



# Weatherford<sup>®</sup>

## Surface Logging Systems

Scale 1:240 (5"=100') Imperial  
Measured Depth Log

888 DeLmont Dr.  
Durham, NC 28601  
704-227-8100

2122 Melodi Ln.  
P.O. Box 400  
Casper, WY 82601  
307-265-2124

Well Name: WAAG 11

API: 05-123-40360-00

Location: Sec. 19, T7N-R65W Weld County, Colorado

License Number: AFE: 14-172

Spud Date: 6/10/2015

Region: Wattenburg

Drilling Completed: 7/19/2015

Surface Coordinates: Northing: 1448304.24'; Easting: 3220341.42'

Bottom Hole From projection to bit survey: 345.38' N, 278.31' W from surface hole location  
Coordinates:

Ground Elevation (ft): 4885'

K.B. Elevation (ft): 4909'

Logged Interval (ft): 4000'

To: 7570'

Total Depth (ft): 7570'

Formation: Niobrara B Chalk

Type of Drilling Fluid: Water Based

Printed by MUD.LOG from WellSight Systems 1-800-447-1534 [www.WellSight.com](http://www.WellSight.com)

### OPERATOR

Company: Extraction Oil & Gas

Address: 1888 Sherman Street, Suite 200  
Denver, CO 80203

### GEOLOGIST

Name: Jennifer Anderson & Douglas Bower

Company: Weatherford, Surface Logging Systems

Address: 2122 Melodi Lane  
Casper, WY 82601  
307-265-2124

### Supervision:

Project Geologist: Vivian Spiess

Company Representatives: Jose Torres and Hugh McGraw

### Personnel:

Contractor: Helmerich & Payne Rig 316

Contractor Representatives:

Directional Services: Phoenix Technology Services

Directional Drillers:

MWD/LWD: Seth Theriot & Damon Decker

## Comments:

Hotwire Calibrated 1% Methane=100u=1000ppm.

## ROCK TYPES

Anhy  
Bent  
Brec  
Cht

Clyst  
Coal  
Congl  
Dol

Gyp  
Igne  
Lmst  
Meta

Mrlst  
Salt  
Shale  
Shcol

Shgy  
Sltst  
Ss  
Till

## ACCESSORIES

### MINERAL

Anhy  
Arggrn  
Arg  
Bent  
Bit  
Brecfrag  
Calc  
Carb  
Chtdk  
Chtlt  
Dol  
Feldspar  
Ferrpel  
Ferr  
Glau

Gyp  
Hvymin  
Kaol  
Marl  
Minxl  
Nodule  
Phos  
Pyr  
Salt  
Sandy  
Silt  
Sil  
Sulphur  
Tuff

### FOSSIL

Algae  
Amph  
Belm  
Bioclst  
Brach  
Bryozoa  
Cephal  
Coral  
Crin  
Echin  
Fish  
Foram  
Fossil  
Gastro  
Oolite

Ostra  
Pelec  
Pellet  
Pisolite  
Plant  
Strom

### STRINGER

Anhy  
Arg  
Bent  
Coal  
Dol  
Gyp  
Ls  
Mrst

Sltstrg  
Ssstrg

### TEXTURE

Boundst  
Chalky  
Cryxln  
Earthy  
Finexln  
Grainst  
Lithogr  
Microxln  
Mudst  
Packst  
Wackest

## OTHER SYMBOLS

### POROSITY

Earthy  
Fenest  
Fracture  
Inter  
Moldic  
Organic  
Pinpoint

Vuggy

### SORTING

Well  
Moderate  
Poor

### ROUNDING

Rounded  
Subrnd  
Subang  
Angular

Spotted  
Ques  
Dead

### INTERVAL

Core  
Dst

### EVENT

Rft  
Sidewall

### OIL SHOW

Even

### Curve Track 1

ROP (min/ft)  
GAS (units)  
GR (API)

—  
—  
—

Depth

Lithology

Geological Descriptions

### C1-C4

C1 (units)  
C2 (units)  
C3 (units)  
C4 (units)

ROP (min/ft)  
GAS (units)  
GR (API)

500  
150

BHA #1  
Bit: 8 3/4" Smith 519  
Motor: Phoenix HR, 2.12° Bend

Extraction Oil & Gas  
WAAG 11  
H&P 319

Weld Co., Colorado  
Sec. 19-T7N-R65W

Weatherford SLS  
Logging Start: @ 4000'  
July 16, 2015 @ 7:12 AM

Bit to Gamma: 56.13'  
Bit to Survey: 63'

ROP (min/ft)  
GAS (units)  
GR (API)

4003 MD  
5.76 INC  
45.34 AZM  
3992.91 TVD  
-155.0 VS

500  
150

SS: clr-wh, trnsI, sme lt gy, sft frm, vfg fg, sb sph, sb ang-sb rnd, mod srted, calc cmt, good cons, tr glauc. W/ SLTST stringrs.

SS: clr-wh, trnsI, sme lt gy, sft frm, vfg fg, sb sph, sb ang-sb rnd, mod srted, calc cmt, good cons, tr glauc. W/ SLTST stringrs.

SS: lt gy-gy, clr-wh, sft frm, vfg fg, sb sph, sb ang-sb rnd, mod srted, calc cmt, good cons, tr glauc. W/ sme SLTST: gy-dk gy, sft frm, mod srted, good cons.

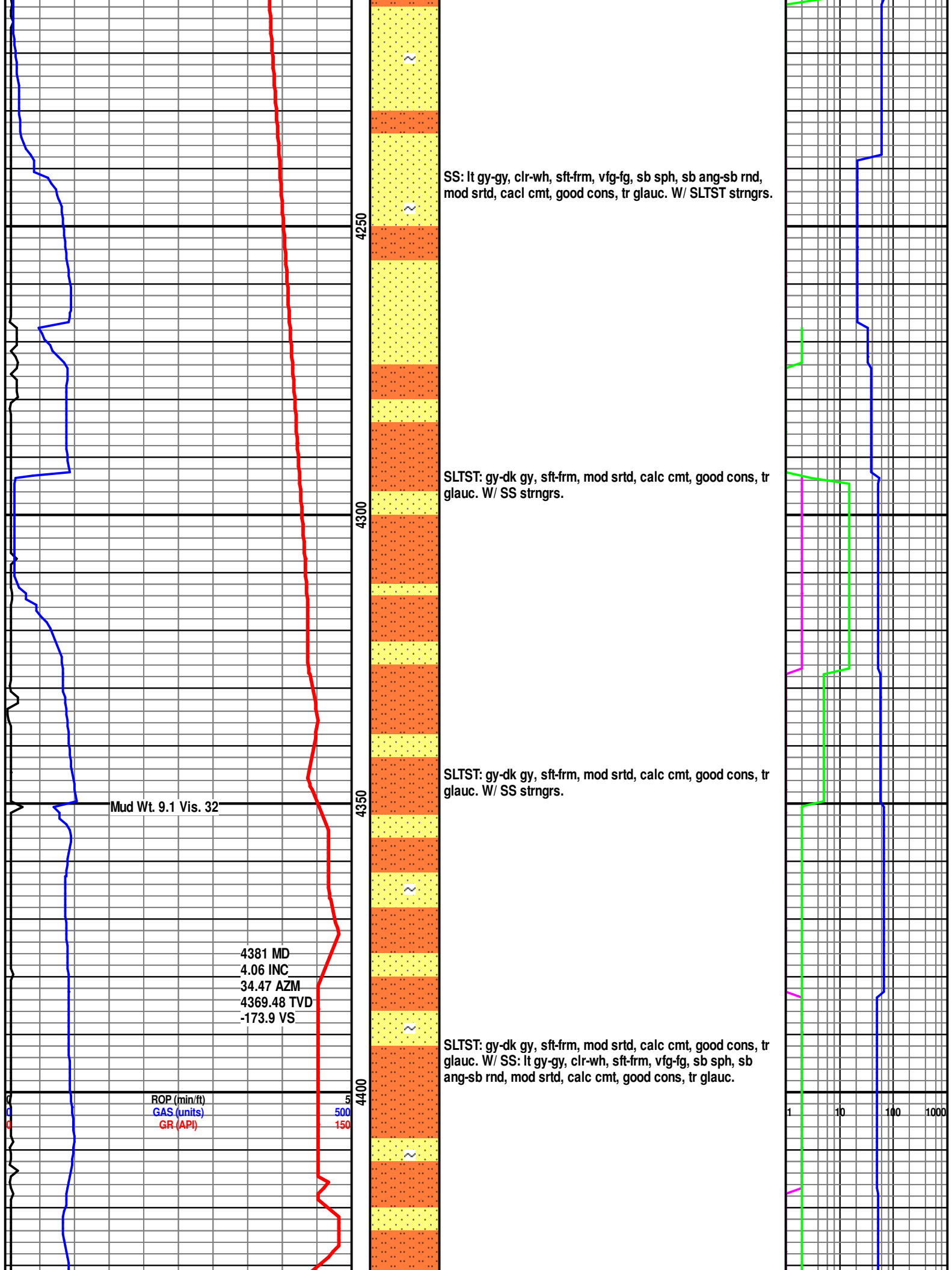
SS: lt gy-gy, clr-wh, sft frm, vfg fg, sb sph, sb ang-sb rnd, mod srted, calc cmt, good cons, tr glauc. W/ sme SLTST: gy-dk gy, sft frm, mod srted, good cons.

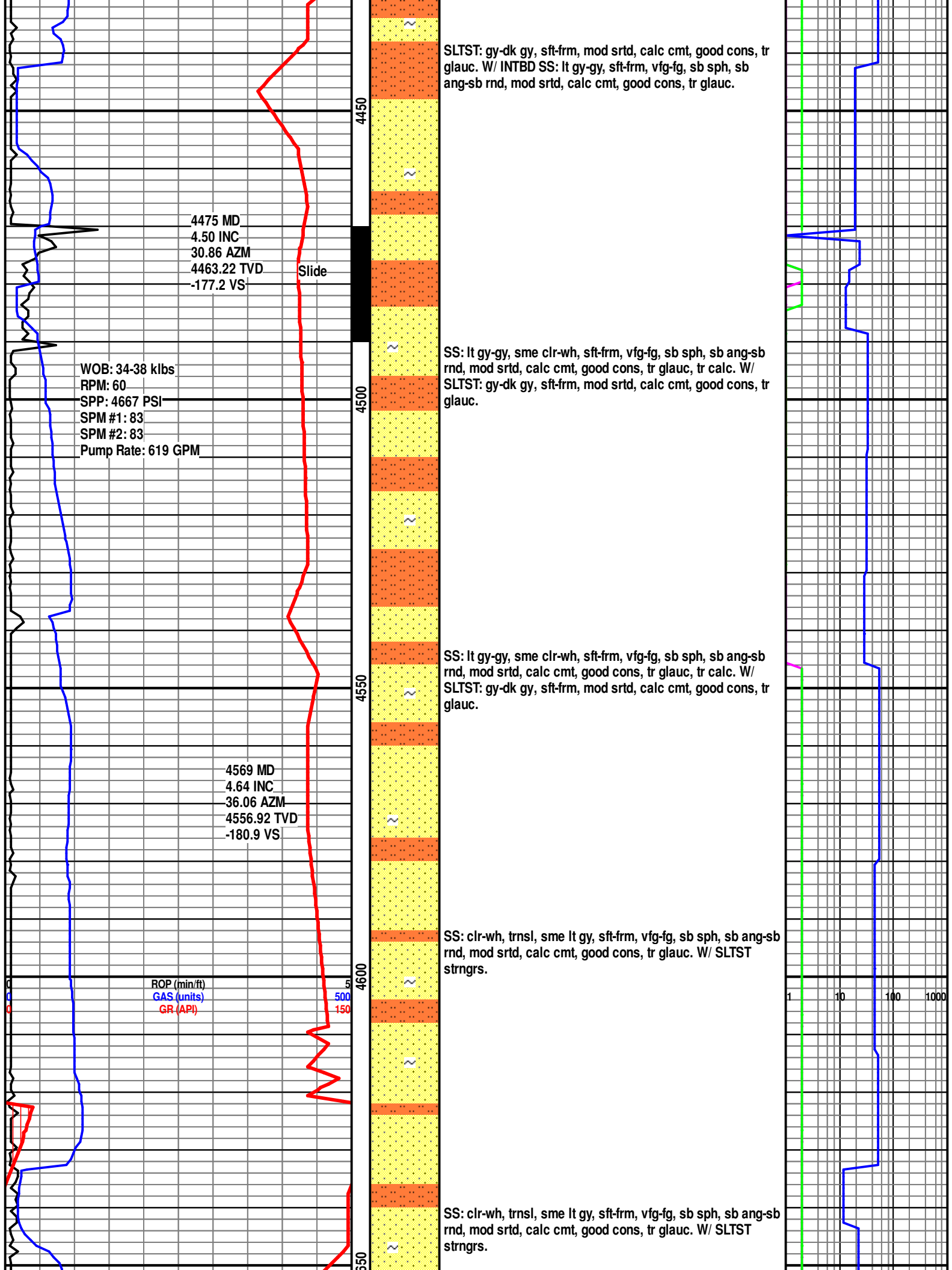
ROP (min/ft)  
GAS (units)  
GR (API)

500  
150

1 10 100 1000

1 10 100 1000





4664 MD  
4.27 INC  
38.47 AZM  
4651.63 TVD  
-184.8 VS

Slide

SS: clr-wh, trnsl, sme lt gy, sft frm, vfg-fg, sb sph, sb ang-sb rnd, mod srted, calc cmt, good cons, tr glauc. W/ INTBD  
SLTST: gy-dk gy, sft frm, mod srted, calc cmt, good cons, tr glauc.

4758 MD  
5.04 INC  
38.44 AZM  
4745.32 TVD  
-189.1 VS

SS: clr-wh, lt gy-gy, sft frm, vfg-fg, sb sph, sb ang-sb rnd, mod srted, calc cmt, good cons, tr glauc, tr calc. W/ INTBD  
SLTST: gy-dk gy, sli frm, mod srted, calc cmt, good cons.

SS: clr-wh, lt gy-gy, sft frm, vfg-fg, sb sph, sb ang-sb rnd, mod srted, calc cmt, good cons, tr glauc, tr calc. W/ INTBD  
SLTST: gy-dk gy, sli frm, mod srted, calc cmt, good cons.

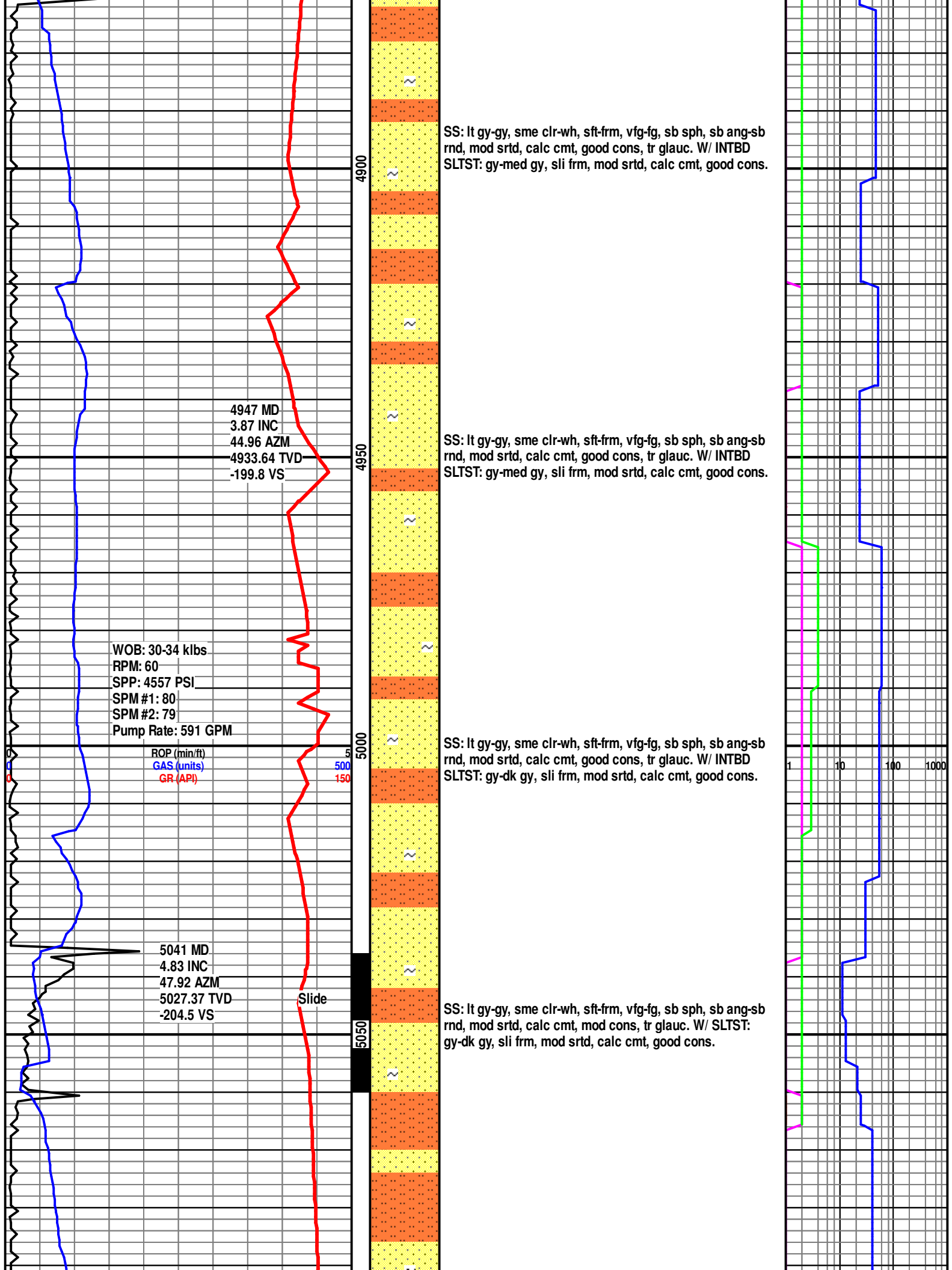
ROP (min/ft)  
GAS (units)  
GR (API)

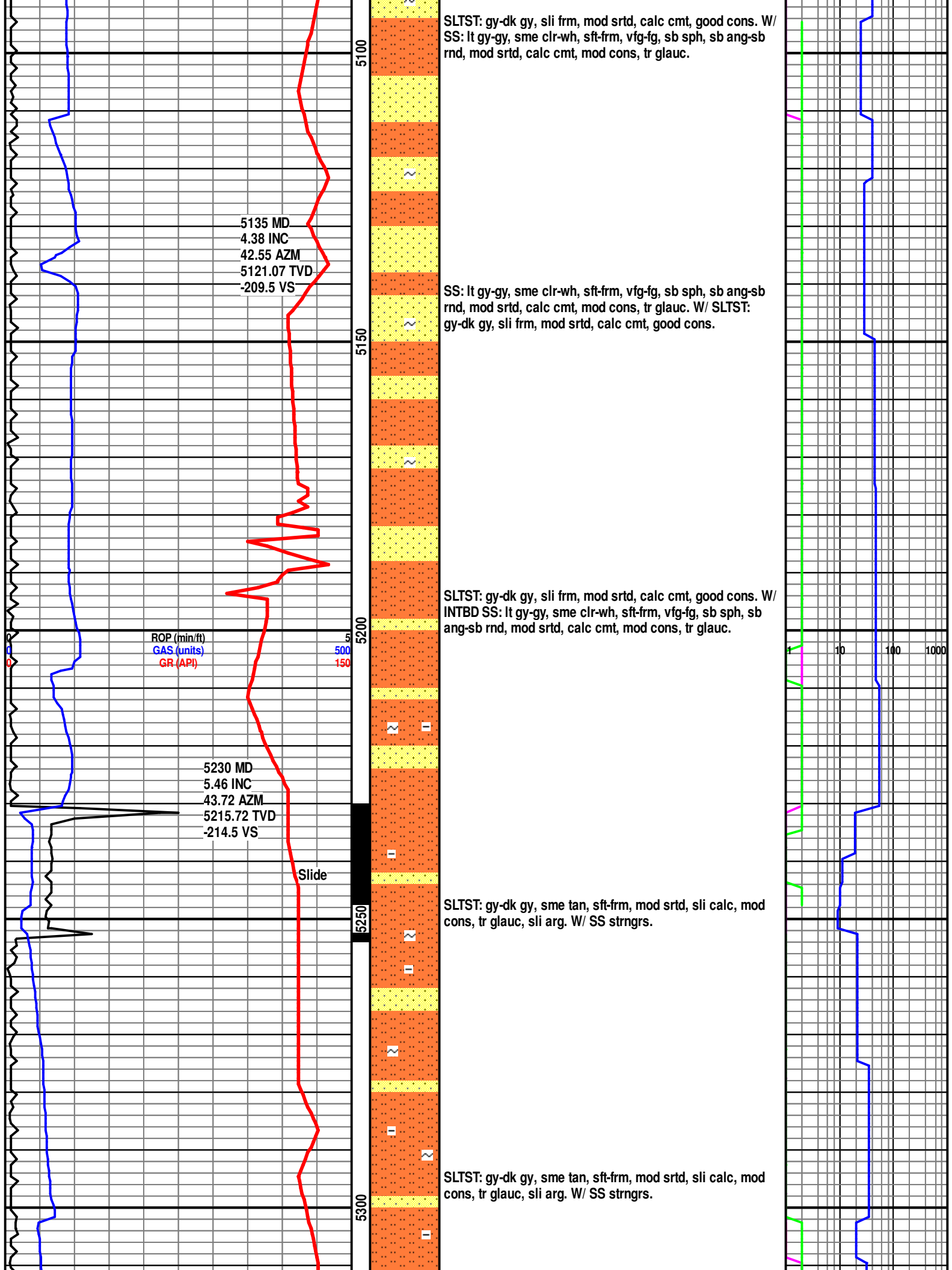
Mud Wt. 9.0 Vis. 32

4852 MD  
5.26 INC  
51.10 AZM  
4838.95 TVD  
-194.5 VS

Slide

SS: clr-wh, lt gy-gy, sft frm, vfg-fg, sb sph, sb ang-sb rnd, mod srted, calc cmt, good cons, tr glauc, tr calc. W/ INTBD  
SLTST: gy-dk gy, sli frm, mod srted, calc cmt, good cons.







5324 MD  
3.87 INC  
41.04 AZM  
5309.40 TVD  
-219.3 VS

Mud Wt. 9.1 Vis. 30

ROP (min/ft)  
GAS (units)  
GR (API)

Slide

Slide

5512 MD  
5.68 INC  
41.99 AZM  
5496.74 TVD  
-228.7 VS

WOB: 33-38 klbs  
RPM: 60  
SPP: 1554 PSI

SLTST: gy-dk gy, sli frm, mod srtd, mod cons, sli calc, tr glauc, tr calc, arg. W/ tr SS.

SLTST: gy-dk gy, sli frm, mod srtd, mod cons, sli calc, tr glauc, tr calc, arg. W/ tr SS & tr SH.

SLTST: gy-dk gy, sli frm, mod srtd, mod cons, sli calc, tr glauc, tr calc, arg. W/ tr SH.

SLTST: gy-dk gy, sli frm, mod srtd, mod cons, sli calc, tr glauc, arg. W/ INTBD SH: gy-dk gy, sft-frm, blk-pty, sli calc, slty.

Pick up off bottom @ 5510' MD at 12:32 PM on 7/16/2015 to repair washed out standpipe. Resumed drilling at 2:14 PM on 7/16/2015

SPP: 4334 PSI  
SPM #1: 78  
SPM #2: 77  
Pump Rate: 575 GPM

ROP (min/ft) 5606 MD  
GAS (units) 4.51 INC  
GR (API) 31.88 AZM  
5590.37 TVD  
-233.2 VS

5701 MD  
2.94 INC  
24.54 AZM  
5685.17 TVD  
-235.8 VS

Slide

SLTST: gy-dk gy, sli frm, mod srtd, mod cons, sli calc, tr glauc, arg. W/ SH strngrs: gy-dk gy, sft-frm, blk-y-plty, sli calc, slty.

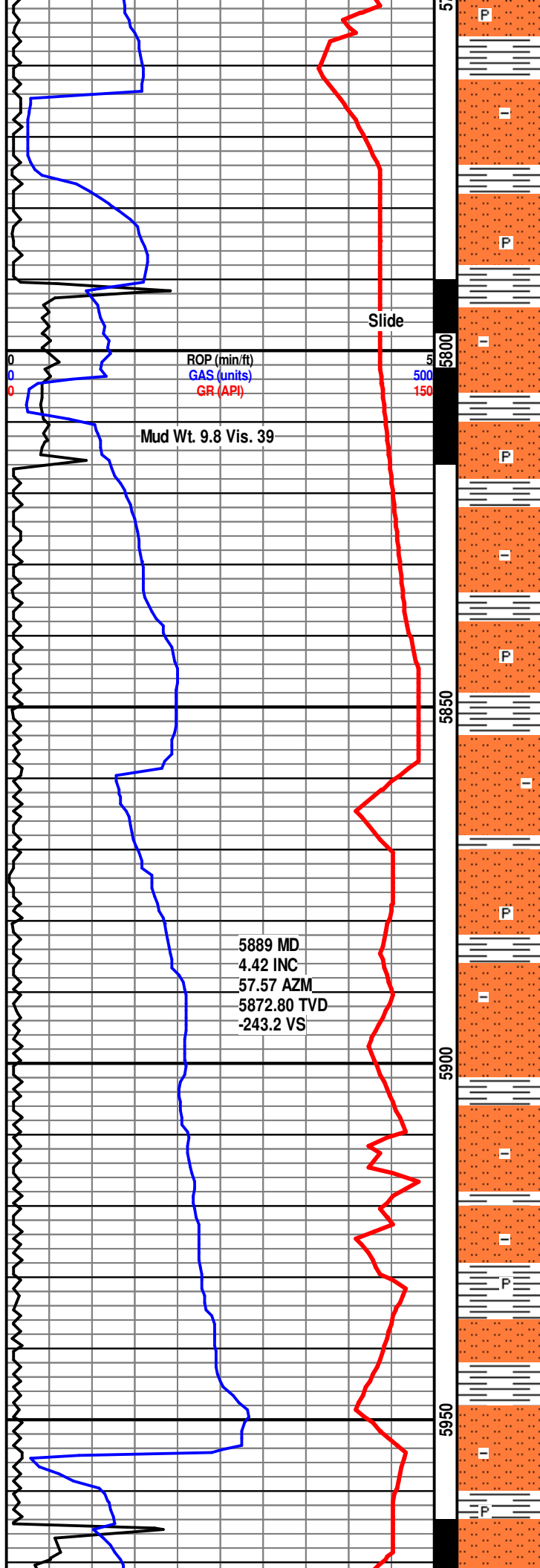
SLTST: gy-dk gy, sli frm, mod srtd, mod cons, sli calc, tr glauc, arg. W/ SH strngrs: gy-dk gy, sft-frm, blk-y-plty, sli calc, slty.

SLTST: gy-dk gy, sli frm, mod srtd, mod cons, sli calc, tr glauc, arg. W/ INTBD SH: gy-dk gy, sft-frm, blk-y-plty, sli calc, slty.

SLTST: gy-dk gy, sli frm, mod srtd, mod cons, sli calc, tr glauc, arg. W/ INTBD SH: gy-dk gy, sft-frm, blk-y-plty, sli calc, slty.

SLTST: gy-dk gy, sli frm, mod srtd, mod cons, sli calc, tr  
pyr tr calc arg W/ INTBD SH: gy-dk gy sft-frm blk-y-plty tr

1 10 100 1000



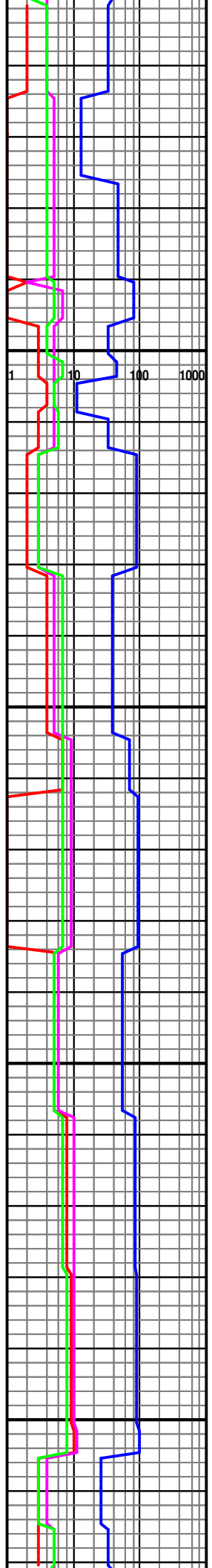
pyr, tr calc, arg. W/ INTBD SH: gy-dk gy, sli frm, blk-ply, tr calc, slty.

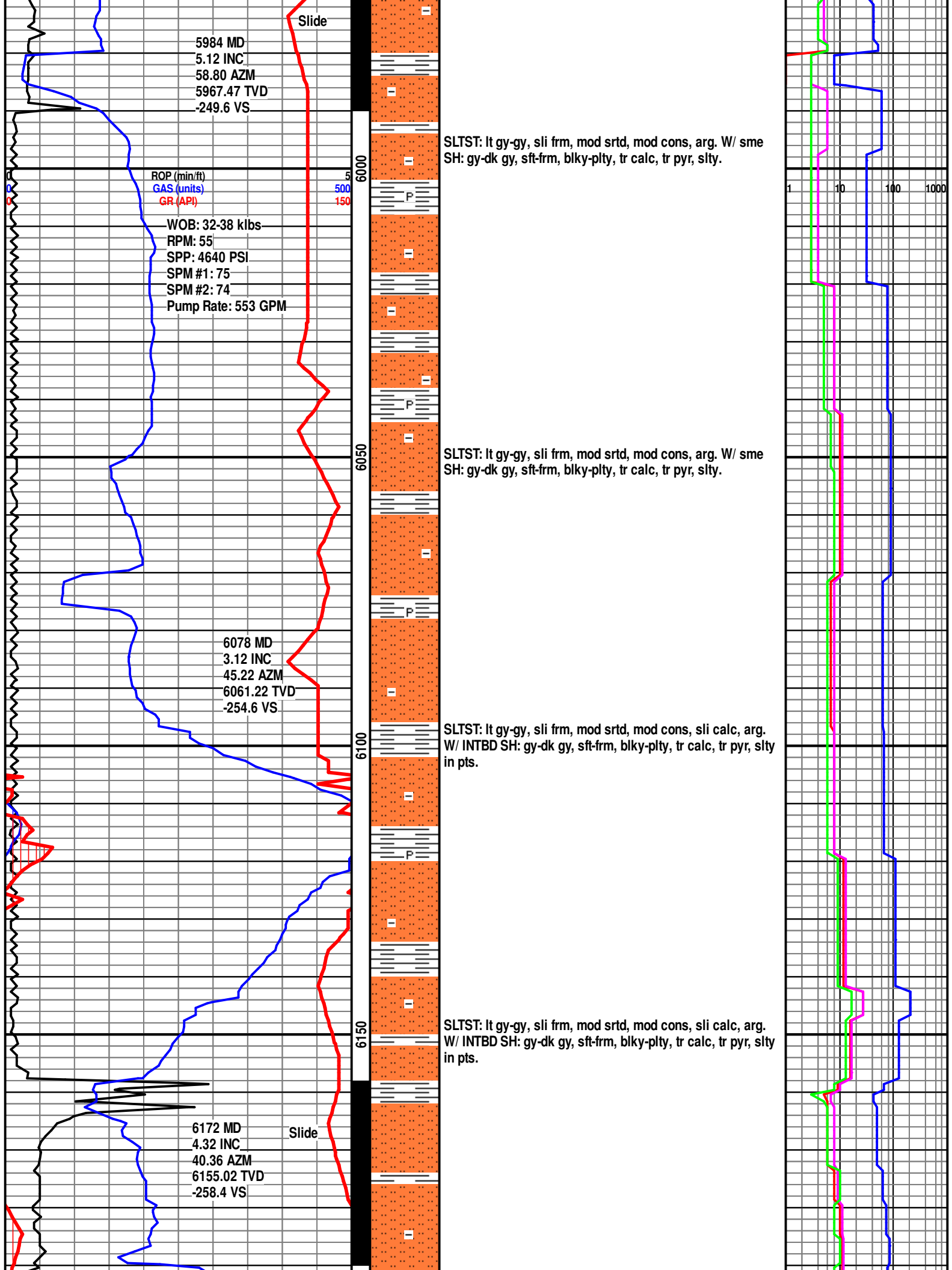
SLTST: gy-dk gy, sli frm, mod srtd, mod cons, sli calc, tr pyr, tr calc, arg. W/ INTBD SH: gy-dk gy, sft-frm, blk-ply, tr calc, slty.

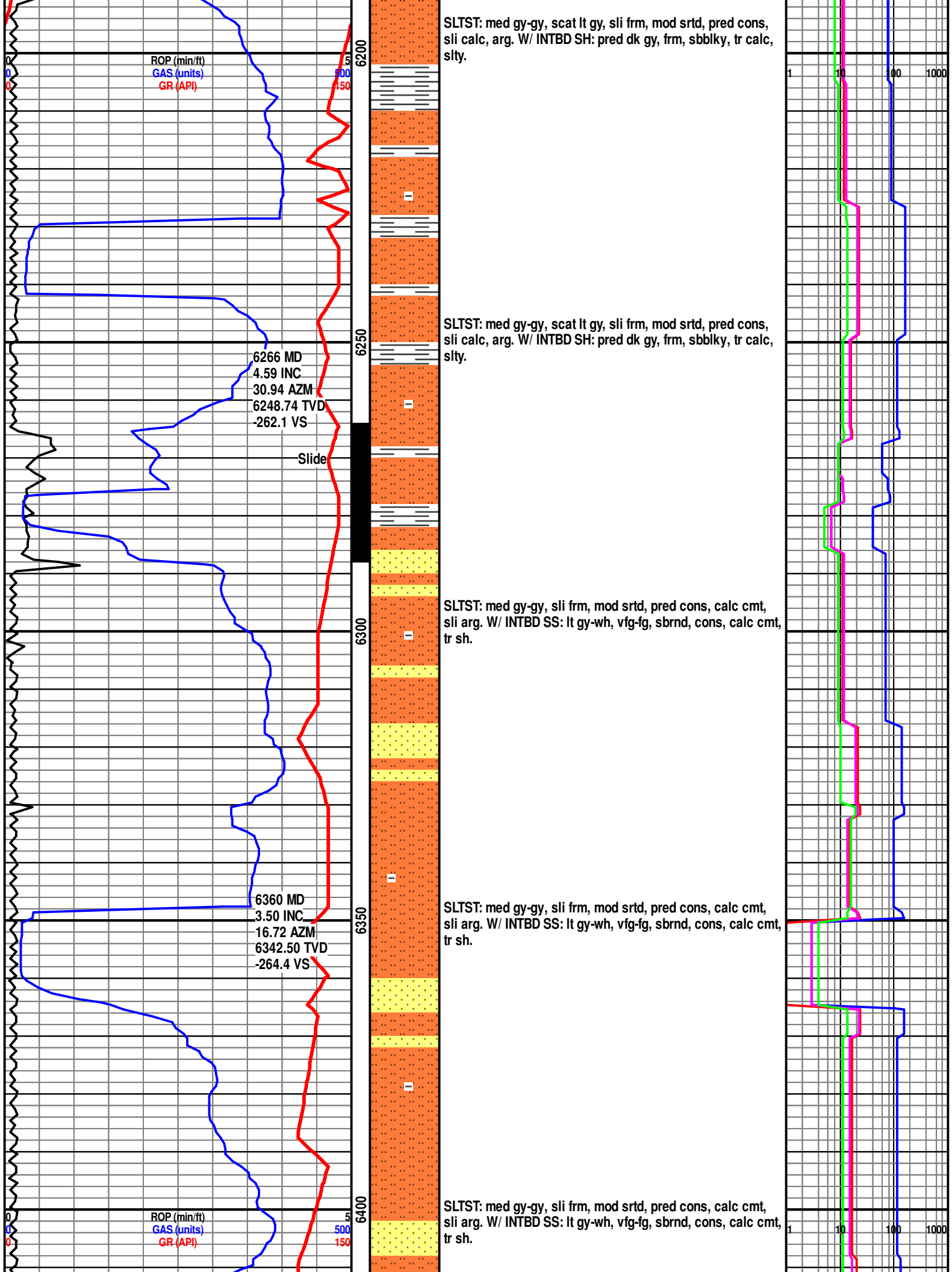
SLTST: lt gy-gy, sli frm, mod srtd, mod cons, sli calc, tr pyr, tr calc, arg. W/ sme SH: lt gy-gy, sft-frm, blk-ply, tr calc, slty.

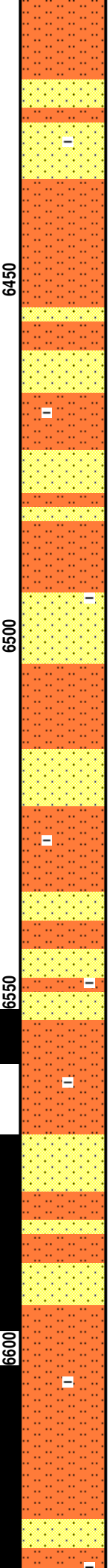
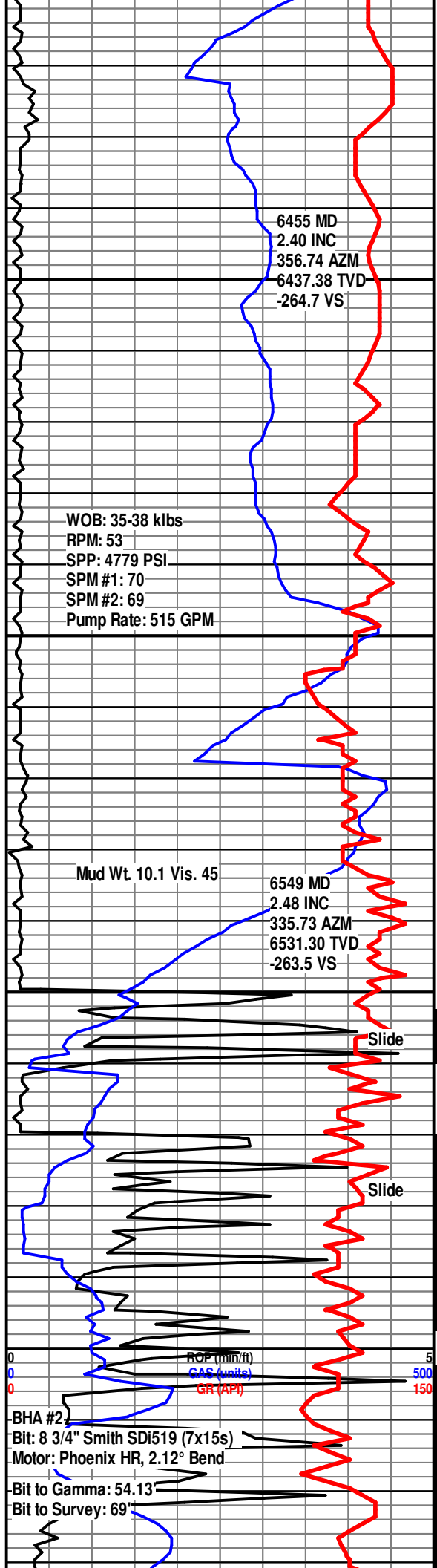
SLTST: lt gy-gy, sli frm, mod srtd, mod cons, sli calc, tr pyr, tr calc, arg. W/ sme SH: lt gy-gy, sft-frm, blk-ply, tr calc, slty.

SLTST: lt gy-gy, sli frm, mod srtd, mod cons, arg. W/ sme SH: gy-dk gy, sft-frm, blk-ply, tr calc, tr pyr, slty.









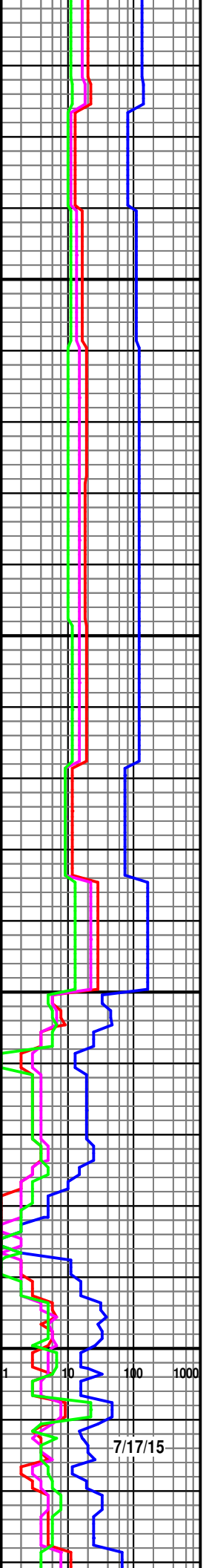
SLTST: med-dk gy, sli frm, mod srtd, mod cons, sli calc, mod arg. W/ INTBD SS: lt gy-lt brn, vfg-fg, sbrnd, cons, calc cmt, scat SH.

SLTST: med-dk gy, sli frm, mod srtd, mod cons, sli calc, mod arg. W/ INTBD SS: lt gy-lt brn, vfg-fg, sbrnd, cons, calc cmt, scat SH.

SLTST: med-dk gy, sli frm, mod srtd, mod cons, sli calc, mod arg. W/ INTBD SS: lt gy-lt brn, vfg-fg, sbrnd, cons, calc cmt, scat SH.

SLTST: med gy-lt gy, frm, mod srtd, mod cons, mod arg. W/ INTBD SS: lt gy-gy/brn, vfg-fg, sbrnd-sbang, cons, calc cmt, tr SH.

TOOH @ 6616' MD at 11:01 PM on 7/16/2015 due to slow ROP. Resumed drilling at 7:13 AM on 7/17/2015.



6638 MD  
5.05 INC  
321.42 AZM  
6620.10 TVD  
-259.9 VS

SLTST: lt gy-gy, sli frm, mod srted, mod cons, sli arg. W/  
INTBD SS: lt gy, clr-wh, sli frm, vfg-fg, sb sph, sb ang-sb  
rnd, mod srted, calc cmt, good cons.

Slide

SLTST: lt gy-gy, sli frm, mod srted, mod cons, tr pyr, sli arg.  
W/ INTBD SS: lt gy, clr-wh, sli frm, vfg-fg, sb sph, sb ang-sb  
rnd, mod srted, calc cmt, good cons.

Mud Wt. 10.4 Vis. 41

6733 MD  
9.81 INC  
287.03 AZM  
6714.32 TVD  
-249.1 VS

SLTST: lt gy-gy, sli frm, mod cons, tr pyr, sli arg. W/ sme  
SH: gy-dk gy, frm, sbblky-sbply, sli calc, slty. Tr SS.

Slide

Mud Wt. 10.2 Vis. 43

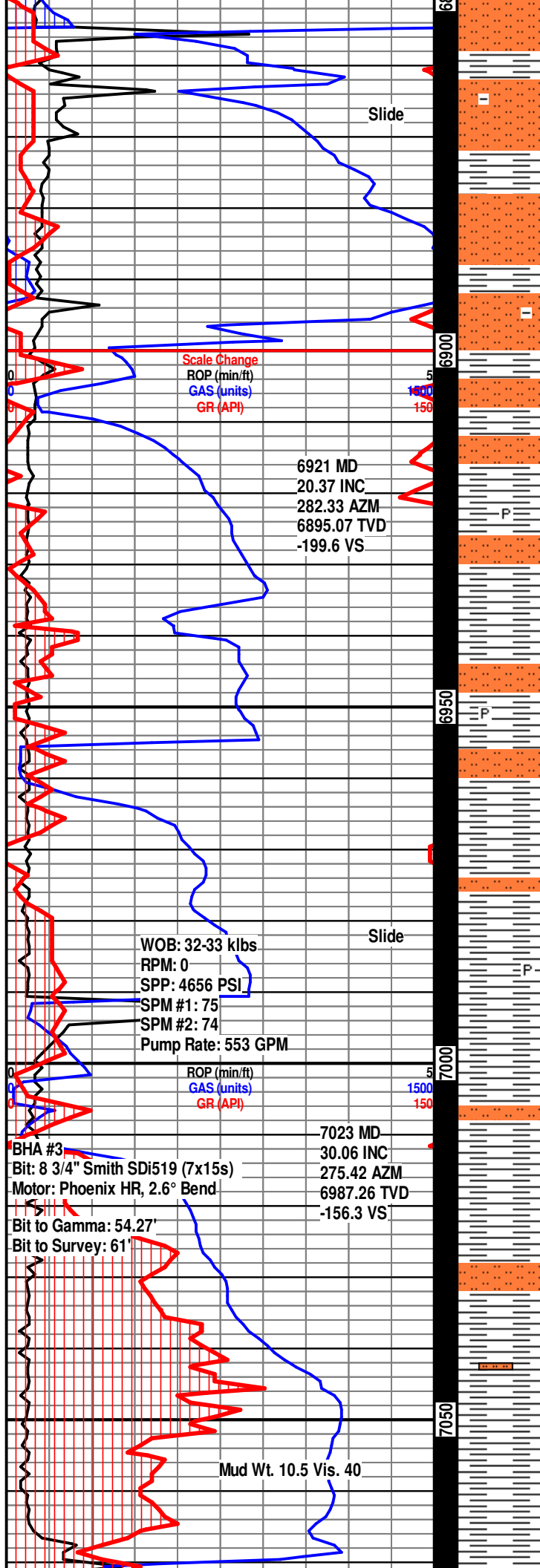
ROP (min/ft)  
GAS (units)  
GR (API)

SLTST: lt gy-gy, sli frm, mod cons, arg. W/ INTBD SH: gy-dk  
gy, frm, sbblky-sbply, sli calc, slty.

6827 MD  
16.28 INC  
289.40 AZM  
6805.84 TVD  
-228.5 VS

1 10 100 1000





SLTST: lt gy-gy, sli frm, mod cons, arg. W/ INTBD SH: gy-dk gy, frm, sbblky-sbply, slty in pts.

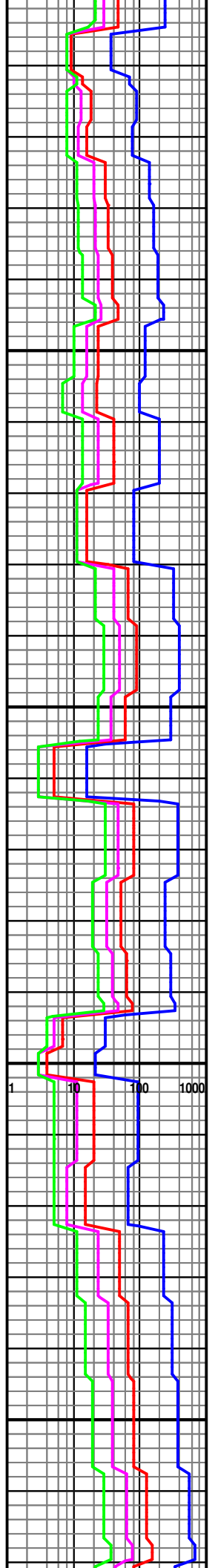
SLTST: lt gy-gy, sli frm, mod cons, arg. W/ INTBD SH: gy-dk gy, frm, sbblky-sbply, slty in pts.

SH: gy-dk gy, sli frm, blkylt, tr pyr. W/ sme SLTST: lt gy-gy, sli frm, mod cons, arg.

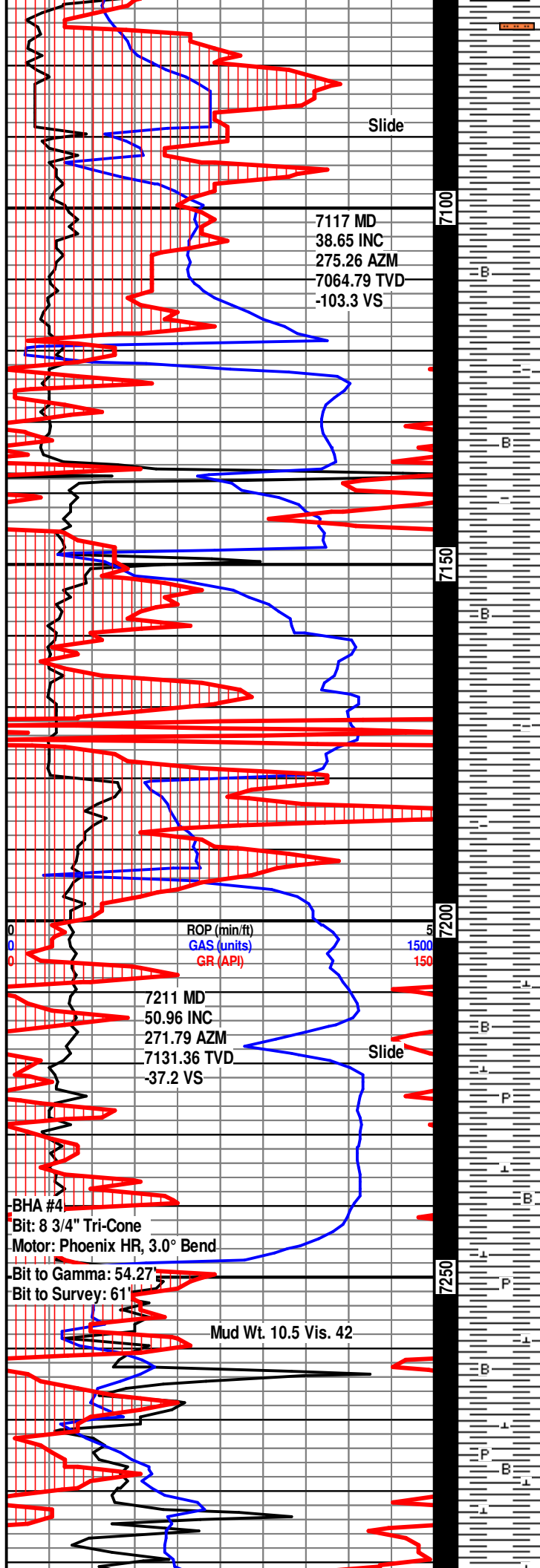
SH: gy-dk gy, sli frm, blkylt, tr pyr. W/ sme SLTST: lt gy-gy, sli frm, mod cons, arg.

TOOH @ 6991' MD at 12:14 PM on 7/17/2015 due to lack of build rate. Resume drilling at 9:55PM on 7/17/2015

SH: gy-dk gy, scat lt gy, sli frm-sft, blkylt-sbply. W/ tr SLTST: gy-lt gy, sft, mod cons, v arg.







## Sharon Springs @ 7079' MD, 7034' TVD

SH: gy-dk gy, scat lt gy, sli frm-sft, blk-ly-sbplty. W/ tr SLTST: gy-lt gy, sft, mod cons, v arg.

## Niobrara A @ 7119' MD, 7066' TVD

SH: dk gy-gy/blk, scat lt gy, sft-sli frm, sbplty-sbblky, sbrthy, sli arg, v calc, scat bent.

7/18/2015

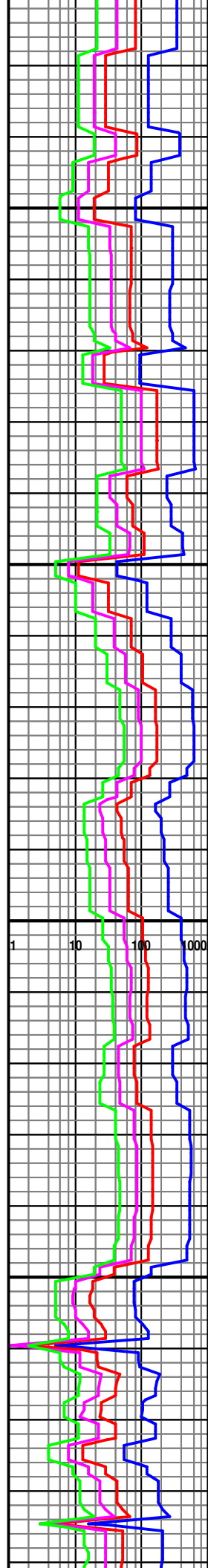
SH: dk gy-gy/blk, scat lt gy, sft-sli frm, sbplty-sbblky, sbrthy, sli arg, v calc, scat bent.

SH: dk gy-med dk gy, sli frm-sft, sbplty-sbblky, sbrthy, v arg, v calc.

TOOH @ 7248' MD at 4:15 AM on 7/18/2015 due to lack of build rate. Resumed drilling at 3:38 PM on 7/18/2015.

SH: gy-dk gy, sft-frm, blk-ly-plty, v calc, tr pyr, tr bent, tr calc.

## Niobrara B @ 7281' MD, 7169' TVD



7305 MD  
68.35 INC  
270.74 AZM  
7178.67 TVD  
43.4 VS

SH: gy-dk gy, frm-occ hrd, blk-y-sbplty, v calc, tr pyr, tr bent.

SH: gy-dk gy, motl, frm-sft, blk-y-sbplty, v calc, abt calc.

SH: med gy-dk gy, motl lt gy, frm-sft, blk-y-sbplty, v calc, scat calc, sli chlky.

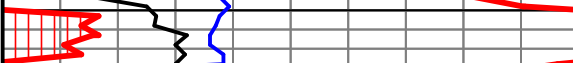
SH: med gy-dk gy, motl lt gy, frm-sft, blk-y-sbplty, v calc, scat calc, sli chlky.

TOOH @ 7401' MD AT 8:30 PM 7/18/2015 to adjust motor.  
Resume drilling 4:42 AM on 7/19/2015.

SH: med gy-dk gy, motl lt gy, frm-sft, blk-y-sbplty, v calc, scat calc, chlky ip.

SH: gy-dk gy, sft-frm, blk-y-plty, v calc, tr pyr, abt calc, tr bent, sli chlky, no vis stn, no fluor, v wk wl mlky cut.

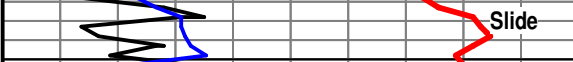
SH: gy-dk gy, sft-frm, blk-y-plty, v calc, tr pyr, abt calc, tr



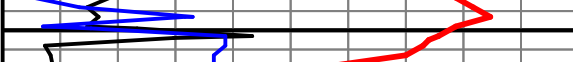
7399 MD  
87.46 INC  
272.01 AZM  
7198.28 TVD  
134.8 VS

ROP (min/ft)  
GAS (units)  
GR (API)

BHA #5  
Bit: 8 3/4" Smith SDI519 (7x15s)  
Motor: Phoenix HR, 1.83° Bend  
Bit to Gamma: 54.27'  
Bit to Survey: 61'



Mud Wt. 10.3 Vis. 40



7509 MD  
86.67 INC  
268.27 AZM  
7203.91 TVD  
244.3 VS

7550

Slide

Projection to Bit:

7570 MD  
90.00 INC  
268.27 AZM  
7205.68 TVD  
304.9 VS

bent, sli chlky, no vis stn, no fluor, v wk slw mlky cut.

SH: gy-dk gy, sft-frm, blk-y-plty, v calc, tr pyr, abt calc, tr bent, sli chlky, no vis stn, no fluor, v wk slw mlky cut.

TD BUILD SECTION 7570' MD AT 8:16 AM 7/19/2015

Please refer to Extraction\_WAAG 11\_HORZ LOG for the remainder of the well.

