



Scale: 4.41" / 100'  
Measured Depth Log

Well Name State Seventy Holes K21-O24-4HNB

Location NENW SEC 4 T4N R62W

State CO

County WELD

Country USA

Rig Number FRONTIER 4

API Number 05-123-39211-00

AFE # 14029

Region DJ BASIN

Field WATTENBERG

Spud Date 12/11/2014

Drilling Completed 12/21/2014

Surface Coordinates 370' FNL x 1382' FWL (LAT: 40.34792, -104.33591)

Bottom Hole Coordinates 470' FSL x 2319' FWL (LAT: 40.33530, -104.33171) PROJECTED

Ground Elevation 4552'

K.B. Elevation 4574'

Logged Interval 6100' To 11078'

Total Depth 11078'

Formation NIOBRARA, B-CHALK

Type of Drilling Fluid H2O, LSND

## Operator

Company Bonanza Creek Energy Inc.

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

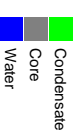
## Geologist

Name Paul McKay

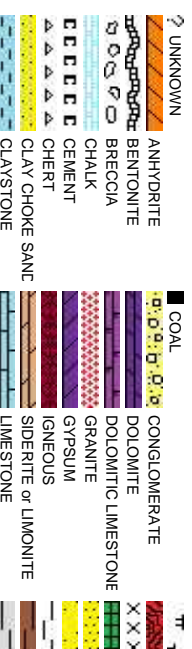
Company Bonanza Creek Energy Inc.

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

## Zone Color C



## Rock Type



Accessories

|  |              |  |                      |                 |                       |
|--|--------------|--|----------------------|-----------------|-----------------------|
|  | GASTROPOD    |  | ARGILLITE GRAIN      |                 | HEAVY MINERAL         |
|  | INOCERAMUS   |  | KAOLIN               |                 | ANHYDRITE STRINGER    |
|  | ALGAE        |  | B BENTONITE          |                 | BENTONITE STRINGER    |
|  | AMPHIPORA    |  | BITUMENOUS SUBSTANCE |                 | COAL STRINGER         |
|  | BELEMNITE    |  | BRECCIA FRAGMENTS    |                 | DOLOMITE STRINGER     |
|  | BIOCLASTIC   |  | CALCAREOUS           |                 | GYPSUM STRINGER       |
|  | BRACHIOPOD   |  | CARBONACEOUS FLAKES  |                 | LIMESTONE STRINGER    |
|  | BRYOZOA      |  | CHERT                |                 | MARLSTONE (CALC) STRG |
|  | CEPHALOPOD   |  | COAL - THIN BEDS     |                 | MARLSTONE (DOL) STRG  |
|  | CORAL        |  | DOLOMITIC            |                 | SANDSTONE STRINGER    |
|  | GRINOID      |  | FELDSPAR             |                 | SHALE STRINGER        |
|  | ECHINOID     |  | FERRUGINOUS PELLET   |                 | SILTY                 |
|  | FISH         |  | FERRUGINOUS          |                 | TUFFACEOUS            |
|  | FORAMINIFERA |  | GLAUCONITE           |                 |                       |
|  | F FOSSIL     |  | GYPSIFEROUS          |                 |                       |
|  |              |  |                      | <b>Stringer</b> |                       |

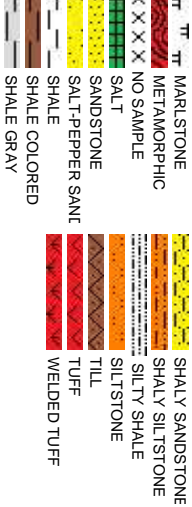
Other Symbols

|                 |                    |  |                        |                 |                              |
|-----------------|--------------------|--|------------------------|-----------------|------------------------------|
|                 | P PINPOINT         |  | WIRELINE TESTED - LEFT |                 | E EARTHY                     |
|                 | V VUGGY            |  | WIRELINE TESTED - RT   |                 | FX FINELYXLN                 |
|                 | D DEAD             |  | FORMATION TOP          |                 | GS GRAINSTONE                |
|                 | EVEN               |  | GAS SHOW               |                 | L LITHOGRAPHIC               |
|                 | QUESTIONABLE       |  | OIL SHOW               |                 | MX MICROXLN                  |
|                 | SPOTTED STAINING   |  | BIT                    |                 |                              |
|                 |                    |  | MN DEPTH UP            |                 | MS MUDSTONE                  |
|                 |                    |  | CONNECTION (UP)        |                 |                              |
|                 |                    |  | MN DEPTH (DOWN)        |                 | AS ANGULAR                   |
|                 |                    |  | CONNECTION (DOWN)      |                 | PS PACKSTONE                 |
| <b>Porosity</b> |                    |  | CONNECTION GAS         |                 | R ROUNDED                    |
|                 | E EARTHY           |  | CONNECTION GAS (LEFT)  |                 | S SUBANG                     |
|                 | F FENESTRAL        |  | TRIP GAS               |                 | S SUBRAND                    |
|                 | F FRACTURE         |  | TRIP GAS (LEFT)        |                 |                              |
|                 | X INTERCRYSTALLINE |  | DOWN TIME GAS          |                 | C CASING                     |
|                 | I INTEROOLITIC     |  | DOWN TIME GAS (LEFT)   |                 | SC (L) SIDEWALL CORE (LEFT)  |
|                 | M MOLDIC           |  | CORE - LOST            |                 | SC (R) SIDEWALL CORE (RIGHT) |
|                 | O ORGANIC          |  | CORE - RECOVERED       |                 | SLIDE                        |
|                 |                    |  | SURVEY                 |                 | B BOUNDSTONE                 |
|                 |                    |  |                        |                 | C CHALKY                     |
|                 |                    |  |                        |                 | CX CRYPTOXLN                 |
|                 |                    |  |                        | <b>Textures</b> |                              |
|                 |                    |  |                        |                 | P POOR                       |
|                 |                    |  |                        |                 | W WELL                       |
|                 |                    |  |                        |                 | M MODERATE                   |
|                 |                    |  |                        | <b>Sorting</b>  |                              |

oding



es



Slide/Rotate

ROP  
ROP —  
GAMMA —

Bit Data  
Bit #: 3  
Type: HE04JMRSV  
Size: 8.75  
Jets: 3 x 20  
S/N: 1395273

Total Gas & Chromatograph

GAS —  
C1 - - -  
C2 - - -  
C3 - - -  
C4 - - -

Depth Labels

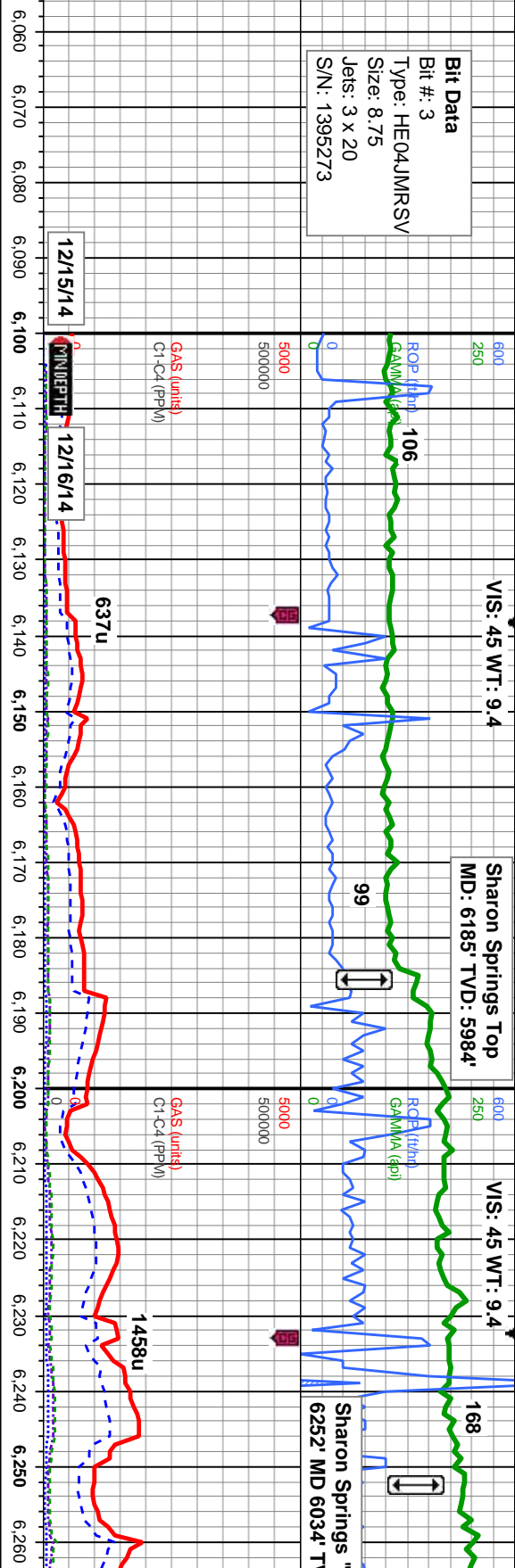
% Lith

Well Bore  
TV D —

Oil Show

E  
G  
M  
F  
T  
S

Images



COLUMBINE LOGGING INC.  
RIGGED UP ON 12/15/2014  
MANNED 2-PERSON LOGGING  
WITH BLOODHOUND GAS  
CHROMATOGRAPH UNIT #316  
BEGAN LOGGING ON  
12/16/2014 @ 08:00 AM

MD: 6,099'  
Inclination: 30.03°  
Azimuth: 175.03°  
VS: -43.48'  
TVD: 5,913.86'

MD: 6,146'  
Inclination: 35.06°  
Azimuth: 174.6°  
VS: -18.53'  
TVD: 5,953.46'

MD: 6,194'  
Inclination: 39.98°  
Azimuth: 175.26°  
VS: 10.32'  
TVD: 5,991.52'

MD: 6,242'  
Inclination: 44.6°  
Azimuth: 175.63°  
VS: 42.14'  
TVD: 6,027.02'

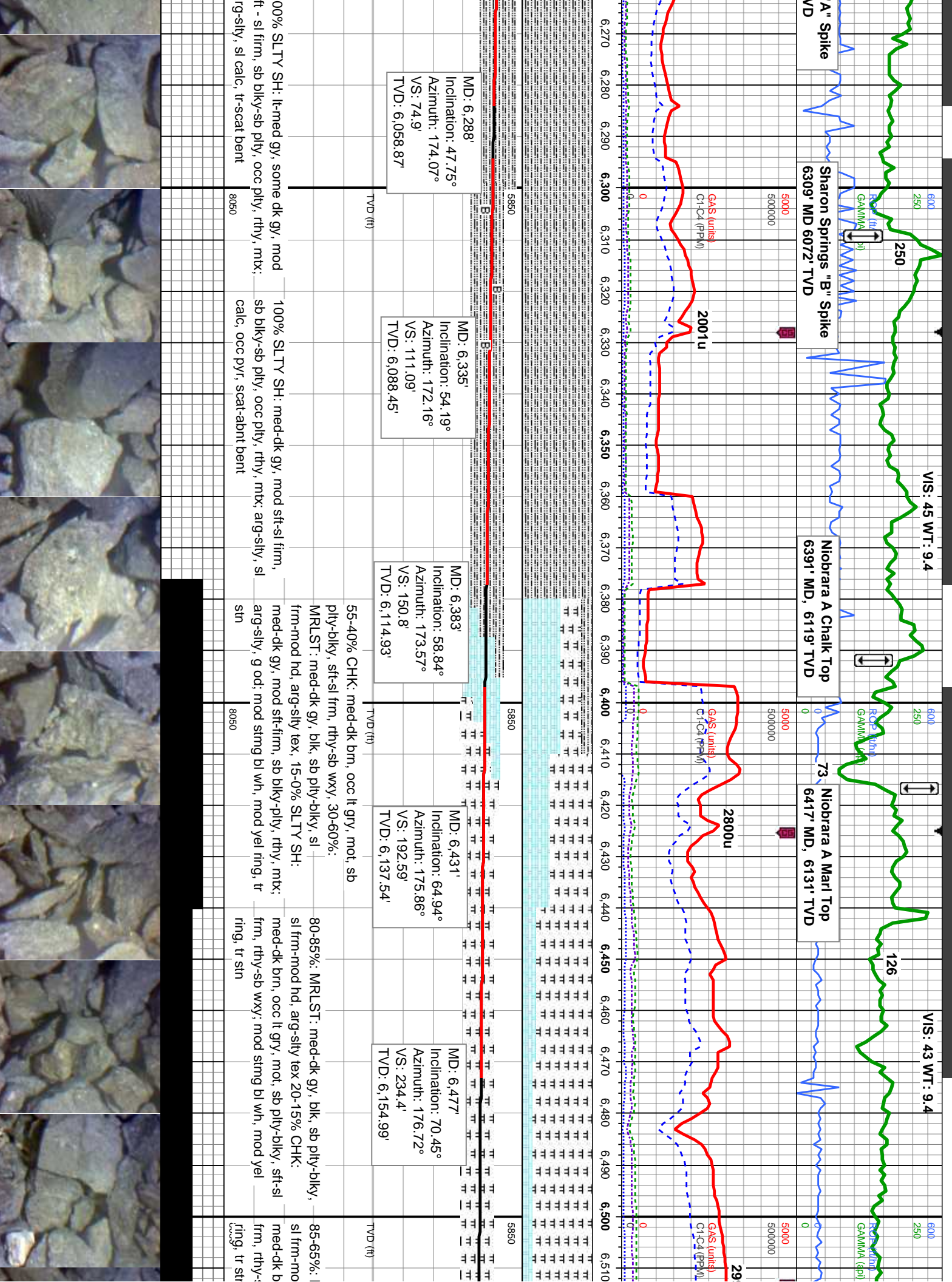
100% SLTY SH: lt-med gy, some dk  
gy, mod sft - sl firm, sb blk-y-sb pily,  
occ pily, rthy, mtx; arg-sily, sl calc, tr  
shy ss

100% SLTY SH: lt-med gy, some dk  
gy, mod sft - sl firm, sb blk-y-sb pily,  
occ pily, rthy, mtx; arg-sily, sl calc, tr  
shy ss

100% SLTY SH: lt-med gy, some dk gy, mod  
sft - sl firm, sb blk-y-sb pily, occ pily, rthy, mtx;  
arg-sily, sl calc, tr shy ss

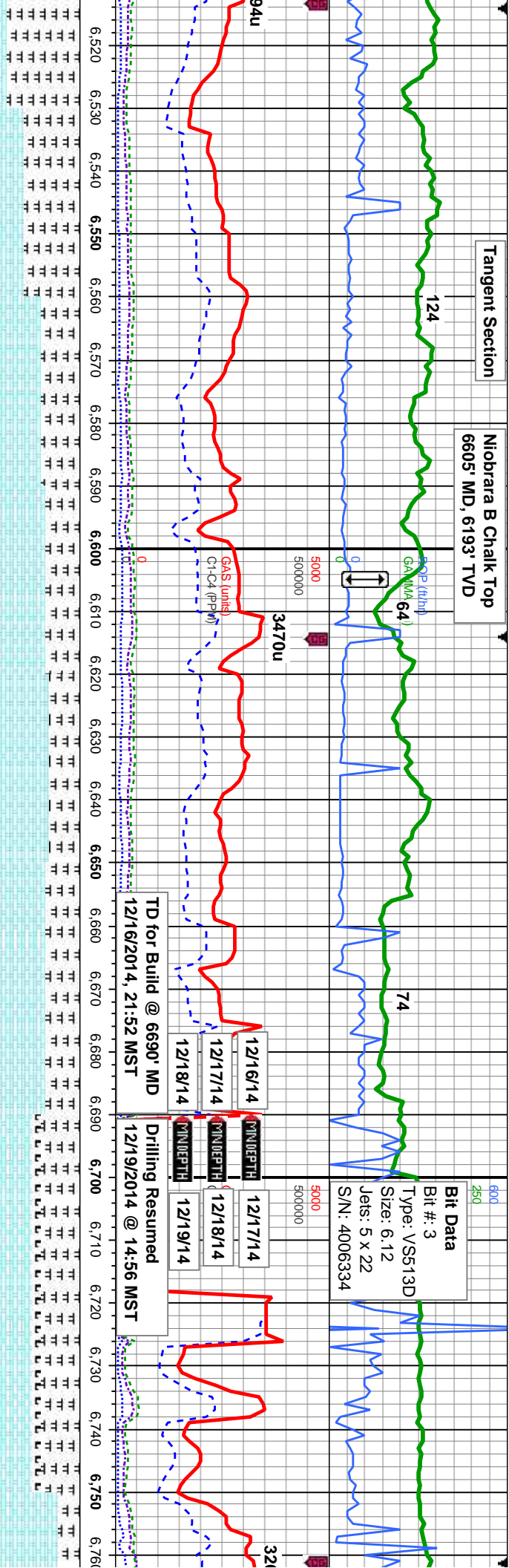






Tangent Section

Niobrara B Chalk Top  
6605' MD, 6193' TVD



|  |  |   |   |  |   |
|--|--|---|---|--|---|
| MD: 6,524'<br>Inclination: 70.79°<br>Azimuth: 176.66°<br>VS: 277.93'<br>TVD: 6,170.59' | MD: 6,571'<br>Inclination: 72.85°<br>Azimuth: 177.14°<br>VS: 321.73'<br>TVD: 6,185.25' | MD: 6,591'<br>Inclination: 76.2°<br>Azimuth: 176.49°<br>VS: 340.64'<br>TVD: 6,190.58' | MD: 6,618'<br>Inclination: 81.15°<br>Azimuth: 176.2°<br>VS: 366.66'<br>TVD: 6,195.89' | MD: 6,648'<br>Inclination: 87.77°<br>Azimuth: 176.33°<br>VS: 395.99'<br>TVD: 6,198.78' | MD: 6,707'<br>Inclination: 90.46°<br>Azimuth: 177.28°<br>VS: 453.88'<br>TVD: 6,200' |
|--|--|---|---|--|---|

55-60% CHK: lt-med gy, occ dk brn, mot, sb  
ply-bkly, sft-sl frm, rthy-sb wxy, 45-40%:  
MRLST: med-dk gy, blk, sb ply-bkly, sl  
frm-mod hd, arg-sily tex, mtx, calc, mod oc;  
mod stmg bl wh, mod-thk yel ring, tr stn;  
mky-slow stmg bl wh, thn-mod yel ring, tr stn

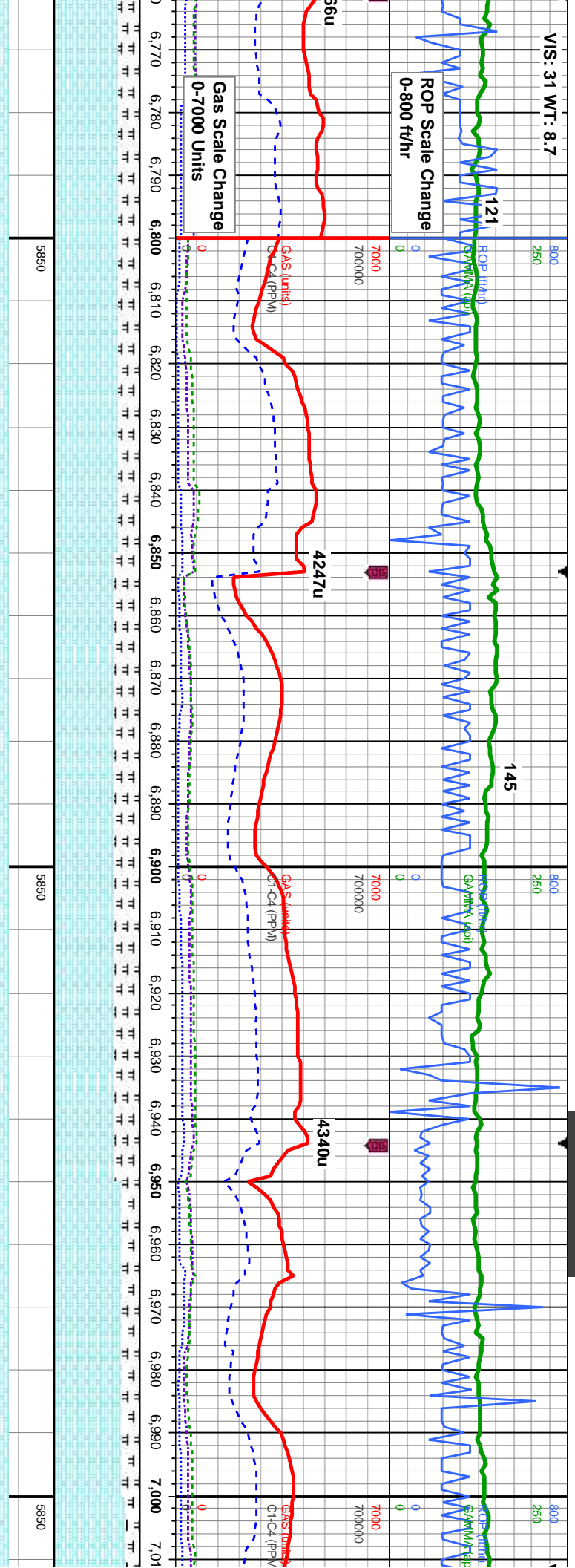
65% CHK: lt-med gy, occ dk brn, mot, sb  
ply-bkly, sft-sl frm, rthy-sb wxy, occ imbd cal, tr  
fos frags, 35%: MRLST: med-dk gy, blk, sb  
ply-bkly, sl frm-mod hd, arg-sily tex, mtx, calc,  
some uphole con, mod oc; mod stmg bl wh,  
mod-thk yel ring, tr stn

45% CHK: med-dk gy, mot, sb ply-bkly, sft-sl  
frm, rthy-sb wxy, occ imbd cal, 45%: MRLST: dk  
gy-bk, sb ply-bkly, sl frm-mod hd, arg-sily tex,  
mtx, calc, 10% Cement; mod stmg bl wh,  
mod-thk yel ring, tr stn

75% CHK: sft-sl frm,  
frags, 25%  
ply-bkly,  
mtx, calc  
mod dull

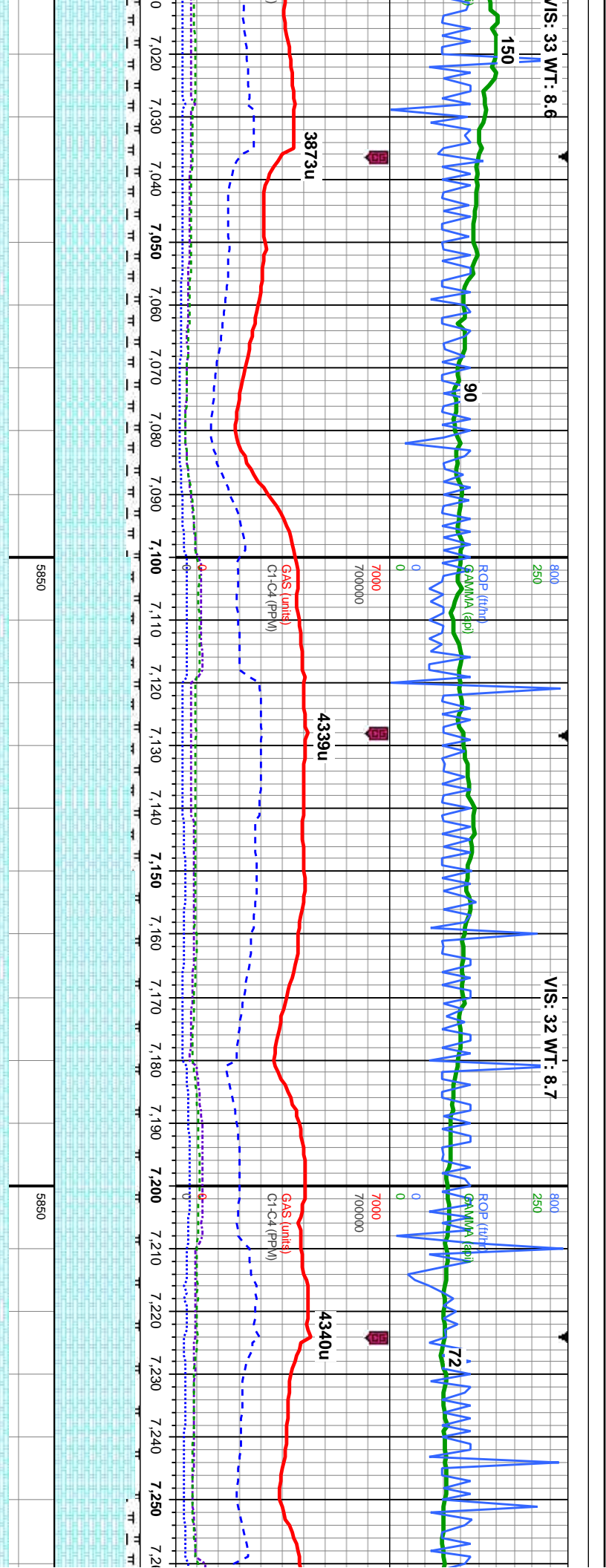






|   |   |   |  |   |  |
|---|---|---|--|---|--|
| It-med gy, mot, sb pily-biky, rthy-sb wxy, tr imbd cal, tr fos  | 75% CHK: It-med gy, mot, sb pily-biky, sft-sl frm, rthy-sb wxy, tr imbd cal, tr fos | 70% CHK: med-dk gy, occ lt gy, mot, sb pily-biky, sft-sl frm, rthy-sb wxy, tr imbd cal, 30%: MRLST: dk gy-blk, sb pily-biky, sl frm-mod hd, arg-sily tex, mtx; calc, mod od; mod sting bl wh, thn yel ring, mod sin | 70% CHK: med-dk gy, occ lt gy, mot, sb pily-biky, sft-sl frm, rthy-sb wxy, tr imbd cal, 30%: MRLST: dk gy-blk, sb pily-biky, sl frm-mod hd, arg-sily tex, mtx; calc, tr pyr, mod od; mod-fast sting bl wh, mod yel ring, mod sin | 80% CHK: med-dk gy, occ lt gy, mot, sb pily-biky, sft-sl frm, rthy-sb wxy, occ imbd cal, 20%: MRLST: dk gy-blk, sb pily-biky, sl frm-mod hd, arg-sily tex, mtx; calc, mod od; mod-fast sting bl wh, mod yel ring, mod sin | 85% CH   |
| %: MRLST: dk gy-blk, sb pily-biky, sl frm-mod hd, arg-sily tex, mod od; mod sting bl wh, yel amb ring, tr sin |   |   |  |   | sb pily-b imbd cal pily-biky mtx; calc wh, mod |
|   |   |   |  |   | wh, mod  |





MD: 7,075'  
Inclination: 88.95°  
Azimuth: 177.37°  
VS: 814.76'  
TVD: 6,203'

MD: 7,171'  
Inclination: 89.14°  
Azimuth: 177.12°  
VS: 908.81'  
TVD: 6,204'

MC  
Inc  
Az  
VS  
TV

|   |   |   |  |   |   |
|---|---|---|--|---|---|
| K: med-dk gy, occ lt gy, mot, blkly, sft-sl frm, rthy-sb wxy, occ 15%: MRLST: dk gy-blk, sb | 85% CHK: med-dk gy, occ lt gy, mot, sb ply-blky, sft-sl frm, rthy-sb wxy, occ imbd cal, 15%: MRLST: dk gy-blk, sb ply-blky, sl frm-mod hd, arg-sily tex, mt; calc, g od; mod-fast stmg bri bl wh, mod yel ring, mod stn | 90% CHK: lt-medgy, occ dk gy, mot, sb ply-blky, sft-sl frm, rthy-sb wxy, occ imbd cal, 10%: MRLST: dk gy-blk, sb ply-blky, sl frm-mod hd, arg-sily tex, mt; calc, g chk flr, g od; fast stmg bri bl wh, mod yel ring, mod stn | 95% CHK: lt-medgy, occ dk gy, mot, sb ply-blky, sft-sl frm, rthy-sb wxy, occ imbd cal, 5%: MRLST: dk gy-blk, sb ply-blky, sl frm-mod hd, arg-sily tex, mt; calc, g chk flr, g od; fast stmg bri bl wh, mod yel ring, mod stn | 95% CHK: lt-medgy, occ dk gy, mot, sb ply-blky, sft-sl frm, rthy-sb wxy, tr imbd cal, 5%: MRLST: dk gy-blk, sb ply-blky, sl frm-mod hd, arg-sily tex, mt; calc, g chk flr, g od; mod-fast stmg bri bl wh, mod yel ring, mod stn | 85% C-<br>sb ply-blky, imbd ca<br>ply-blky<br>mt; cal<br>stmg bri |
|---|---|---|--|---|---|

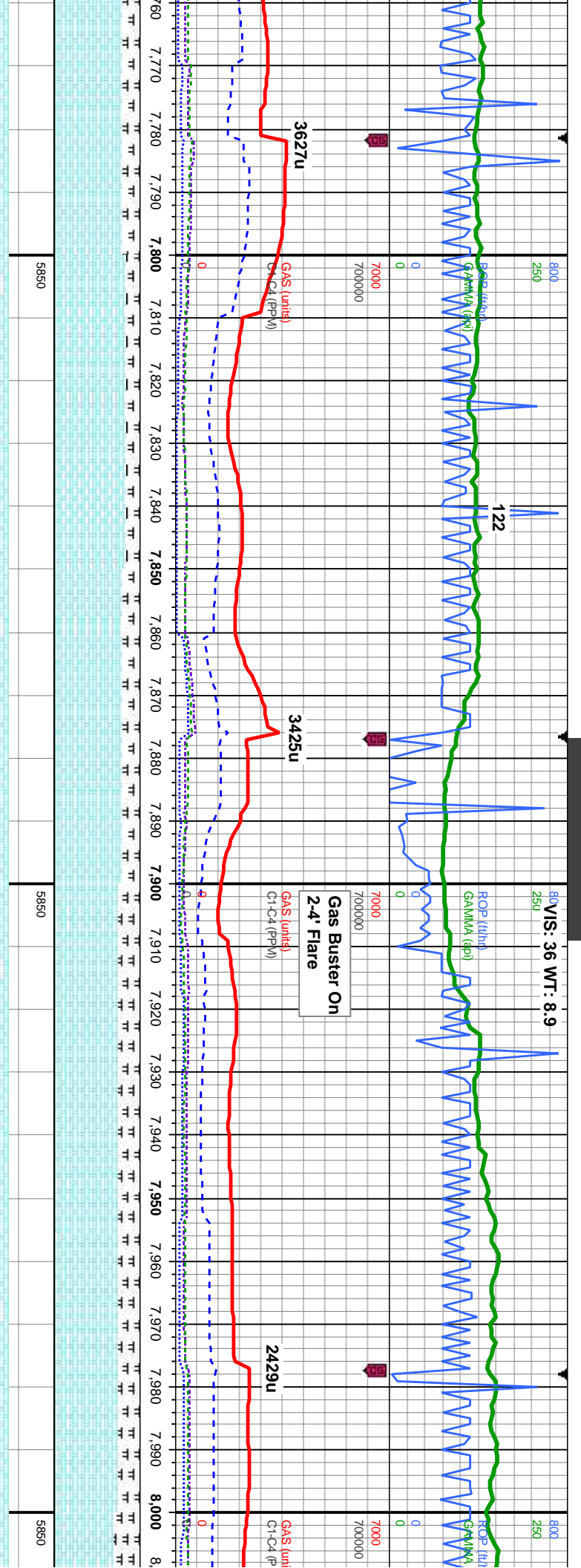








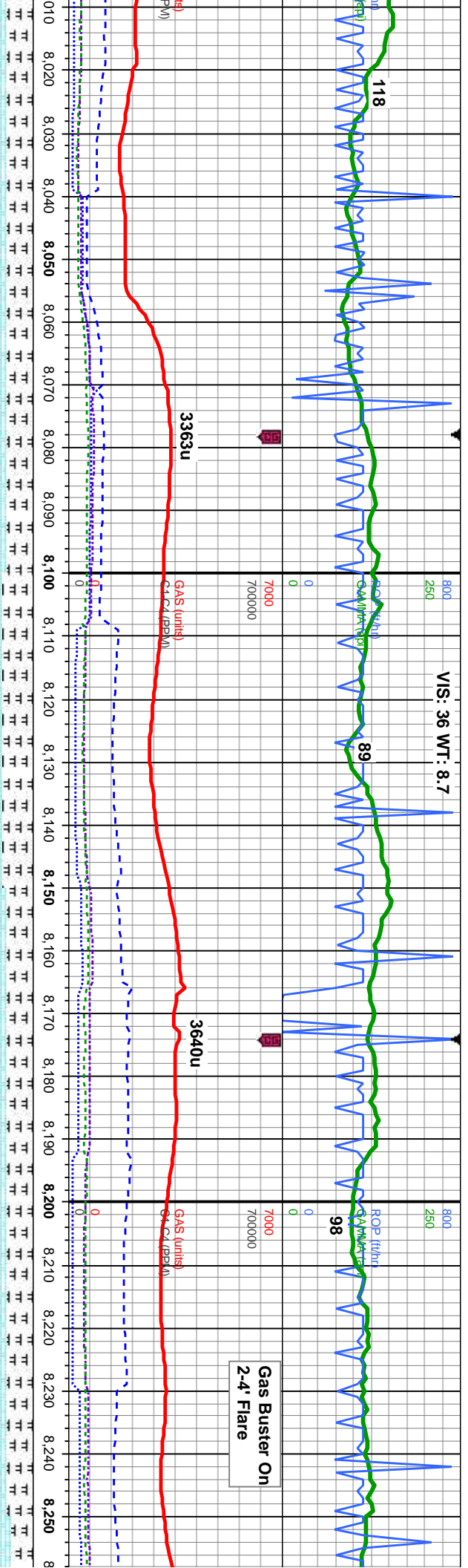




|   |  |  |  |  |
|---|--|--|--|--|
| TT  |  | 5850   | 5850   | 5850   |
| CHK: lt-medgy, occ dk gy, mot, sb<br>gy, sft-si frm, rthy-sb wxy, imbd<br>% MRLST: dk gy-blk, sb<br>ply, si frm-mod hd, arg-sily tex,<br>mtx, g od, mod milky fr bl wh, fr<br>fr yel ring, tr stn | 85% CHK: lt-medgy, occ dk gy, mot, sb<br>ply-blky, sft-si frm, rthy-sb wxy, imbd<br>cal, 15% MRLST: dk gy-blk, sb<br>ply-blky, si frm-mod hd, arg-sily tex,<br>mtx, calc, mod od, mod milky fr bl wh,<br>fr yel ring, tr stn | MD: 7.834'<br>Inclination: 91.2°<br>Azimuth: 176.59°<br>VS: 1,557.89'<br>TVD: 6,209.73'  | 80% CHK: lt-medgy, occ dk gy, mot,<br>sb ply-blky, sft-si frm, rthy-sb wxy,<br>imbd cal, 20% MRLST: dk gy-blk, sb<br>ply-blky, si frm-mod hd, arg-sily tex,<br>mtx, calc, mod od, mod milky fr bl wh,<br>fr yel ring, tr stn   | 75% CHK: lt-medgy, occ dk gy, mot,<br>sb ply-blky, sft-si frm, rthy-sb wxy,<br>imbd cal, 25% MRLST: dk gy-blk, sb<br>ply-blky, si frm-mod hd, arg-sily tex,<br>mtx, calc, g od, fast sling bri bl wh,<br>mod yel ring, mod stn |
|   | TVD (ft)   |  | TVD (ft)   | TVD (ft)   |
|   |  | MD: 7.929'<br>Inclination: 89.54°<br>Azimuth: 176.79°<br>VS: 1,651.15'<br>TVD: 6,209.12' | 75% CHK: lt-medgy, occ dk gy, mot,<br>sb ply-blky, sft-si frm, rthy-sb wxy,<br>imbd cal, 25% MRLST: dk gy-blk, sb<br>ply-blky, si frm-mod hd, arg-sily tex,<br>mtx, calc, g od, fast sling bri bl wh,<br>mod yel ring, mod stn | 70% C<br>sb ply<br>imbd c<br>ply-bl<br>mtx, c<br>wh, m   |
|   |  |  |  | TVD (ft)   |







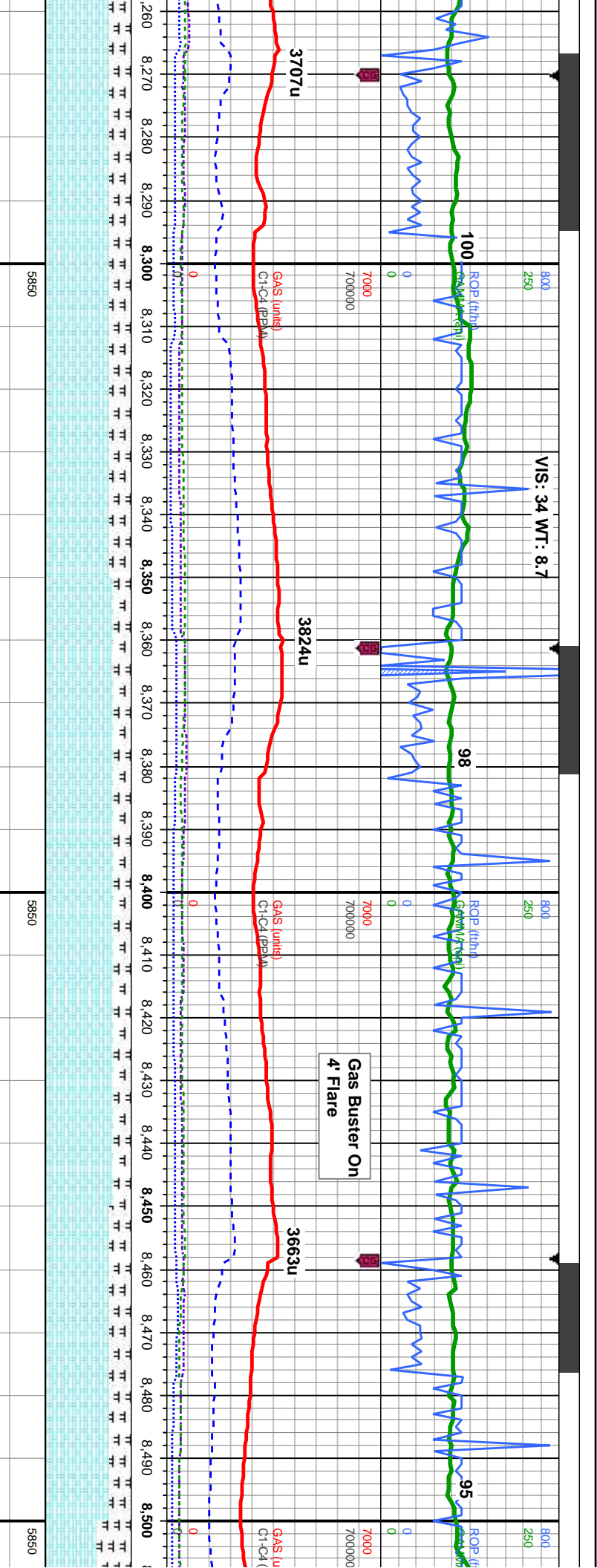
MD: 8,024'  
Inclination: 89.78°  
Azimuth: 177.38°  
VS: 1,744.28'  
TVD: 6,209.68'

MD: 8,120'  
Inclination: 90.34°  
Azimuth: 177.87°  
VS: 1,838.21'  
TVD: 6,209.58'

MD: 8,217'  
Inclination: 92.31°  
Azimuth: 178.89°  
VS: 1,932.82'  
TVD: 6,207.34'

|   |   |  |  |  |  |
|---|---|--|--|--|--|
| CHK: lt-medgy, occ dk gy, mot, -biky, sft-sl frm, rthy-sb wxy, cal, 30% MRLST: dk gy-bik, sb ply-si frm-mod hd, arg-sily tex, al-c, g od, mod stng mod bri bl mod yel ring, mod stn | 70% CHK: lt-medgy, occ dk gy, mot, sb ply-biky, sft-sl frm, rthy-sb wxy, imbd cal, 30% MRLST: dk gy-bik, sb ply-biky, si frm-mod hd, arg-sily tex, mx, calc, g od, mod strng bri bl wh, mod yel ring, mod stn | 65% CHK: lt-medgy, occ dk gy, mot, sb ply-biky, sft-sl frm, rthy-sb wxy, imbd cal, tr fos frags, 35% MRLST: dk gy-bik, sb ply-biky, si frm-mod hd, arg-sily tex, mx, calc, g od, fast bri bl wh, mod yel ring, mod stn | 70% CHK: lt-medgy, occ dk gy, mot, sb ply-biky, sft-sl frm, rthy-sb wxy, imbd cal, tr fos frags, 30% MRLST: dk gy-bik, sb ply-biky, si frm-mod hd, arg-sily tex, mx, calc, tr pyr, g od, fast bri bl wh, mod yel ring, mod stn | 70% CHK: lt-medgy, occ dk gy, mot, sb ply-biky, sft-sl frm, rthy-sb wxy, imbd cal, tr fos frags, 30% MRLST: dk gy-bik, sb ply-biky, si frm-mod hd, arg-sily tex, mx, calc, tr pyr, g od, v fast bri bl wh, thk yel ring, g stn | 75% CHK: lt-medgy, occ dk gy, mot, sb ply-biky, sft-sl frm, rthy-sb wxy, imbd cal, tr fos frags, 30% MRLST: dk gy-bik, sb ply-biky, si frm-mod hd, arg-sily tex, mx, calc, tr pyr, g od, v fast bri bl wh, thk yel ring, g stn |
|---|---|--|--|--|--|





MD: 8,312'  
Inclination: 89.81°  
Azimuth: 177.82°  
VS: 2,025.49'  
TVD: 6,205.58'

MD: 8,407'  
Inclination: 90.89°  
Azimuth: 176.58°  
VS: 2,118.58'  
TVD: 6,205'

MD: 8,503'  
Inclination:  
Azimuth: 17  
VS: 2,212.5'  
TVD: 6,204

CHK: med-dk gy, occ lt gy, mot,  
gy-biky, sft-sl frm, rthy-sb wxy, occ  
cal, tr fos frags, 25% MRLST: dk  
s, sb pily-biky, sl frm-mod hd,  
arg-sily tex, mtb; calc, g od, v fast bri bl  
wh, thk yel ring, g sin

75% CHK: med-dk gy, occ lt gy, mot,  
sb pily-biky, sft-sl frm, rthy-sb wxy, occ  
imbd cal, tr fos frags, 25% MRLST: dk  
gy-bik, sb pily-biky, sl frm-mod hd,  
arg-sily tex, mtb; calc, g od, v fast bri bl  
wh, thk yel ring, g sin

80% CHK: med-dk gy, occ lt gy, mot,  
sb pily-biky, sft-sl frm, rthy-sb wxy, occ  
imbd cal, 20% MRLST: dk gy-bik, sb  
pily-biky, sl frm-mod hd, arg-sily tex,  
mtb; calc, g od, v fast bri bl wh, thk yel  
ring, g sin

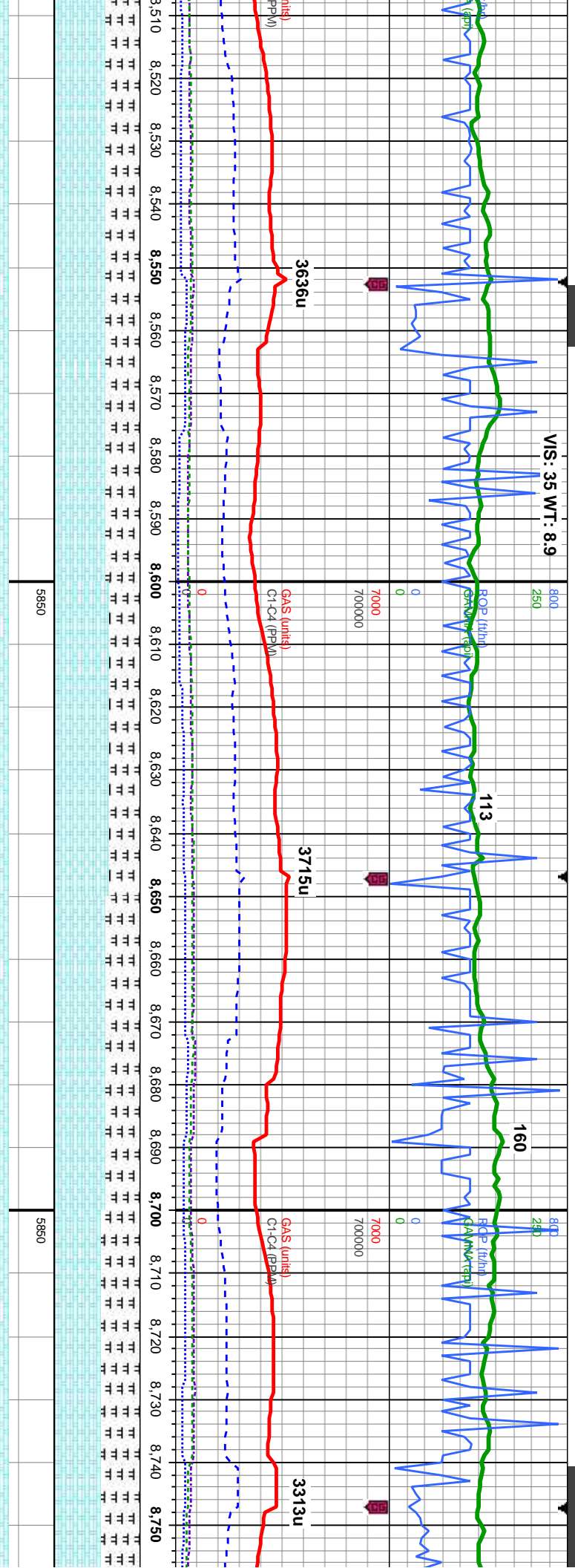
80% CHK: med-dk gy, occ lt gy, mot,  
sb pily-biky, sft-sl frm, rthy-sb wxy, occ  
imbd cal, 20% MRLST: dk gy-bik, sb  
pily-biky, sl frm-mod hd, arg-sily tex,  
mtb; calc, g od, fast bri bl wh, mod yel  
ring, mod sin

75% CHK: med-dk gy, tr lt gy, mot, sb  
pily-biky, sft-sl frm, rthy-sb wxy, occ  
imbd cal, 25% MRLST: dk gy-bik, sb  
pily-biky, sl frm-mod hd, arg-sily tex,  
mtb; calc, tr pyr, g od, fast bri bl wh,  
mod yel ring, mod sin

60%  
pily-t  
imbd  
pily-t  
mtb;  
wh, f







90.12°  
6.17°  
2'  
.15'

MD: 8,598'  
Inclination: 89.69°  
Azimuth: 176.47°  
VS: 2,306.29'  
TVD: 6,204.31'

MD: 8,693'  
Inclination: 90.83°  
Azimuth: 176.97°  
VS: 2,399.54'  
TVD: 6,203.88'

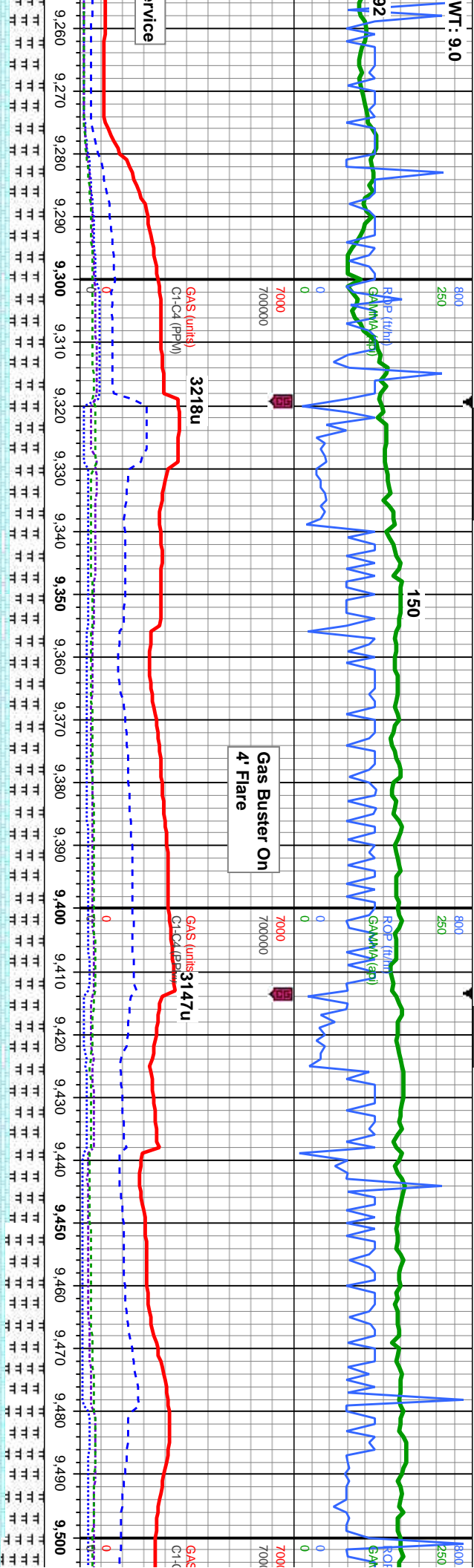
|  |  |  |  |   |   |
|--|--|--|--|---|---|
| CHK: med-dk gy, tr lt gy, mot, sb      | 60% CHK: med-dk gy, tr lt gy, mot, sb  | 65% CHK: med-dk gy, tr lt gy, mot, sb    | 60% CHK: med-dk gy, tr lt gy, mot, sb  | 55% CHK: med-dk gy, tr lt gy, mot, sb   | 55%                                     |
| ply-biky, sft-si frm, rthy-sb wxy, occ | ply-biky, sft-si frm, rthy-sb wxy, occ | ply-biky, sft-si frm, rthy-sb wxy, occ   | ply-biky, sft-si frm, rthy-sb wxy, occ | ply-biky, sft-si frm, rthy-sb wxy, imbd | ply-biky, sft-si frm, rthy-sb wxy, imbd |
| cal, 40% MRLST: dk gy-bik, sb          | imbd cal, 40% MRLST: dk gy-bik, sb     | imbd cal, tr fos frags, 35% MRLST: dk    | imbd cal, 40% MRLST: dk gy-bik, sb     | cal, 45% MRLST: dk gy-bik, sb           | cal, 45% MRLST: dk gy-bik, sb           |
| ply-biky, si frm-mod hd, arg-sily tex, | ply-biky, si frm-mod hd, arg-sily tex, | gy-bik, sb ply-biky, si frm-mod hd,      | ply-biky, si frm-mod hd, arg-sily tex, | ply-biky, si frm-mod hd, arg-sily tex,  | ply-biky, si frm-mod hd, arg-sily tex,  |
| cal, tr pyr, mod od, slow-mod bl       | mtx, calc, tr pyr, mod od, slow-mod bl | arg-sily tex, mtx, calc, tr pyr, mod od, | mtx, calc, tr pyr, mod od, slow-mod bl | mtx, calc, mod od, slow-mod stng bri    | mtx, calc, mod od, slow-mod stng bri    |
| wh, fr yel ring, fr stn                | wh, fr yel ring, fr stn                | slow-mod bl wh, fr yel ring, fr stn      | wh, fr yel ring, fr stn                | mod yel brn stn                         | mod yel brn stn                         |







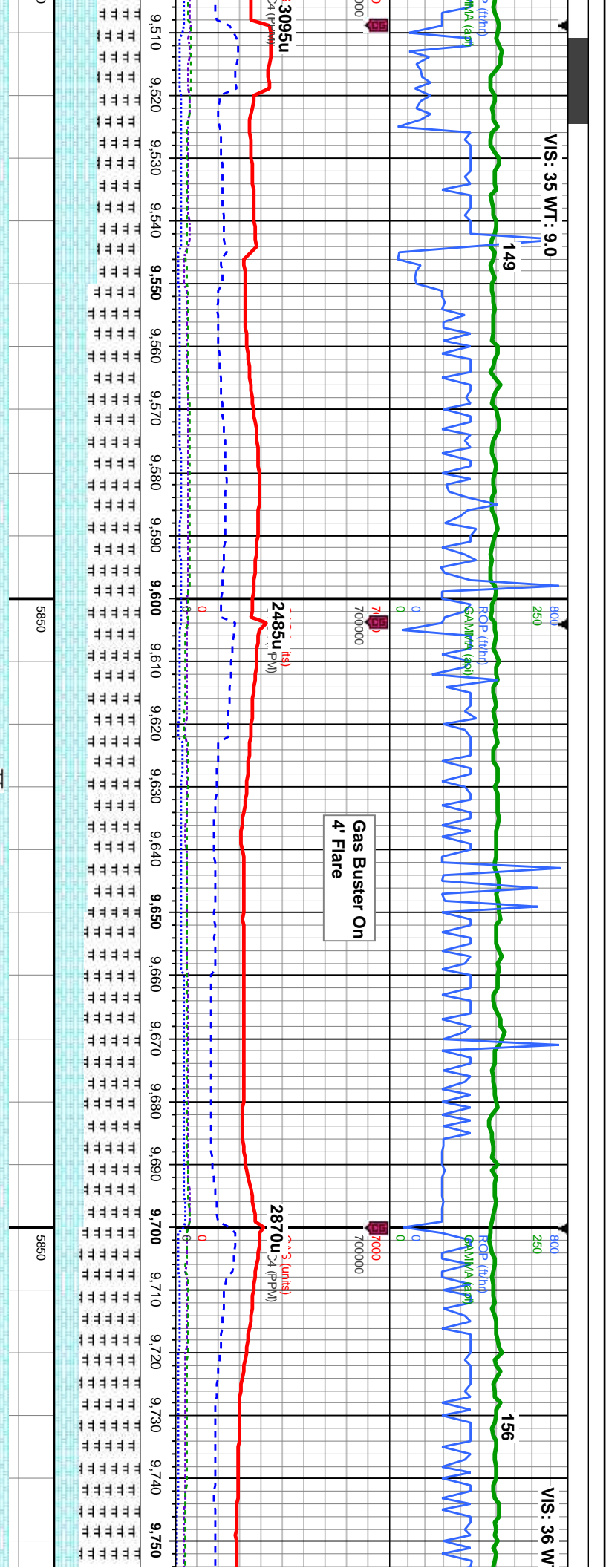




|   |  |  |  |  |  |
|---|--|--|--|--|--|
| MD: 9,267'<br>Inclination: 87.26°<br>Azimuth: 175.64°<br>VS: 2,962.47'<br>TVD: 6,205.89'  |  | MD: 9,362'<br>Inclination: 88.8°<br>Azimuth: 176.35°<br>VS: 3,055.89'<br>TVD: 6,209.15'  |  | MD: 9,457'<br>Inclination: 90.46°<br>Azimuth: 176.7°<br>VS: 3,149.19'<br>TVD: 6,209.77'  |  |
| 60% CHK: med-dk gy, occ lt gy, mot, mot, sb ply-biky, sft-sl frm, rthy-sb wxy, some imbd cal, 40% MRLST: dk gy-blk, sb ply-biky, sl frm-mod hd, arg-sily tex, mt; calc, tr fos frags, g od; w-mod sting bri wh bl, even mod amb ring, mod yel brn stn | 60% CHK: med-dk brn gy, occ lt gy, mot, sb ply-biky, sft-sl frm, rthy-sb wxy, some imbd cal, 40% MRLST: dk gy-blk, sb ply-biky, sl frm-mod hd, arg-sily tex, mt; calc, tr fos frags, mod sting bri wh bl, even mod thk mod yel amb ring, mod yel brn stn | 60% CHK: med-dk brn gy, occ lt gy, mot, sb ply-biky, sft-sl frm, rthy-sb wxy, some imbd cal, 40% MRLST: dk gy-blk, sb ply-biky, sl frm-mod hd, arg-sily tex, mt; calc, tr fos frags, mod sting bri wh bl, even mod thk mod yel amb ring, mod yel brn stn | 60% CHK: med-dk brn gy, occ lt gy, mot, sb ply-biky, sft-sl frm, rthy-sb wxy, some imbd cal, 40% MRLST: dk gy-blk, sb ply-biky, sl frm-mod hd, arg-sily tex, mt; calc, tr fos frags, mod-fast sting bri wh bl, even thk mod wh yel ring, mod yel brn stn | 55% CHK: med-dk brn gy, occ lt gy, mot, sb ply-biky, sft-sl frm, rthy-sb wxy, some imbd cal, 45% MRLST: dk gy-blk, sb ply-biky, sl frm-mod hd, arg-sily tex, mt; calc, tr fos frags, mod-fast sting bri wh bl, even thk mod wh yel ring, mod yel brn stn | 50% CHK: med-dk brn gy, occ lt gy, mot, sb ply-biky, sft-sl frm, rthy-sb wxy, some imbd cal, 40% MRLST: dk gy-blk, sb ply-biky, sl frm-mod hd, arg-sily tex, mt; calc, tr fos frags, mod-fast sting bri wh bl, even thk mod wh yel ring, mod yel brn stn |





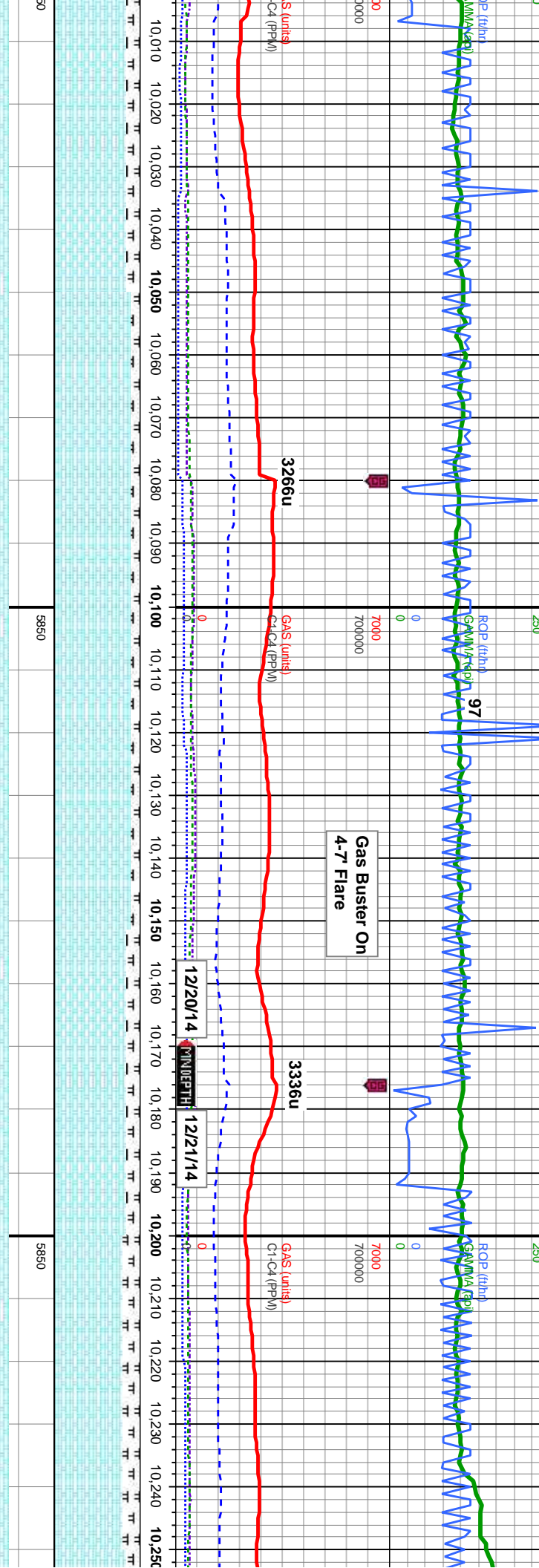


|   |   |  |   |  |   |
|---|---|--|---|--|---|
| MD: 9.552'<br>Inclination: 89.6°<br>Azimuth: 175.49°<br>VS: 3,242.64'<br>TVD: 6,209.72' |   | MD: 9.647'<br>Inclination: 89.94°<br>Azimuth: 176.57°<br>VS: 3,336.1'<br>TVD: 6,210.1' |   | MD: 9.743'<br>Inclination: 89.97°<br>Azimuth: 177.99°<br>VS: 3,430.14'<br>TVD: 6,210.17' |   |
| 60% MRLST: dk gy-blk, sb pty-blky, sl   | 60% MRLST: dk gy-blk, sb pty-blky, sl                                     | 65% MRLST: dk gy-blk, sb pty-blky, sl  | 70% MRLST: dk gy-blk, sb pty-blky, sl                                   | 70% MRLST: dk gy-blk, sb pty-blky, sl  | 70% MRLST: dk gy-blk, sb pty-blky, sl                                   |
| frn-mod hd, arg-sily tex, mtx; calc 40%   | frn-mod hd, arg-sily tex, mtx; calc 40%                                   | frn-mod hd, arg-sily tex, mtx; calc 35%  | frn-mod hd, arg-sily tex, mtx; calc 30%                                 | frn-mod hd, arg-sily tex, mtx; calc 30%  | frn-mod hd, arg-sily tex, mtx; calc 30%                                 |
| CHK: med-dk brn gy, occ lt gy, mot, sb  | CHK: med-dk brn gy, occ lt gy, mot, sb                                    | CHK: med-dk brn gy, occ lt gy, mot, sb   | CHK: med-dk brn gy, occ lt gy, mot, sb                                  | CHK: med-dk brn gy, occ lt gy, mot, sb   | CHK: med-dk brn gy, occ lt gy, mot, sb                                  |
| pty-blky, sft-sl frm, rthy-sb wxy, tr imbd  | pty-blky, sft-sl frm, rthy-sb wxy, tr imbd                                | pty-blky, sft-sl frm, rthy-sb wxy, tr imbd   | pty-blky, sft-sl frm, rthy-sb wxy, tr imbd                              | pty-blky, sft-sl frm, rthy-sb wxy, tr imbd   | pty-blky, sft-sl frm, rthy-sb wxy, tr imbd                              |
| cal, mod od; slow-mod sting bri wh bl, even mod thk mod wh yel ring;thk yel             | cal, mod od; slow sting bri wh bl, even mod thk mod yel amb ring, mod yel | cal, mod od; slow sting bri wh bl, even mod thk mod yel amb ring, mod yel              | cal, mod od; v slow sting bri wh bl, even mod thk mod yel amb ring, mod | cal, mod od; v slow sting bri wh bl, even mod thk mod yel amb ring, mod                  | cal, mod od; v slow sting bri wh bl, even mod thk mod yel amb ring, mod |
| brn stn   | brn stn   | brn stn  | yel brn stn   | yel brn stn  | yel brn stn   |



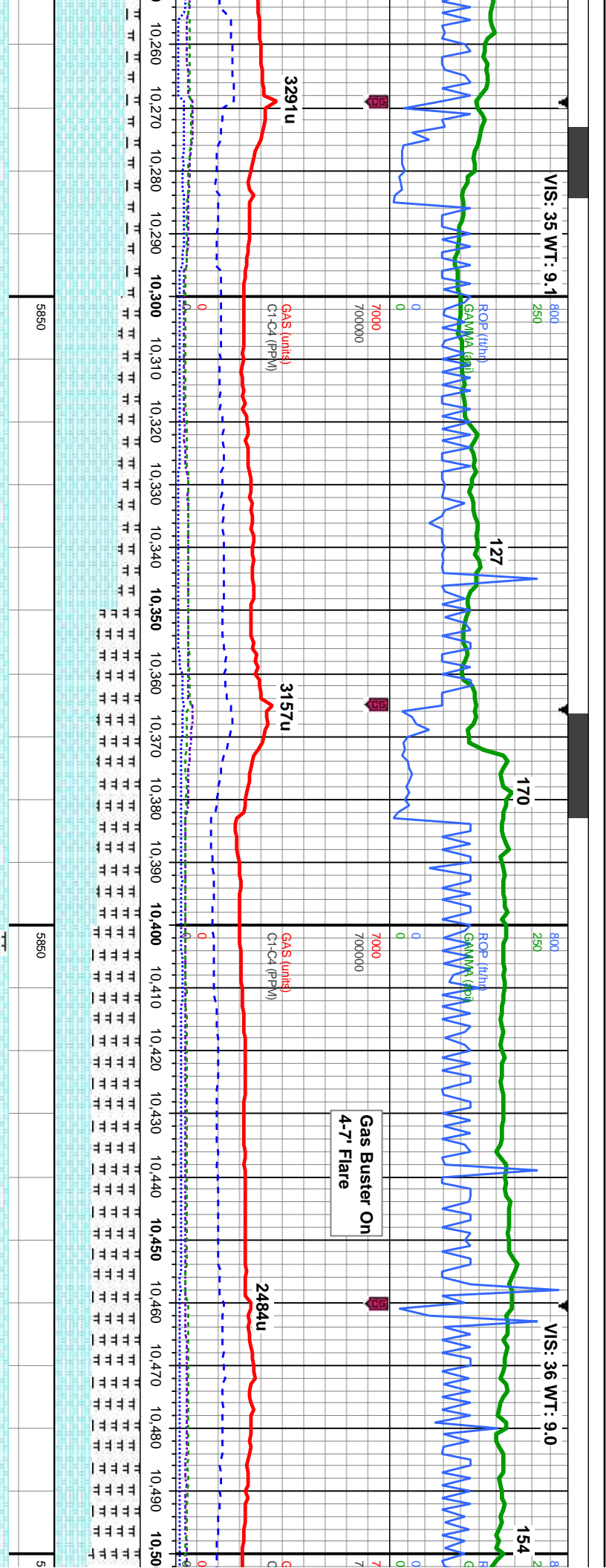






|   |   |   |   |   |   |
|---|---|---|---|---|---|
| MD: 10,028'<br>Inclination: 89.2°<br>Azimuth: 176.25°<br>VS: 3,709.83'<br>TVD: 6,206.82'  |   | MD: 10,124'<br>Inclination: 90.59°<br>Azimuth: 177.01°<br>VS: 3,804.09'<br>TVD: 6,206.99'   |   | MD: 10,218'<br>Inclination: 91.24°<br>Azimuth: 175.59°<br>VS: 3,896.47'<br>TVD: 6,205.49'   |   |
| 90% CHK: lt-med gy, occ dk gy brn, mot, sb pily-biky, sft-sl frm, rthy-sb wxy, some imbd cal 10% MRLST: dk gy-blk, sb pily-biky, sl frm-mod hd, arg-sily tex, mtx; calc, tr fos frags, mod chk flor, g od, mod-fast sting bri wh bl, even mod thk yel amb ring, mod yel brn stn | 90% CHK: lt-med gy, occ dk gy brn, mot, sb pily-biky, sft-sl frm, rthy-sb wxy, some imbd cal 10% MRLST: dk gy-blk, sb pily-biky, sl frm-mod hd, arg-sily tex, mtx; calc, tr fos frags, mod chk flor, g od, mod-fast sting bri wh bl, even mod thk yel amb ring, mod yel brn stn | 85% CHK: lt-med gy, occ dk gy brn, mot, sb pily-biky, sft-sl frm, rthy-sb wxy, some imbd cal 15% MRLST: dk gy-blk, sb pily-biky, sl frm-mod hd, arg-sily tex, mtx; calc, tr fos frags, mod chk flor, g od, mod chk flor, g od, mod-fast sting bri wh bl, even mod yel amb ring, mod yel brn stn | 80% CHK: lt-med gy, occ dk gy brn, mot, sb pily-biky, sft-sl frm, rthy-sb wxy, some imbd cal 20% MRLST: dk gy-blk, sb pily-biky, sl frm-mod hd, arg-sily tex, mtx; calc, g od, mod chk flor, g od, fast sting bri wh bl, even mod yel amb ring, mod yel brn stn | 80% CHK: lt-med gy, occ dk gy brn, mot, sb pily-biky, sft-sl frm, rthy-sb wxy, some imbd cal 20% MRLST: dk gy-blk, sb pily-biky, sl frm-mod hd, arg-sily tex, mtx; calc, g od, mod chk flor, g od, fast sting bri wh bl, even mod yel amb ring, mod yel brn stn | 80% CHK: lt-med gy, occ dk gy brn, mot, sb pily-biky, sft-sl frm, rthy-sb wxy, some imbd cal 20% MRLST: dk gy-blk, sb pily-biky, sl frm-mod hd, arg-sily tex, mtx; calc, g od, mod chk flor, g od, fast sting bri wh bl, even mod yel amb ring, mod yel brn stn |

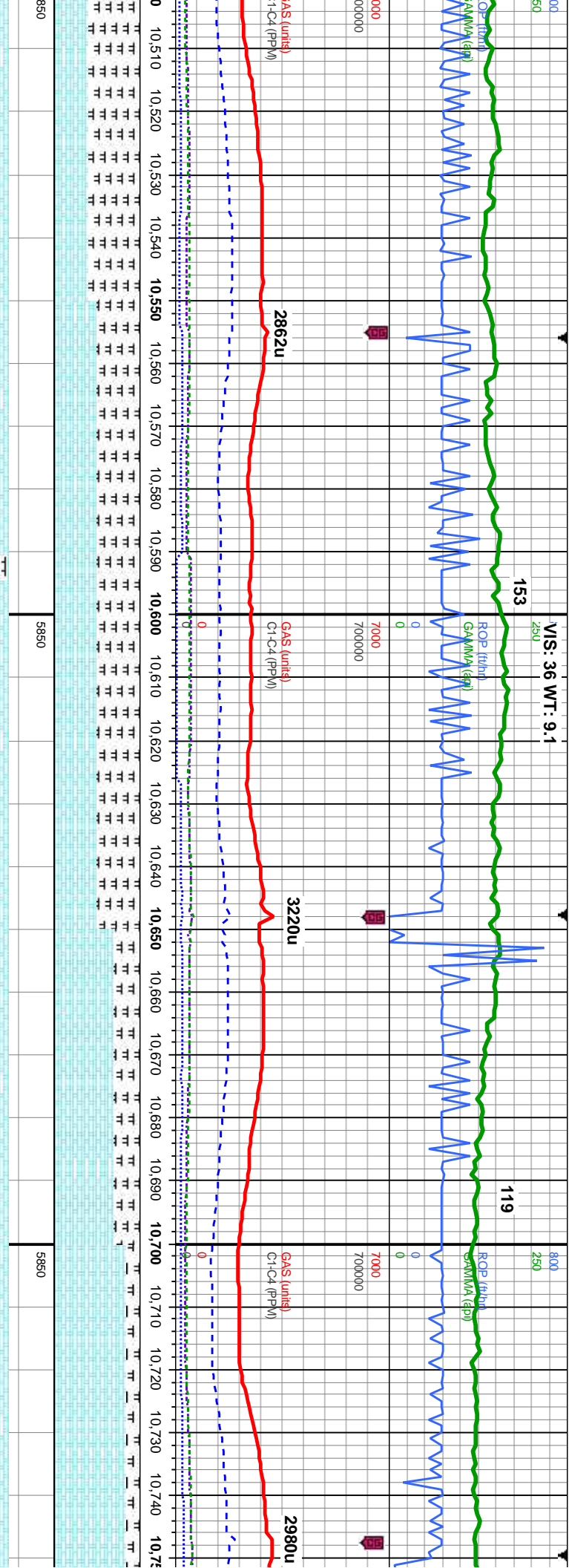




|  |   |   |   |   |
|--|---|---|---|---|
| 5% CHK: lt-med gy, occ dk gy bm, mot, sb pty-biky, sft-sl frm, rthy-sb wxy, some imbd cal 15% MRLST: dk gy-bik, sb pty-biky, sl frm-mod hd, arg-sily tex, mix; calc, g od, mod chk | 75% CHK: lt-med gy, occ dk gy bm, mot, sb pty-biky, sft-sl frm, rthy-sb wxy, some imbd cal 25% MRLST: dk gy-bik, sb pty-biky, sl frm-mod hd, arg-sily tex, mix; calc, tr fos frags, g od, mod chk | 50% MRLST: dk gy-bik, sb pty-biky, sl frm-mod hd, arg-sily tex, mix; calc 50% CHK: med-dk brn gy, occ lt gy, mot, sb pty-biky, sft-sl frm, rthy-sb wxy, tr imbd cal, mod od, mod sting wh bl, even dull | 55% MRLST: dk gy-bik, sb pty-biky, sl frm-mod hd, arg-sily tex, mix; calc 45% CHK: med-dk brn gy, occ lt gy, mot, sb pty-biky, sft-sl frm, rthy-sb wxy, tr imbd cal, mod od, mod sting wh bl, even dull | 55% MRLST: dk gy-bik, sb pty-biky, sl frm-mod hd, arg-sily tex, mix; calc 45% CHK: med-dk brn gy, occ lt gy, mot, sb pty-biky, sft-sl frm, rthy-sb wxy, tr imbd cal, mod od, mod sting wh bl, even dull |
| MD: 10,314'<br>Inclination: 90.56°<br>Azimuth: 175.77°<br>VS: 3,991.01'<br>TVD: 6,203.98'  | MD: 10,410'<br>Inclination: 89.1°<br>Azimuth: 176.38°<br>VS: 4,085.44'<br>TVD: 6,204.27'  | MD: 10,410'<br>Inclination: 89.1°<br>Azimuth: 176.38°<br>VS: 4,085.44'<br>TVD: 6,204.27'  | MD: 10,410'<br>Inclination: 89.1°<br>Azimuth: 176.38°<br>VS: 4,085.44'<br>TVD: 6,204.27'  | MD: 10,410'<br>Inclination: 89.1°<br>Azimuth: 176.38°<br>VS: 4,085.44'<br>TVD: 6,204.27'  |







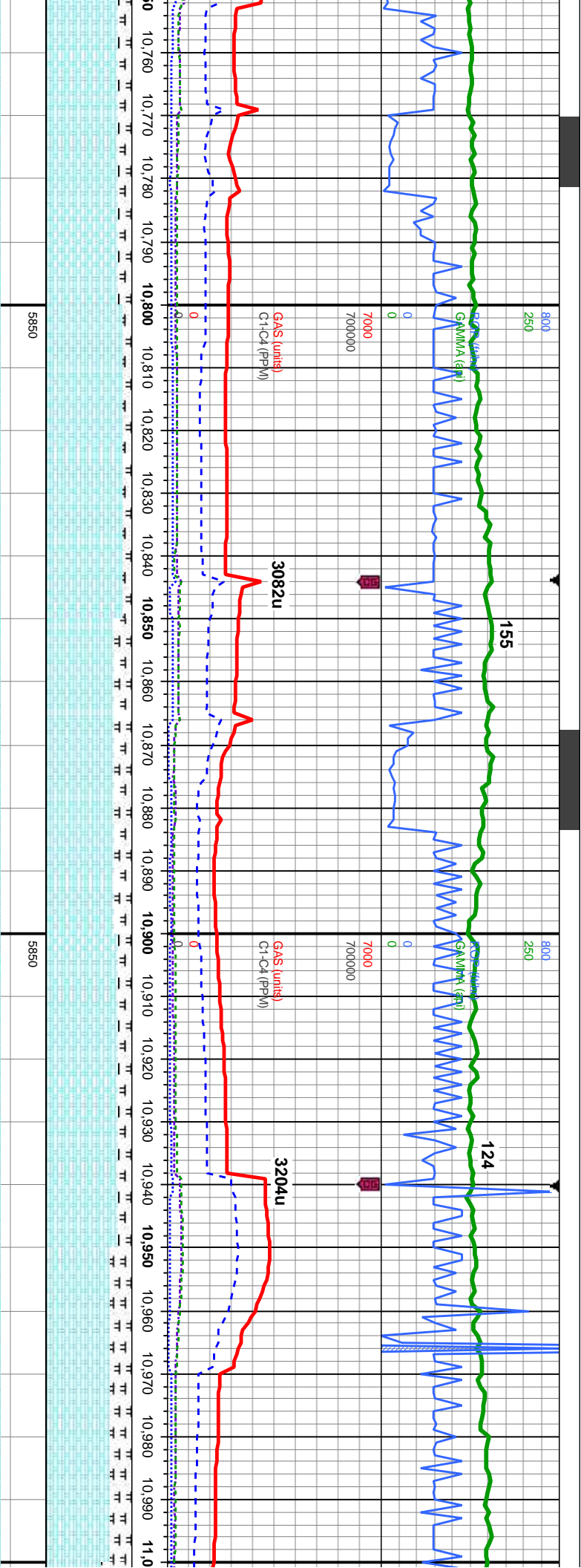
10,505'  
Inclination: 89.72°  
Azimuth: 176.68°  
VS: 4,178.75'  
TVD: 6,205.25'

MD: 10,600'  
Inclination: 89.88°  
Azimuth: 176.9°  
VS: 4,271.98'  
TVD: 6,205.58'

MD: 10,696'  
Inclination: 90.31°  
Azimuth: 177.56°  
VS: 4,366.04'  
TVD: 6,205.42'

|  |  |   |   |  |
|--|--|---|---|--|
| 100% MRLST: dk gy-blk, sb ply-blky, sl     | 50% MRLST: dk gy-blk, sb ply-blky, sl      | 50% CHK: med-dk gy, tr it gy, mot, sb   | 70% CHK: med-dk gy, tr it gy, mot, sb   | 85% CHK: lt-med gy, occ dk gy brn,         |
| frn-mod hd, arg-sily tex, mt; calc 40%     | frn-mod hd, arg-sily tex, mt; calc 50%     | ply-blky, sft-sl frm, rthy-sb wxy, some | ply-blky, sft-sl frm, rthy-sb wxy, some | mot, sb ply-blky, sft-sl frm, rthy-sb wxy, |
| CHK: med-dk brn gy, occ lt gy, mot, sb     | CHK: med-dk brn gy, occ lt gy, mot, sb     | imbd cal, 50% MRLST: dk gy-blk, sb      | imbd cal, 30% MRLST: dk gy-blk, sb      | gy-blk, sb ply-blky, sl frn-mod hd,        |
| ply-blky, sft-sl frm, rthy-sb wxy, tr imbd | ply-blky, sft-sl frm, rthy-sb wxy, tr imbd | ply-blky, sl frn-mod hd, arg-sily tex,  | ply-blky, sl frn-mod hd, arg-sily tex,  | arg-sily tex, mt; calc, tr fos frags, mod  |
| cal, mod od, mod sting wh bl, even it      | cal, mod od, mod sting wh bl, even it      | mt; calc, mod od, mod sting wh bl,      | mt; calc, mod od, mod sting wh bl,      | chk flr, g od, fast sting wh bl, even yel  |
| yel amb ring, tr yel brn stn               | yel amb ring, tr yel brn stn               | even it yel amb ring, tr yel brn stn    | even it yel amb ring, tr yel brn stn    | amb ring, mod yel brn stn                  |

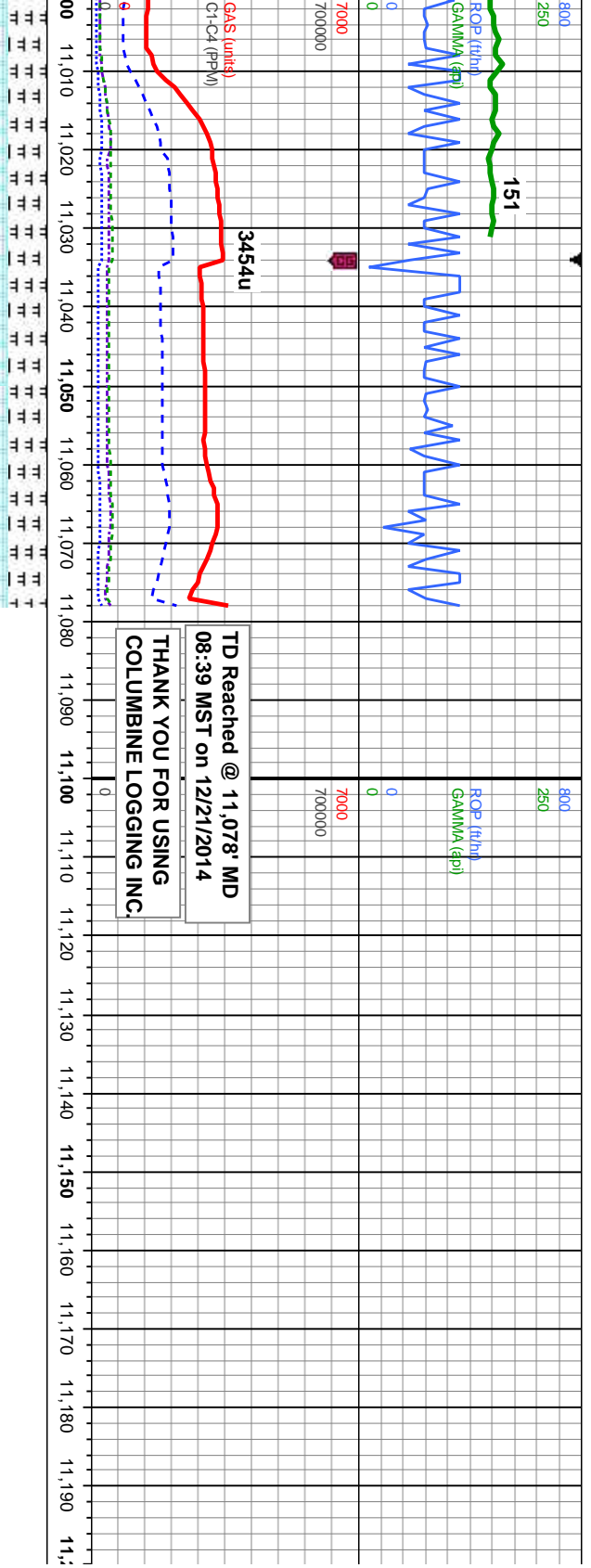




|   |  |  |  |   |   |  |
|---|--|--|--|---|---|--|
| MD: 10,791'<br>Inclination: 90.43°<br>Azimuth: 177.15°<br>VS: 4,459.08'<br>TVD: 6,204.81' |  | 90% CHK: lt-med gy, occ dk gy brn, mot, sb pily-blky, sft-sl frm, rthy-sb wxy, some imbd cal 15% MRLST: dk gy-blk, sb pily-blky, sl frm-mod hd, arg-sily tex, mt; calc, tr fos frags, mod chk flr, g od, fast stmg wh bl, even yel amb ring, mod yel brn stn | 90% CHK: lt-med gy, occ dk gy brn, mot, sb pily-blky, sft-sl frm, rthy-sb wxy, some imbd cal 10% MRLST: dk gy-blk, sb pily-blky, sl frm-mod hd, arg-sily tex, mt; calc, tr fos frags, mod chk flr, g od, fast stmg wh bl, even yel amb ring, mod yel brn stn | 80% CHK: lt-med gy, mot, sb pily-blky, sft-sl frm, rthy-sb wxy, occ imbd cal 20% MRLST: dk gy-blk, sb pily-blky, sl frm-mod hd, arg-sily tex, mt; calc, tr fos frags, g od, fast stmg wh bl, even yel amb ring, mod yel brn stn | 85% CHK: lt-med gy, mot, sb pily-blky, sft-sl frm, rthy-sb wxy, occ imbd cal 15% MRLST: dk gy-blk, sb pily-blky, sl frm-mod hd, arg-sily tex, mt; calc, tr fos frags, g od, fast stmg wh bl, even yel amb ring, mod yel brn stn | 75% CHK: lt-med gy, occ dk gy, mot, sb pily-blky, sft-sl frm, rthy-sb wxy, occ imbd cal 25% MRLST: dk gy-blk, sb pily-blky, sl frm-mod hd, arg-sily tex, mt; calc, tr fos frags, mod od, fast stmg wh bl, even yel amb ring, mod yel brn stn |
|---|--|--|--|---|---|--|







MD: 11,025'  
Inclination: 90.62°  
Azimuth: 177.59°  
VS: 4,688.36'  
TVD: 6,204.09'

MD: 11,078'  
Inclination: 90.62°  
Azimuth: 177.59°  
VS: 4,740.22'  
TVD: 6,203.51'

65% CHK: lt-med gy, occ dk gy, mot, sb pily-biky, sft-sl frm, rthy-sb wxy, occ imbd cal 35% MRLST: dk gy-blk, sb pily-biky, sl frm-mod hd, arg-sily tex, mtx; calc, mod od, mod stmg wh bl, even yel thin amb ring, tr yel brn stn

