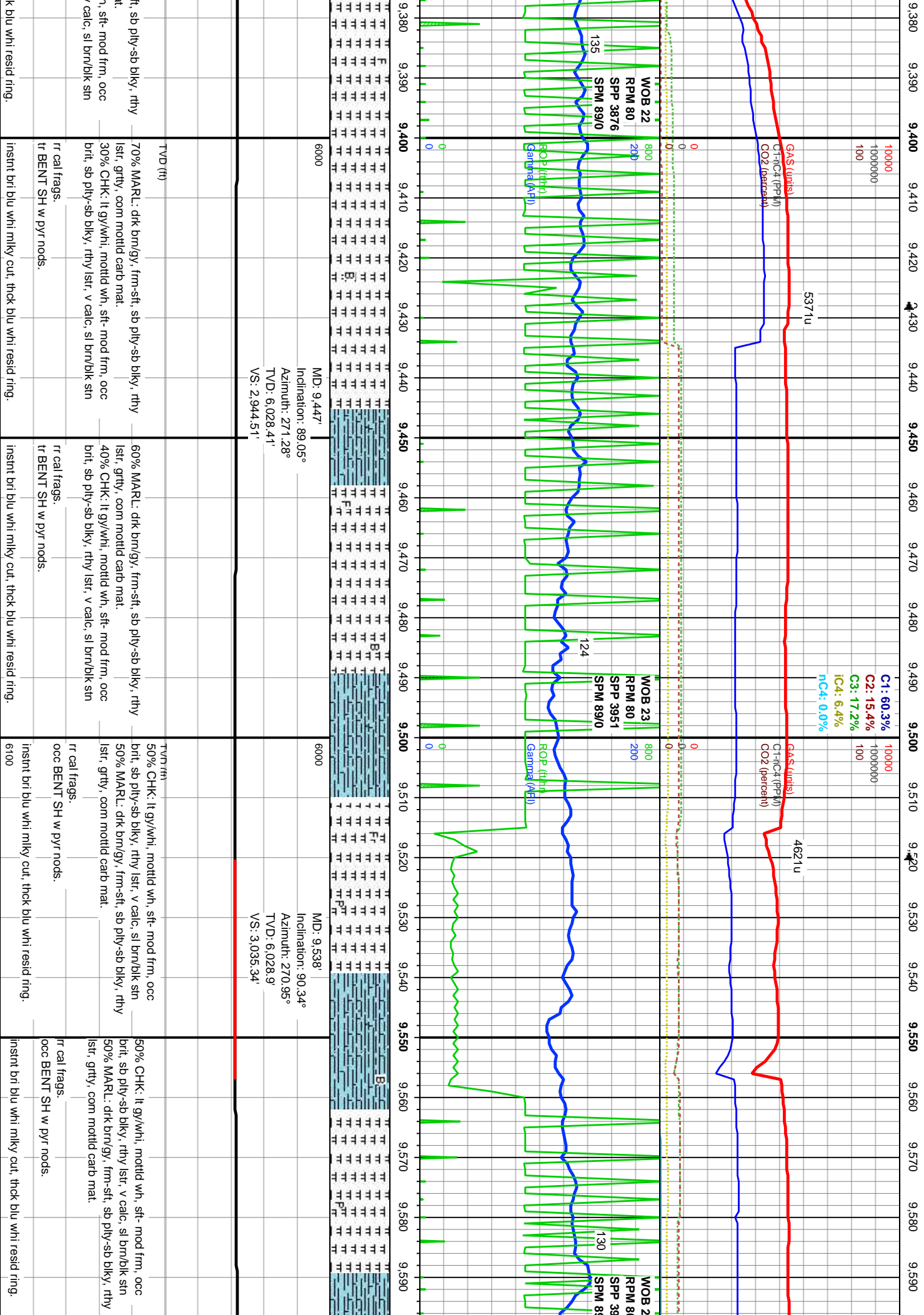
ARL: dk brn/gy, frm-sft, sb ply-sb biky, rthy  
y, com mottld carb mat.  
HK: lt gy/wht, mottld wh, sft- mod frm, occ  
ply-sb biky, rthy lstr, v calc, sl brn/bk sn  
ags.  
T SH w pyr nods.  
insnt bri blu whi milky cut, thck blu whi resid ring.

tr cal frags.  
tr BENT SH w pyr nods.  
insnt bri blu whi milky cut, thck blu whi resid ring.

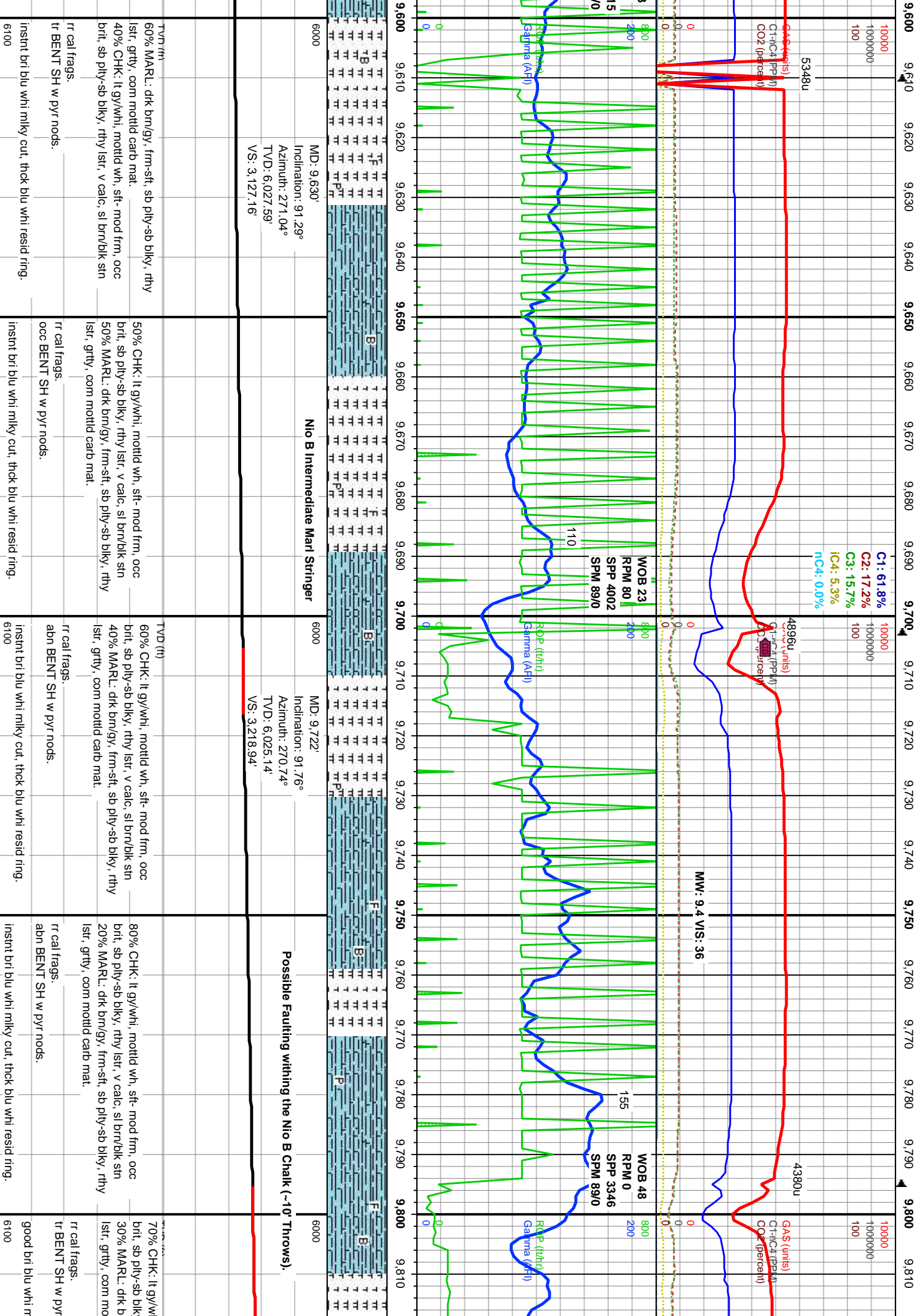
tr cal frags.  
tr BENT SH w pyr nods.  
insnt bri blu whi milky cut, thck blu whi resid ring.

tr cal frags.  
tr BENT SH w pyr nods.  
insnt bri blu whi milky cut, thck blu whi resid ring.

tr cal frags.  
tr BENT SH w pyr nods.  
insnt bri blu whi milky cut, thck blu whi resid ring.







Possible Faulting with the Nio B Chalk (~10' Throws).



9,820 9,830 9,840 9,850 9,860 9,870 9,880 9,890 9,900 9,910 9,920 9,930 9,940 9,950 9,960 9,970 9,980 9,990 10,000 10,010 10,020 10,030

C1: 60.6%  
C2: 15.7%  
C3: 17.2%  
iC4: 6.6%  
nC4: 0.0%

GAS (units)  
C1-iC4 (PPM)  
CO2 (percent)

4664u

MW: 9.45 VIS: 36

MW: 9.4 VIS: 34

WOB 20  
RPM 80  
SPM 4095  
SPM 89/0

WOB 18  
RPM 80  
SPM 3898  
SPM 89/0

ROP (ft/hr)  
Gamma (AFI)

ROP (ft/hr)  
Gamma (AFI)

MD: 9,830'  
Inclination: 92.16°  
Azimuth: 269.78°  
TVD: 6,021.45'  
VS: 3,326.57'

MD: 9,943'  
Inclination: 90.25°  
Azimuth: 270.02°  
TVD: 6,019.07'  
VS: 3,439.17'

MD: 10,000'  
Inclination: 90.0°  
Azimuth: 270.0°  
TVD: 6,000'  
VS: 3,553'

th, mottld wh, sft- mod frm, occ  
y, rthy lstr, v calc, sl brn/blk stn  
frm/gy, frm-sft, sb ply-sb blk, rthy  
mottld carb mat.

50% CHK: lt gy/whi, mottld wh, occ  
brt, sb ply-sb blk, rthy lstr, v calc, sl brn/blk stn  
50% MARL: dk brn/gy, frm-sft, sb ply-sb blk, rthy  
lstr, grty, com mottld carb mat.

nods:  
rr cal frags.  
occ BENT SH w pyr nod.

instint bri blu whi resid ring.

TVD (ft)  
90% MARL: dk brn/gy, frm-sft, sb ply-sb blk, rthy  
lstr, grty, com mottld carb mat.  
10% CHK: lt gy/whi, mottld wh, sft- mod frm, occ  
brt, sb ply-sb blk, rthy lstr, v calc, sl brn/blk stn

rr cal frags.  
abn BENT SH w pyr nod.

instint bri blu whi milky cut, thck blu whi resid ring.

90% MARL: dk brn/gy, frm-sft, sb ply-sb blk, rthy  
lstr, grty, com mottld carb mat.  
10% CHK: lt gy/whi, mottld wh, sft- mod frm, occ  
brt, sb ply-sb blk, rthy lstr, v calc, sl brn/blk stn

rr cal frags.  
abn BENT SH w pyr nod.

instint bri blu whi milky cut, thck blu whi resid ring.

TVD (ft)  
90% MARL: dk brn/gy, frm-sft, sb ply-sb blk, rthy  
lstr, grty, com mottld carb mat.  
10% CHK: lt gy/whi, mottld wh, sft- mod frm, occ  
brt, sb ply-sb blk, rthy lstr, v calc, sl brn/blk stn

rr cal frags.  
abn BENT SH w pyr nod.

instint bri blu whi milky cut, thck blu whi resid ring.

10,040 10,050 10,060 10,070 10,080 10,090 10,100 10,110 10,120 10,130 10,140 10,150 10,160 10,170 10,180 10,190 10,200 10,210 10,220 10,230 10,240 10,250

C1: 74.0%  
C2: 13.7%  
C3: 9.5%  
iC4: 2.9%  
nC4: 0.0%

GAS (units)  
C1+C4 (PPM)  
CO2 (percent)

4701u

4214u

5286u

WOB 21  
RPM 80  
SPM 4089  
SPM 89/0

WOB 18  
RPM 80  
SPM 4109  
SPM 89/0

ROP (t/hr)  
Gamma (AFI)

ROP (t/hr)  
Gamma (AFI)



38'  
n: 89.51°  
268.61°  
19.27'

6000

MD: 10.134'  
Inclination: 89.85°  
Azimuth: 269.16°  
TVD: 6,019.81'  
VS: 3.629 3'

6000

MD: 10.229'  
Inclination: 89.88°  
Azimuth: 269.52°  
TVD: 6,020.03'  
VS: 3.723 91'

90% MARL: dk brn/gy, frm-sft, sb ply-sb blk, rthy  
lsr, grty, com mottld carb mat.  
tr CHK: lt gy/whi, mottld wh, sft- mod frm, occ brit,  
sb ply-sb blk, rthy lsr, v calc, sl brn/bk sin

10% calc frags.  
abn BENT SH w pyr nods.

instnt bri blu whi milky cut, thick blu whi resid ring.

95% MARL: dk brn/gy, frm-sft, sb ply-sb blk, rthy  
lsr, grty, com mottld carb mat.  
5% CHK: lt gy/whi, mottld wh, sft- mod frm, occ  
brit, sb ply-sb blk, rthy lsr, v calc, sl brn/bk sin

abn cal frags.  
abn BENT SH w pyr nods.

instnt bri blu whi milky cut, thick blu whi resid ring.

95% MARL: dk brn/gy, frm-sft, sb ply-sb blk, rthy  
lsr, grty, com mottld carb mat.  
5% CHK: lt gy/whi, mottld wh, sft- mod frm, occ  
brit, sb ply-sb blk, rthy lsr, v calc, sl brn/bk sin

abn cal frags.  
abn BENT SH w pyr nods.

instnt bri blu whi milky cut, thick blu whi resid ring.

10,260 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

C1: 65.8%  
C2: 12.9%  
C3: 15.2%  
iC4: 6.1%  
nC4: 0.0%

10000  
1000000  
100

Gas (units)  
C1-C4 (PPM)  
CO2 (percent)

5050u

MW: 9.4 VIS: 34

WOB 17  
RPM 80  
SPM 4055  
SPM 0/89

ROP (ft/hr)  
Gamma (AFI)

WOB 16  
RPM 80  
SPM 4230  
SPM 0/89

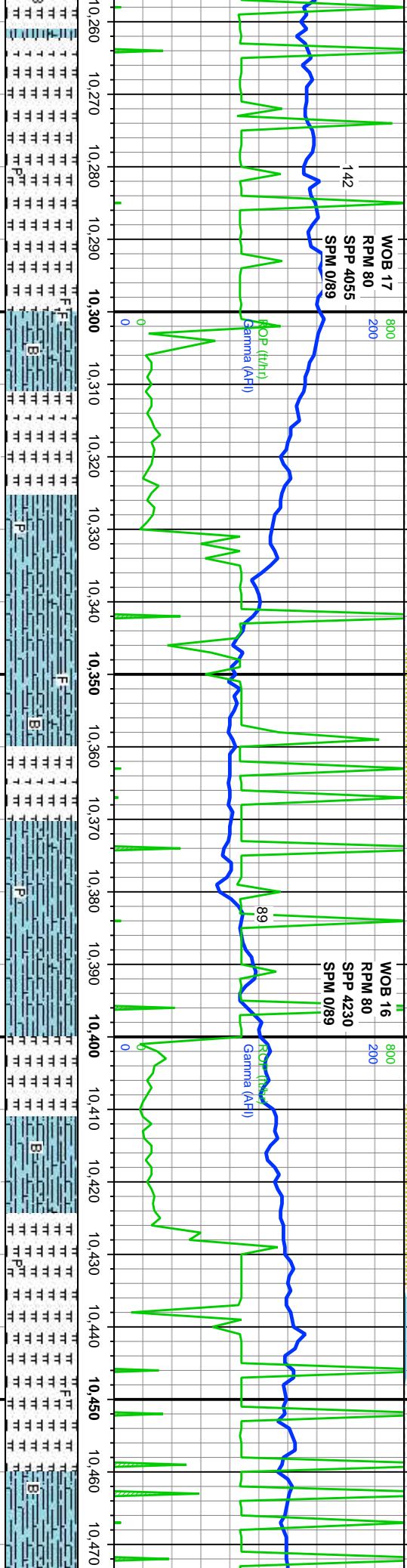
ROP (ft/hr)  
Gamma (AFI)

10000  
1000000  
100

Gas (units)  
C1-C4 (PPM)  
CO2 (percent)

5218u

MW: 9.4 VIS: 34



MD: 10,327'  
Inclination: 88.29°  
Azimuth: 269.23°  
TVD: 6,021.6'  
VS: 3,821.5'

MD: 10,425'  
Inclination: 88.67°  
Azimuth: 268.1°  
TVD: 6,024.19'  
VS: 3,918.95'

TVD (ft)  
70% CHK: lt gy/whi, mottld wh, sft- mod frm, occ  
brt, sb pty-sb blk, rthy lstr, v calc, sl brn/bk sin  
30% MARL: dk brn/gy, frm-sft, sb pty-sb blk, rthy  
lstr, grty, com mottld carb mat.  
abn calc frags.  
tr BENT SH w pyr nods.  
inst bri blu whi milky cut, thck blu whi resid ring.  
6100

TVD (ft)  
60% CHK: lt gy/whi, mottld wh, sft- mod frm, occ  
brt, sb pty-sb blk, rthy lstr, v calc, sl brn/bk sin  
30% MARL: dk brn/gy, frm-sft, sb pty-sb blk, rthy  
lstr, grty, com mottld carb mat.  
10% calc frags.  
tr BENT SH w pyr nods.  
inst bri blu whi milky cut, thck blu whi resid ring.  
6100

TVD (ft)  
60% MARL: dk brn/gy, frm-sft, sb pty-sb blk, rthy  
lstr, grty, com mottld carb mat.  
30% CHK: lt gy/whi, mottld wh, sft- mod frm, occ  
brt, sb pty-sb blk, rthy lstr, v calc, sl brn/bk sin  
10% calc frags.  
abn BENT SH w pyr nods.  
instnt bri blu whi milky cut, thck blu whi resid ring.  
6100

TVD (ft)  
60% MARL: dk brn/gy, frm-sft, sb pty-sb blk, rthy  
lstr, grty, com mottld carb mat.  
30% CHK: lt gy/whi, mottld wh, sft- mod frm, occ  
brt, sb pty-sb blk, rthy lstr, v  
10% calc frags.  
abn BENT SH w pyr nods.  
instnt bri blu whi milky cut, thck

10,480 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

C1: 74.0%  
C2: 10.8%  
C3: 8.7%  
iC4: 6.5%  
nC4: 0.0%

GA\$ (units)  
40420 -iC4 (PPM)  
CO2 (percent)

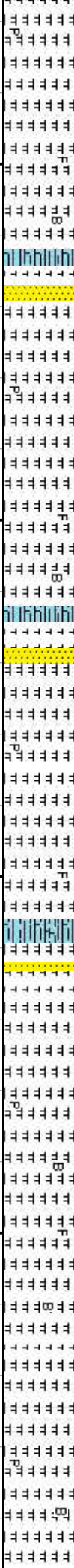
Picking up Singles due to high wind.

WOB 55  
RPM 0  
SPP 3461  
SPM 0/89

ROP (t/hr)  
Gamma (AFI)

0

123



MD: 10,538'  
Inclination: 88.89°  
Azimuth: 270.83°  
TVD: 6,026.6'  
VS: 4,031.47'

6000

80% MARL: dk brn/gy, frm-sft, sb ply-sb blk, rthy  
lstr. gfty, com mottd carb mat.  
5% CHK: lt gy/whi, mottd wh, sft- mod frm, occ  
brit, sb ply-sb blk, rthy lstr. v calc, sl brn/bk sin

10% calc frags.  
vry abn BENT SH w pyr nodes.

5% SS: whi-grn, rdd, high Sphyr, well sort, cmnt  
grn sppt, cmnt mtrx, BENT cmnt, sft, dss pyr nodes  
(AM),

instnt bri blu whi milky cut, thck blu whi resid ring.

10000  
1000000  
100

GA\$ (units)  
C1-iC4 (PPM)  
CO2 (per 3460u

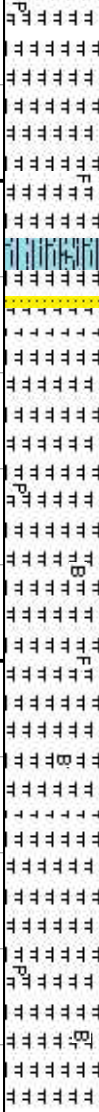
MW: 9.45 VIS: 37

WOB 13  
RPM 81  
SPP 4083  
SPM 0/89

ROP (t/hr)  
Gamma (AFI)

0

124



MD: 10,646'  
Inclination: 88.34°  
Azimuth: 268.18°  
TVD: 6,029.21'  
VS: 4,139.01'

6000

80% MARL: dk brn/gy, frm-sft, sb ply-sb blk, rthy  
lstr. gfty, com mottd carb mat.  
5% CHK: lt gy/whi, mottd wh, sft- mod frm, occ  
brit, sb ply-sb blk, rthy lstr. v calc, sl brn/bk sin

10% calc frags.  
vry abn BENT SH w pyr nodes.

5% SS: whi-grn, rdd, high Sphyr, well sort, cmnt  
grn sppt, cmnt mtrx, BENT cmnt, sft, dss pyr nodes  
(AM),

instnt bri blu whi milky cut, thck blu whi resid ring.

C1: 69.4  
C2: 15.2  
C3: 12.5  
iC4: 2.9%  
nC4: 0.0

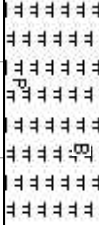
4836

WOB 15  
RPM 80  
SPP 425  
SPM 0/8

ROP (t/hr)  
Gamma (AFI)

0

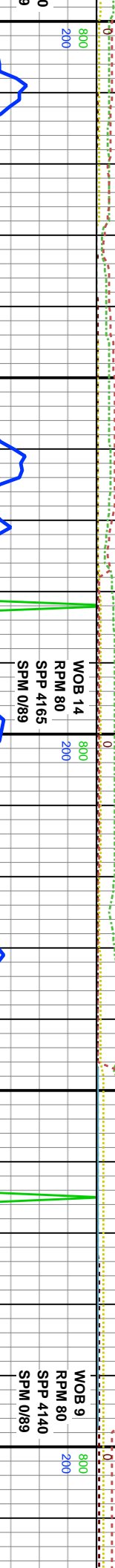
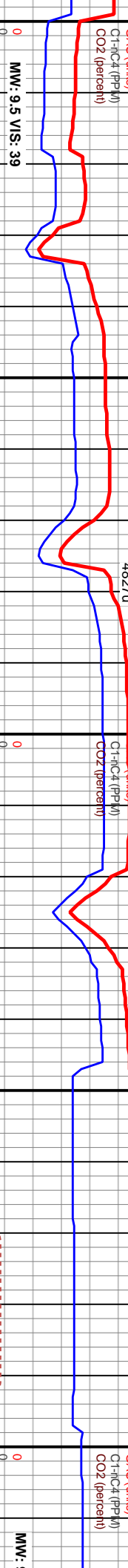
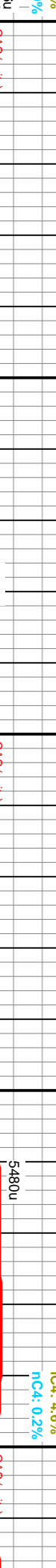
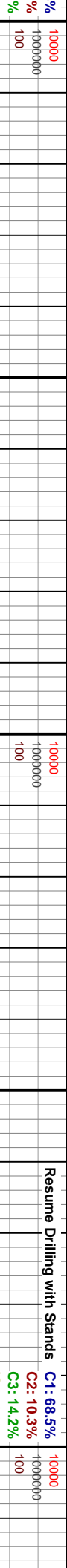
126



instnt bri blu whi milky cut, thck blu whi resid ring.

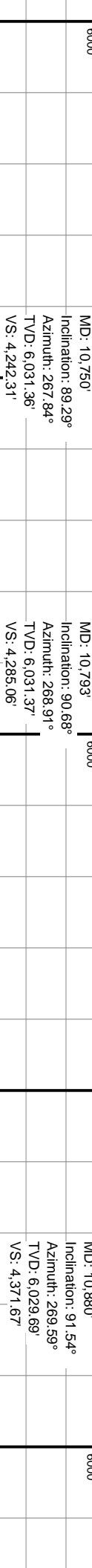
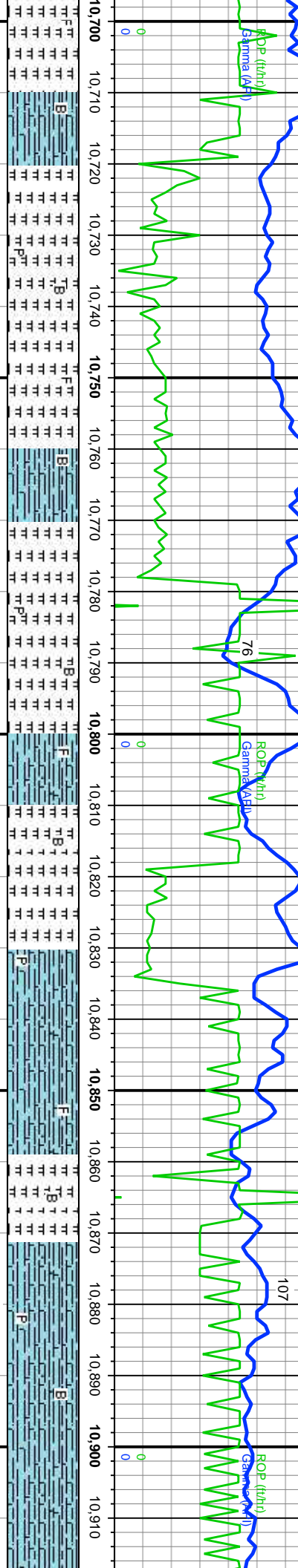


10,700 10,710 10,720 10,730 10,740 10,750 10,760 10,770 10,780 10,790 10,800 10,810 10,820 10,830 10,840 10,850 10,860 10,870 10,880 10,890 10,900 10,910



WOB 14  
RPM 80  
SPP 4165  
SPM 0/89

WOB 9  
RPM 80  
SPP 4140  
SPM 0/89



MD: 10,750'  
Inclination: 89.29°  
Azimuth: 267.84°  
TVD: 6,031.36'  
VS: 4,242.31'

MD: 10,793'  
Inclination: 90.68°  
Azimuth: 268.91°  
TVD: 6,031.37'  
VS: 4,285.06'

MD: 10,860'  
Inclination: 91.54°  
Azimuth: 269.59°  
TVD: 6,029.69'  
VS: 4,371.67'

80% MARL: dk brn/gy, frm-sft, sb ply-sb blk, rthy lstr, gfty, com mottd carb mat. 20% CHK: lt gy/whi, mottd wh, sft- mod frm, occ brt, sb ply-sb blk, rthy lstr, v calc, sl brn/blk sn.	80% MARL: dk brn/gy, frm-sft, sb ply-sb blk, rthy lstr, gfty, com mottd carb mat. 20% CHK: lt gy/whi, mottd wh, sft- mod frm, occ brt, sb ply-sb blk, rthy lstr, v calc, sl brn/blk sn.	60% CHK: lt gy/whi, mottd wh, sft- mod frm, occ brt, sb ply-sb blk, rthy lstr, v calc, sl brn/blk sn. 40% MARL: dk brn/gy, frm-sft, sb ply-sb blk, rthy lstr, gfty, com mottd carb mat.	80% CHK: lt gy/whi, mottd wh, sft- mod frm, occ brt, sb ply-sb blk, rthy lstr, v calc, sl brn/blk sn. 20% MARL: dk brn/gy, frm-sft, sb ply-sb blk, rthy lstr, gfty, com mottd carb mat.	80% CHK: lt gy/whi, mottd wh, sft- mod frm, occ brt, sb ply-sb blk, rthy lstr, v calc, sl brn/blk sn. 20% MARL: dk brn/gy, frm-sft, sb ply-sb blk, rthy lstr, gfty, com mottd carb mat.
abn calc frags. abn BENT SH w pyr nods. tr SS: whi-grn, rdd, high Sphyr, well sort, cmnt gmn spprt, cmnt mtrx, BENT cmnt, sft, diss pyr nods (AM).	abn calc frags. abn BENT SH w pyr nods. vry tr SS: whi-grn, rdd, high Sphyr, well sort, cmnt gmn spprt, cmnt mtrx, BENT cmnt, sft, diss pyr nods (AM).	abn calc frags. abn BENT SH w pyr nods. vry tr SS: whi-grn, rdd, high Sphyr, well sort, cmnt gmn spprt, cmnt mtrx, BENT cmnt, sft, diss pyr nods (AM).	abn calc frags. abn BENT SH w pyr nods. vry tr SS: whi-grn, rdd, high Sphyr, well sort, cmnt gmn spprt, cmnt mtrx, BENT cmnt, sft, diss pyr nods (AM).	abn calc frags. abn BENT SH w pyr nods. vry tr SS: whi-grn, rdd, high Sphyr, well sort, cmnt gmn spprt, cmnt mtrx, BENT cmnt, sft, diss pyr nods (AM).
instnt brl blu whi milky cut, thck blu whi resid ring.	instnt brl blu whi milky cut, thck blu whi resid ring.	instnt brl blu whi milky cut, thck blu whi resid ring.	instnt brl blu whi milky cut, thck blu whi resid ring.	instnt brl blu whi milky cut, thck blu whi resid ring.

MD: 10,750'  
Inclination: 89.29°  
Azimuth: 267.84°  
TVD: 6,031.36'  
VS: 4,242.31'

MD: 10,793'  
Inclination: 90.68°  
Azimuth: 268.91°  
TVD: 6,031.37'  
VS: 4,285.06'

MD: 10,860'  
Inclination: 91.54°  
Azimuth: 269.59°  
TVD: 6,029.69'  
VS: 4,371.67'



10,920 10,930 10,940 10,950 10,960 10,970 10,980 10,990 11,000 11,010 11,020 11,030 11,040 11,050 11,060 11,070 11,080 11,090 11,100 11,110 11,120 11,130

10000  
1000000  
100

C1: 64.4%  
C2: 14.5%  
C3: 14.8%  
iC4: 4.8%  
nC4: 0.0%

GAS (units)  
CH4 (PPM)  
CO2 (percent)

GAS (units)  
CH4 (PPM)  
CO2 (percent)

9.4 VIS: 36

MW: 9.4 VIS: 39

MW:

181  
WOB 9  
RPM 80  
SPM 4003  
SPM 0/89

177  
WOB 9  
RPM 80  
SPM 3987  
SPM 0/89

ROP (t/hr)  
Gamma (AFI)

ROP (t/hr)  
Gamma (AFI)

148

MD: 10,983  
Inclination: 89.11°  
Azimuth: 270.84°  
TVD: 6,029.1'  
VS: 4,474.37'

MD: 11,050'  
Inclination: 88.71°  
Azimuth: 270.95°  
TVD: 6,030.38'  
VS: 4,541.22'

MD: 11,136'  
Inclination:  
Azimuth: 2  
TVD: 6,031.6'  
VS: 4,627.6'

Faulted into Lower A  
Marl @ 11,020' MD



60% CHK: lt gy/whi, mottld wh, sft- mod frm, occ  
brt, sb ply-sb blkly, rthy lstr, v calc, sl brn/blk sin.  
40% MARL: dk brn/gy, frm-sft, sb ply-sb blkly, rthy  
lstr, grty, com mottld carb mat.

50% CHK: lt gy/whi, mottld wh, sft- mod frm, occ  
brt, sb ply-sb blkly, rthy lstr, v calc, sl brn/blk sin.  
50% MARL: dk brn/gy, frm-sft, sb ply-sb blkly, rthy  
lstr, grty, com mottld carb mat.

80% MARL: dk brn/gy, frm-sft, sb ply-sb blkly, rthy  
lstr, grty, com mottld carb mat.  
20% CHK: lt gy/whi, mottld wh, sft- mod frm, occ  
brt, sb ply-sb blkly, rthy lstr, v calc, sl brn/blk sin.

50% CHK: lt gy/whi, mottld wh, sft- mod frm, occ  
brt, sb ply-sb blkly, rthy lstr, v calc, sl brn/blk sin.  
50% MARL: dk brn/gy, frm-sft, sb ply-sb blkly, rthy  
lstr, grty, com mottld carb mat.

com calc frags.  
rr BENT SH w pyr nods.  
insint bri blu whi milky cut, thick blu whi resid frng.

com calc frags.  
rr BENT SH w pyr nods.  
insint bri blu whi milky cut, thick blu whi resid frng.

com calc frags.  
rr BENT SH w pyr nods.  
mod lstr mod bri blu whi milky cut, thick blu whi resid frng.

com calc frags.  
rr BENT SH w pyr nods.  
mod lstr mod bri blu whi milky cut, thick blu whi resid frng.

60% CHK: lt gy/whi, mottld wh, sft- mod frm, occ  
brt, sb ply-sb blkly, rthy lstr, v calc, sl brn/blk sin.  
40% MARL: dk brn/gy, frm-sft, sb ply-sb blkly, rthy  
lstr, grty, com mottld carb mat.

11,140 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

10000  
1000000  
100

GAS 5144u  
C1-MC4 (PPM)  
CO2 (percent)

9.4 VIS: 39

MW: 9.4 VIS: 40

WOB 10  
RPM 80  
SPP 4019  
SPM 0/89

WOB 7  
RPM 80  
SPP 3840  
SPM 0/89

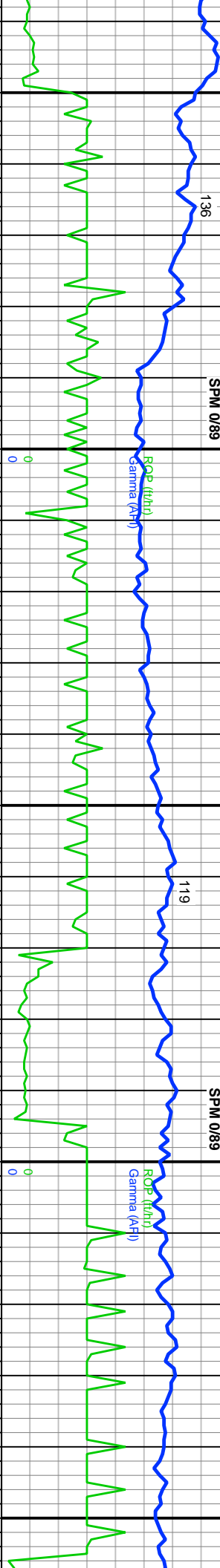
C1: 73.4%  
C2: 13.3%  
C3: 10.8%  
iC4: 2.4%  
nC4: 0.0%  
5132u

GAS (units)  
C1-MC4 (PPM)  
CO2 (percent)

MW: 9.3 VIS: 40

ROP (t/h)  
Gamma (AFI)

ROP (t/h)  
Gamma (AFI)



90.15°  
71.32°  
.23°  
.36°

MD: 11,221'  
Inclination: 90.59°  
Azimuth: 271.72°  
TVD: 6,030.69'  
VS: 4,711.94'

MD: 11,307'  
Inclination: 90.31°  
Azimuth: 270.24°  
TVD: 6,030.01'  
VS: 4,797.77'

frm, occ  
b/bk stn.  
biky, rthy  
80% CHK: lt gy/whi, mottld wh, sft- mod frm, occ  
brt, sb ply-sb biky, rthy lstr, v calc, sl brn/bk stn.  
20% MARL: dk brn/gy, frm-sft, sb ply-sb biky, rthy  
lstr, grty, com mottld carb mat.  
com calc frags.  
rr BENT SH w pyr nods.  
whi resid  
V fst v bri blu whi milky cut, thick blu whi resid ring.

TVD (ft)  
80% CHK: lt gy/whi, mottld wh, sft- mod frm, occ  
brt, sb ply-sb biky, rthy lstr, v calc, sl brn/bk stn.  
20% MARL: dk brn/gy, frm-sft, sb ply-sb biky, rthy  
lstr, grty, com mottld carb mat.  
com calc frags.  
rr BENT SH w pyr nods.  
V fst bri blu whi milky cut, thick blu whi resid ring.

80% MARL: dk brn/gy, frm-sft, sb ply-sb biky, rthy  
lstr, grty, com mottld carb mat.  
20% CHK: lt gy/whi, mottld wh, sft- mod frm, occ  
brt, sb ply-sb biky, rthy lstr, v calc, sl brn/bk stn.  
com calc frags.  
rr BENT SH w pyr nods.  
mod fst mod bri blu whi milky cut, thick blu whi resid  
ring.

TVD (ft)  
90% MARL: dk brn/gy, frm-sft, sb ply-sb biky, rthy  
lstr, grty, com mottld carb mat.  
10% CHK: lt gy/whi, mottld wh, sft- mod frm, occ  
brt, sb ply-sb biky, rthy lstr, v calc, sl brn/bk stn.  
com cc  
rr BENT SH w pyr nods.  
mod fst  
ring.

11.360 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

10000  
1000000  
100

GAS (units)  
CH4 (ppm)  
CO2 (percent)

4987u

4783u

C1: 79.6%  
C2: 5.2%  
C3: 12.8%  
iC4: 2.4%  
nC4: 0.0%

GAS (units)  
CH4 (ppm)  
CO2 (percent)

4475u

MW: 9.3 VIS: 39

MW: 9.3 VIS: 39

WOB 6  
RPM 80  
SPP 3874  
SPM 89/0

WOB 12  
RPM 80  
SPP 3932  
SPM 89/0

ROP (t/hr)  
Gamma (AFI)

ROP (t/hr)  
Gamma (AFI)

110

114

MD: 11,392'  
Inclination: 89.85°  
Azimuth: 268.9°  
TVD: 6,029.89'  
VS: 4,882.45'

MD: 11,477'  
Inclination: 89.05°  
Azimuth: 268.76°  
TVD: 6,030.71'  
VS: 4,967.02'

MD: 11,563'  
Inclination: 88.74°  
Azimuth: 268.97°  
TVD: 6,032.37'  
VS: 5,052.59'

TVD (ft)

TVD (ft)

100% MARL: drk brn/gy, frm-sft, sb pty-sb blkly, rthy  
lst, grty, com mottld carb mat.  
rr CHK: lt gy/whi, mottld wh, sft- mod frm, occ brt,  
sb pty-sb blkly, rthy lst, v calc, sl brn/bk sin.

90% MARL: drk brn/gy, frm-sft, sb pty-sb blkly, rthy  
lst, grty, com mottld carb mat.  
10% CHK: lt gy/whi, mottld wh, sft- mod frm, occ  
brt, sb pty-sb blkly, rthy lst, v calc, sl brn/bk sin.

80% MARL: drk brn/gy, frm-sft  
lst, grty, com mottld carb mat.  
20% CHK: lt gy/whi, mottld wh  
brt, sb pty-sb blkly, rthy lst, v

com calc frags.  
com BENT SH w pyr nodes.

com calc frags.  
com BENT SH w pyr nodes  
grn spprt, cmnt mtrx, BENT cmnt, sft, diss pyr nodes

com calc frags.  
rr BENT SH w pyr nodes.

mod fst mod bri blu whi milky cut, thick blu whi resid  
ring.

mod fst mod bri blu whi milky cut, thick blu whi resid  
ring.

mod fst sl bri blu whi milky cut, thick blu whi resid  
ring.

mod fst sl bri blu whi milky cut  
ring.

MARL: drk brn/gy, frm-sft, sb pty-sb blkly, rthy  
lst, grty, com mottld carb mat.  
rr CHK: lt gy/whi, mottld wh, sft- mod frm, occ brt,  
sb pty-sb blkly, rthy lst, v calc, sl brn/bk sin.  
calc frags.  
BENT SH w pyr nodes.  
mod bri blu whi milky cut, thick blu whi resid

tr calc frags.  
occ BENT SH w pyr nodes.  
mod fst sl bri blu whi milky cut

11,580 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

MINDEPTH  
11/19/2015

C1: 68.6%  
C2: 9.8%  
C3: 13.5%  
iC4: 4.8%  
nC4: 0.1%

GAS (units)  
C1-iC4 (PPM)  
CO2 (percent)

GAS (units)  
C1-iC4 (PPM)  
CO2 (percent)

0 MW: 9.3 VIS: 40

0 MW: 9.3 VIS: 39

WOB 9  
RPM 80  
SPM 3987  
SPM 89/0

WOB 64  
RPM 0  
SPM 3546  
SPM 89/0

WOB 13  
RPM 80  
SPM 400  
SPM 89

ROP (ft/hr)  
Gamma (AFI)

ROP (ft/hr)  
Gamma (AFI)

ROP (ft/hr)  
Gamma (AFI)

6000

B Chalk

6000

New Target: 6,034' TVD

MD: 11,648'  
Inclination: 88.52°  
Azimuth: 269.48°  
TVD: 6,034.4'  
VS: 5,137.2'

MD: 11,734'  
Inclination: 89.11°  
Azimuth: 269.4°  
TVD: 6,036.18'  
VS: 5,222.84'

TVD (ft)  
90% MARL: dk brn/gy, frm-sft, sb ply-sb blk, rthy  
1st, grty, com mottld carb mat.  
10% CHK: lt gy/whi, mottld wh, sft- mod frm, occ brtl, sb ply-sb blk, rthy 1st, v calc, sl brn/bk sin.  
com calc frags.  
rr BENT SH w pyr nods.  
mod 1st mod bri blu whi milky cut, thick blu whi resid ring.

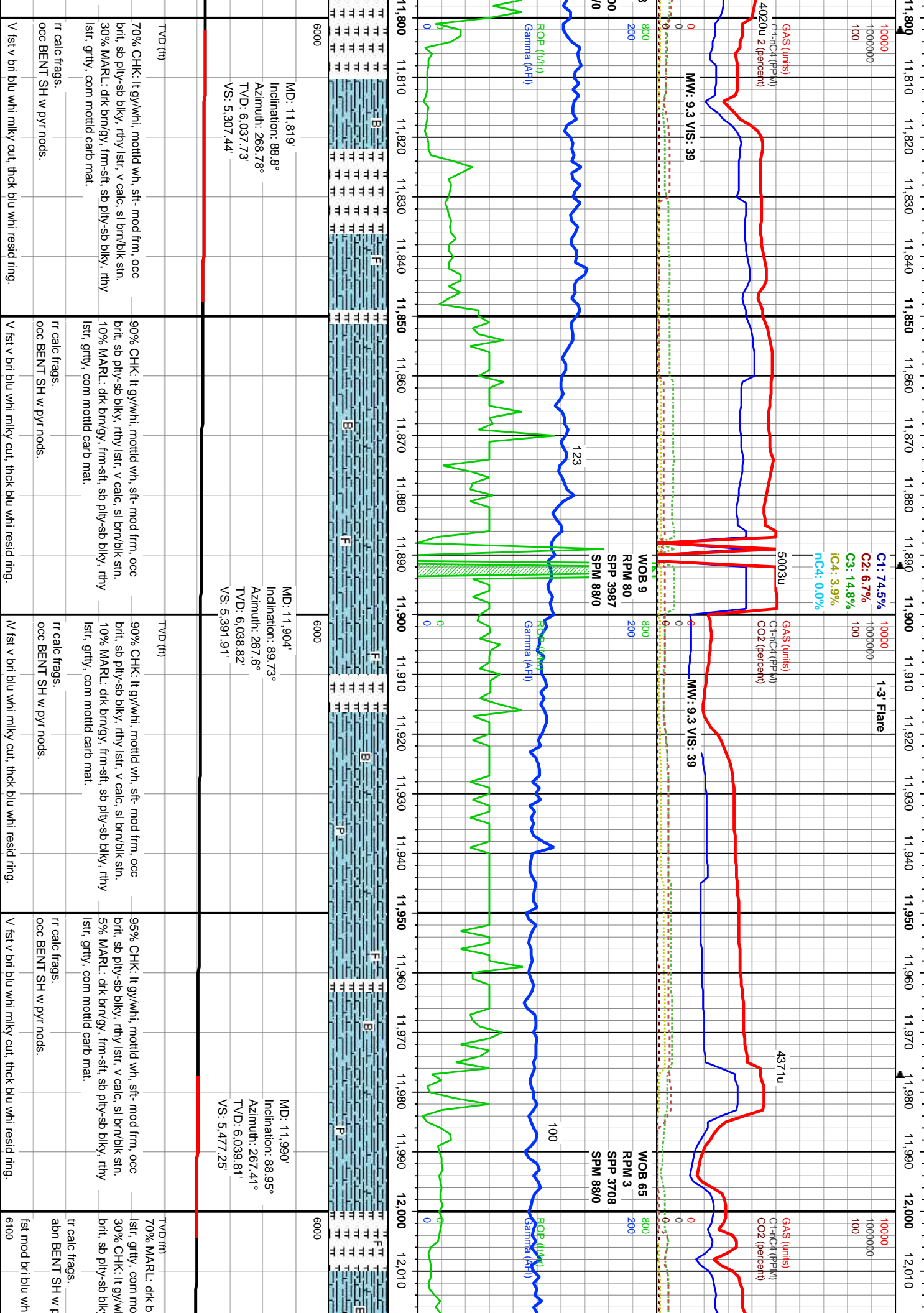
TVD (ft)  
90% MARL: dk brn/gy, frm-sft, sb ply-sb blk, rthy  
1st, grty, com mottld carb mat.  
10% CHK: lt gy/whi, mottld wh, sft- mod frm, occ brtl, sb ply-sb blk, rthy 1st, v calc, sl brn/bk sin.  
rr calc frags.  
occ BENT SH w pyr nods.  
mod 1st mod bri blu whi milky cut, thick blu whi resid ring.

TVD (ft)  
50% MARL: dk brn/gy, frm-sft, sb ply-sb blk, rthy  
1st, grty, com mottld carb mat.  
50% CHK: lt gy/whi, mottld wh, sft- mod frm, occ brtl, sb ply-sb blk, rthy 1st, v calc, sl brn/bk sin.  
rr calc frags.  
occ BENT SH w pyr nods.  
mod 1st bri blu whi milky cut, thick blu whi resid ring.

TVD (ft)  
60% CHK: lt gy/whi, mottld wh, sft- mod frm, occ brtl, sb ply-sb blk, rthy 1st, v calc, sl brn/bk sin.  
40% MARL: dk brn/gy, frm-sft, sb ply-sb blk, rthy 1st, grty, com mottld carb mat.  
rr calc frags.  
occ BENT SH w pyr nods.  
V fst v bri blu whi milky cut, thick blu whi resid ring.

11,580 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







12.020 12.030 12.040 12.050 12.060 12.070 12.080 12.090 12.100 12.110 12.120 12.130 12.140 12.150 12.160 12.170 12.180 12.190 12.200 12.210 12.220 12.230

C1: 81.0%  
C2: 11.2%  
C3: 7.8%  
iC4: 0.0%  
nC4: 0.0%

100000  
1000000  
100

Gas (units)  
C1+IC4 (PPM)  
CO2 (percent)

4552u

4858u

MW: 9.3 VIS: 41

WOB 11  
RPM 80  
SPP 3972  
SPM 88/0

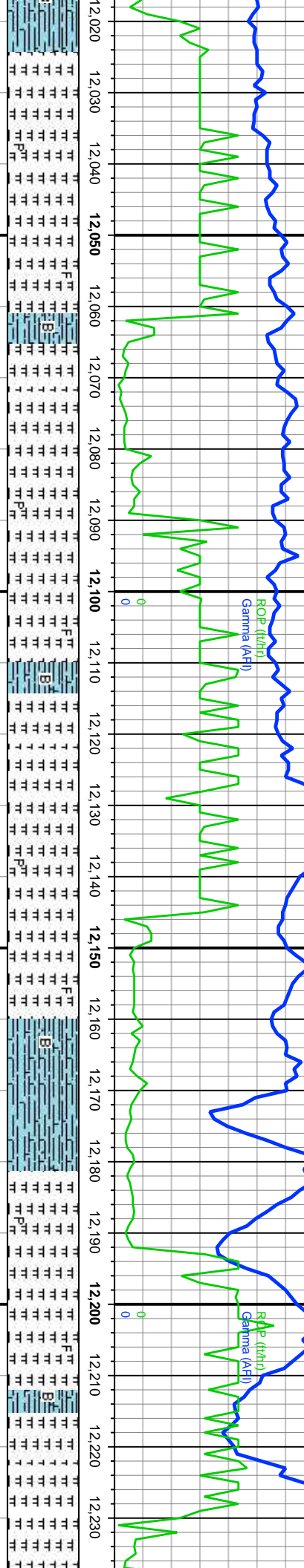
WOB 17  
RPM 80  
SPP 3726  
SPM 0/79

127

146

ROP (t/h)  
Gamma (AFI)

ROP (t/h)  
Gamma (AFI)



MD: 12.076'  
Inclination: 89.14°  
Azimuth: 267.67°  
TVD: 6.041.24'  
VS: 5.562.6'

MD: 12.189'  
Inclination: 90.09°  
Azimuth: 267.54°  
TVD: 6.042'  
VS: 5.674.77'

Possible faults - 10' throws

mm/gy, frm-sft, sb ply-sb biky, rthy ttd carb mat.	90% MARL: dk brn/gy, frm-sft, sb ply-sb biky, rthy lstr, grty, com mottld carb mat. 10% CHK: lt gy/whi, mottld wh, sft- mod frm, occ brlt, sb ply-sb biky, rthy lstr, v calc, sl brn/bk stn.	TVD (ft) 90% MARL: dk brn/gy, frm-sft, sb ply-sb biky, rthy lstr, grty, com mottld carb mat. 10% CHK: lt gy/whi, mottld wh, sft- mod frm, occ brlt, sb ply-sb biky, rthy lstr, v calc, sl brn/bk stn.	60% MARL: dk brn/gy, frm-sft, sb ply-sb biky, rthy lstr, grty, com mottld carb mat. 40% CHK: lt gy/whi, mottld wh, sft- mod frm, occ brlt, sb ply-sb biky, rthy lstr, v calc, sl brn/bk stn.	90% MARL: dk brn/gy, frm-sft, sb ply-sb lstr, grty, com mottld carb mat. 10% CHK: lt gy/whi, mottld wh, sft- mod fr brlt, sb ply-sb biky, rthy lstr, v calc, sl brn/bk abn calc frags. abn BENT SH w pyr nodes.
mm/gy, frm-sft, sb ply-sb biky, rthy ttd carb mat.	90% MARL: dk brn/gy, frm-sft, sb ply-sb biky, rthy lstr, grty, com mottld carb mat. 10% CHK: lt gy/whi, mottld wh, sft- mod frm, occ brlt, sb ply-sb biky, rthy lstr, v calc, sl brn/bk stn.	TVD (ft) 90% MARL: dk brn/gy, frm-sft, sb ply-sb biky, rthy lstr, grty, com mottld carb mat. 10% CHK: lt gy/whi, mottld wh, sft- mod frm, occ brlt, sb ply-sb biky, rthy lstr, v calc, sl brn/bk stn.	60% MARL: dk brn/gy, frm-sft, sb ply-sb biky, rthy lstr, grty, com mottld carb mat. 40% CHK: lt gy/whi, mottld wh, sft- mod frm, occ brlt, sb ply-sb biky, rthy lstr, v calc, sl brn/bk stn.	90% MARL: dk brn/gy, frm-sft, sb ply-sb lstr, grty, com mottld carb mat. 10% CHK: lt gy/whi, mottld wh, sft- mod fr brlt, sb ply-sb biky, rthy lstr, v calc, sl brn/bk abn calc frags. abn BENT SH w pyr nodes.
mm/gy, frm-sft, sb ply-sb biky, rthy ttd carb mat.	90% MARL: dk brn/gy, frm-sft, sb ply-sb biky, rthy lstr, grty, com mottld carb mat. 10% CHK: lt gy/whi, mottld wh, sft- mod frm, occ brlt, sb ply-sb biky, rthy lstr, v calc, sl brn/bk stn.	TVD (ft) 90% MARL: dk brn/gy, frm-sft, sb ply-sb biky, rthy lstr, grty, com mottld carb mat. 10% CHK: lt gy/whi, mottld wh, sft- mod frm, occ brlt, sb ply-sb biky, rthy lstr, v calc, sl brn/bk stn.	60% MARL: dk brn/gy, frm-sft, sb ply-sb biky, rthy lstr, grty, com mottld carb mat. 40% CHK: lt gy/whi, mottld wh, sft- mod frm, occ brlt, sb ply-sb biky, rthy lstr, v calc, sl brn/bk stn.	90% MARL: dk brn/gy, frm-sft, sb ply-sb lstr, grty, com mottld carb mat. 10% CHK: lt gy/whi, mottld wh, sft- mod fr brlt, sb ply-sb biky, rthy lstr, v calc, sl brn/bk abn calc frags. abn BENT SH w pyr nodes.
mm/gy, frm-sft, sb ply-sb biky, rthy ttd carb mat.	90% MARL: dk brn/gy, frm-sft, sb ply-sb biky, rthy lstr, grty, com mottld carb mat. 10% CHK: lt gy/whi, mottld wh, sft- mod frm, occ brlt, sb ply-sb biky, rthy lstr, v calc, sl brn/bk stn.	TVD (ft) 90% MARL: dk brn/gy, frm-sft, sb ply-sb biky, rthy lstr, grty, com mottld carb mat. 10% CHK: lt gy/whi, mottld wh, sft- mod frm, occ brlt, sb ply-sb biky, rthy lstr, v calc, sl brn/bk stn.	60% MARL: dk brn/gy, frm-sft, sb ply-sb biky, rthy lstr, grty, com mottld carb mat. 40% CHK: lt gy/whi, mottld wh, sft- mod frm, occ brlt, sb ply-sb biky, rthy lstr, v calc, sl brn/bk stn.	90% MARL: dk brn/gy, frm-sft, sb ply-sb lstr, grty, com mottld carb mat. 10% CHK: lt gy/whi, mottld wh, sft- mod fr brlt, sb ply-sb biky, rthy lstr, v calc, sl brn/bk abn calc frags. abn BENT SH w pyr nodes.

12,240 12,250 12,260 12,270 12,280 12,290 12,300 12,310 12,320 12,330 12,340 12,350 12,360 12,370 12,380 12,390 12,400 12,410 12,420 12,430 12,440 12,450

C1: 73.4%  
C2: 10.6%  
C3: 11.9%  
iC4: 3.9%  
nC4: 0.0%

10000  
1000000  
100

Gas (units)  
C1-C4 (ppm)  
CO2 (percent)

5066u

MW: 9.4 VIS: 36

MW: 9.4 VIS: 38

10000  
1000000  
100

Gas (units)  
C1-C4 (ppm)  
CO2 (percent)

4711u

ROP (t/hr)  
Gamma (AFI)

ROP (t/hr)  
Gamma (AFI)

WOB 12  
RPM 80  
SPM 4101  
SPM 0/88

WOB 20  
RPM 80  
SPM 4102  
SPM 0/87

Nio B Marl

6000

6000

MD: 12,246'  
Inclination: 90.4°  
Azimuth: 267.75°  
TVD: 6,041.76'  
VS: 5,731.36'

MD: 12,331'  
Inclination: 89.75°  
Azimuth: 268.12°  
TVD: 6,041.65'  
VS: 5,815.79'

MD: 12,417'  
Inclination: 89.72°  
Azimuth: 268.11°  
TVD: 6,042.04'  
VS: 5,901.25'

biky, rthy  
95% MARL: dk brn/gy, frm-sft, sb ply-sb biky, rthy  
lsfr, grty, com mottd carb mat.  
5% CHK: lt gy/whi, mottd wh, sft- mod frm, occ  
brt, sb ply-sb biky, rthy lsfr, v calc, sl brn/blk stn.

biky, rthy  
95% MARL: dk brn/gy, frm-sft, sb ply-sb biky, rthy  
lsfr, grty, com mottd carb mat.  
5% CHK: lt gy/whi, mottd wh, sft- mod frm, occ  
brt, sb ply-sb biky, rthy lsfr, v calc, sl brn/blk stn.

biky, rthy  
95% MARL: dk brn/gy, frm-sft, sb ply-sb biky, rthy  
lsfr, grty, com mottd carb mat.  
5% CHK: lt gy/whi, mottd wh, sft- mod frm, occ  
brt, sb ply-sb biky, rthy lsfr, v calc, sl brn/blk stn.

100% MARL: dk brn/gy, frm-sft, sb ply-sb biky, rthy  
lsfr, grty, com mottd carb mat.

abn BENT SH w pyr nodes.  
abn SS: whi-grn, mod, high SpHyr, well sort, cmnt  
gm sppt, cmnt mtrx, BENT cmnt, sft, diss pyr nodes  
ring.  
inst brl blu whi mlky cut, thick blu whi resid ring.

abn calc frags.  
abn BENT SH w pyr nodes.  
abn SS: whi-grn, mod, high SpHyr, well sort, cmnt  
gm sppt, cmnt mtrx, BENT cmnt, sft, diss pyr nodes  
ring.  
inst brl blu whi mlky cut, thick blu whi resid ring.

abn calc frags.  
abn BENT SH w pyr nodes.  
abn SS: whi-grn, mod, high SpHyr, well sort, cmnt  
gm sppt, cmnt mtrx, BENT cmnt, sft, diss pyr nodes  
ring.  
inst brl blu whi mlky cut, thick blu whi resid ring.

tr calc frags.  
tr BENT SH w pyr nodes.  
good blu whi mlky cut, thin blu whi resid ring.  
good b

12,460 12,470 12,480 12,490 12,500 12,510 12,520 12,530 12,540 12,550 12,560 12,570 12,580 12,590 12,600 12,610 12,620 12,630 12,640 12,650 12,660 12,670

C1: 78.5%  
C2: 11.6%  
C3: 8.5%  
iC4: 1.4%  
nC4: 0.0%

10000  
1000000  
100

GA\$ (units)  
C1-iC4 (PPM)  
CO2 (percent)

4793u

MW: 9.4 VIS: 36

10000  
1000000  
100

GA\$ (units)  
C1-iC4 (PPM)  
CO2 (percent)

4924u

5004u

ROP (t/hr)  
Gamma (AFI)

WOB 11  
RPM 80  
SPM 4000  
SPM 850

ROP (t/hr)  
Gamma (AFI)

WOB 76  
RPM 0  
SPM 3297  
SPM 820

6000

6000

MD: 12,502'  
Inclination: 89.07°  
Azimuth: 267.62°  
TVD: 6,042.94'  
VS: 5,985.67'

MD: 12,635'  
Inclination: 90.52°  
Azimuth: 267.75°  
TVD: 6,043.42'  
VS: 6,117.71'

MD: 12,674'  
Inclination: 9  
Azimuth: 267  
TVD: 6,043.  
VS: 6,156.44'

TVD (ft)

TVD (ft)

100% MARL: dk brn/gy, frm-sft, sb pily-sb blkly, rthy  
lsfr, grtty, com mottld carb mat.

100% MARL: dk brn/gy, frm-sft, sb pily-sb blkly, rthy  
lsfr, grtty, com mottld carb mat.

100% MARL: dk brn/gy, frm-sft, sb pily-sb blkly, rthy  
lsfr, grtty, com mottld carb mat.

100% MARL: dk brn/gy, frm-sft, sb pily-sb blkly, rthy  
lsfr, grtty, com mottld carb mat.

frags.  
T SH w pyr nods.

tr calc frags.  
tr BENT SH w pyr nods.

tr calc frags.  
tr BENT SH w pyr nods.

tr calc frags.  
tr BENT SH w pyr nods.

tr calc frags.  
tr BENT SH w pyr nods.

lu whi mlky cut, thn blu whi resid ring.

good blu whi mlky cut, thn blu whi resid ring.

good blu whi mlky cut, thn blu whi resid ring.

good blu whi mlky cut, thn blu whi resid ring.

good blu whi mlky cut, thn blu whi resid ring.

12 680 12 690 12 700 12 710 12 720 12 730 12 740 12 750 12 760 12 770 12 780 12 790 12 800 12 810 12 820 12 830 12 840 12 850 12 860 12 870 12 880 12 890

C1: 73.2%  
C2: 13.2%  
C3: 11.3%  
iC4: 2.4%  
nC4: 0.0%

10000  
1000000  
100

Gas (units)  
Cl-ClC4 (ppm)  
CO2 (percent)

4554u

MW: 9.3 VIS: 37

178

ROP (t/hr)  
Gamma (AFI)

WOB 14  
RPM 80  
SPM 4090  
SPM 870

6000

MD: 12.759'  
Inclination: 89.45°  
Azimuth: 269.87°  
TVD: 6.043.21'  
VS: 6.241.02'

TVD (ft)

100% MARL: dk brn/gy, frm-sft, sb pily-sb blkly, rthy  
lstr, grtly, com mottld carb mat.  
tr calc frags.  
tr BENT SH w pyr nods.  
good blu whi milky cut, thn blu whi resid ring.  
6100

10000  
1000000  
100

Gas (units)  
Cl-ClC4 (ppm)  
CO2 (percent)

4484u

MW: 9.5 VIS: 37

170

ROP (t/hr)  
Gamma (AFI)

WOB 18  
RPM 80  
SPM 3828  
SPM 0/82

6000

MD: 12.845'  
Inclination: 89.75°  
Azimuth: 270.68°  
TVD: 6.043.82'  
VS: 6.326.78'

TVD (ft)

100% MARL: dk brn/gy, frm-sft, sb pily-sb blkly, rthy  
lstr, grtly, com mottld carb mat.  
tr calc frags.  
tr BENT SH w pyr nods.  
good blu whi milky cut, thn blu whi resid ring.  
6100

C1: 75.8%  
C2: 7.2%  
C3: 13.0%  
iC4: 3.9%  
nC4: 0.0%

MW: 9.3 VIS: 34

156

WOB 21  
RPM 80  
SPM 392  
SPM 0/8

100% MARL: dk brn/gy, frm-sft, sb pily-sb blkly, rthy  
lstr, grtly, com mottld carb mat.  
tr calc frags.  
tr BENT SH w pyr nods.  
good blu whi milky cut, thn blu whi resid ring.



