

**PCGC: Pressure Case Gamma**  
**PCDC: Pressure Case Directional**



**1 : 600 / 1 : 240**

[illegible]

## WELL INFORMATION

|   |                  |                  |  |  |  |
|---|------------------|------------------|--|--|--|
| <b>MWD Run Number</b>                   | 100              | 200              |  |  |  |
| <b>Date run completed</b>               | 27-Oct-12        | 28-Oct-12        |  |  |  |
| <b>Rig Bit Number</b>                   | 2                | 3                |  |  |  |
| <b>Bit Size (in)</b>                    | 8.750            | 8.750            |  |  |  |
| <b>Tool Nominal OD (in)</b>             | 6.750            | 6.750            |  |  |  |
| <b>Log Start Depth (TVD, ft)</b>        | 632.00           | 5,940.80         |  |  |  |
| <b>Log End Depth (TVD, ft)</b>          | 5,940.80         | 6,635.53         |  |  |  |
| <b>Drill or Wipe</b>                    | Drill            | Drill            |  |  |  |
| <b>Drill/Wipe Start Date and Time</b>   | 26-Oct-12 06:00  | 27-Oct-12 08:40  |  |  |  |
| <b>Drill/Wipe End Date and Time</b>     | 26-Oct-12 23:10  | 28-Oct-12 11:10  |  |  |  |
| <b>Min Inc (deg) @ Depth (TVD, ft)</b>  | 0 @ 622.00       | 11.78 @ 5,973.12 |  |  |  |
| <b>Max Inc (deg) @ Depth (TVD, ft)</b>  | 11.87 @ 5,697.80 | 88.49 @ 6,635.53 |  |  |  |
| <b>Bit TFA(in2) / Bit Type</b>          | .75 / PDC        | .75 / PDC        |  |  |  |
| <b>Flow Rate (gpm)</b>                  | 591.00           | 536.00           |  |  |  |
| <b>Max AV (fpm) / CV (fpm) @ MWD</b>    | N/A / N/A        | N/A / N/A        |  |  |  |
| <b>Fluid Type</b>                       | Fresh Water Gel  | Fresh Water Gel  |  |  |  |
| <b>Density (ppg) / Viscosity (spqt)</b> | 9.00 / 28.00     | 10.50 / 35.00    |  |  |  |
| <b>Filtrate CL (ppm)</b>                | 1,500.00         | 1,300.00         |  |  |  |
| <b>pH / Fluid Loss (mptm)</b>           | 9.20 / 0         | 9.10 / 8         |  |  |  |
| <b>PV (cP) / YP (lbf2)</b>              | 1 / 4.00         | 9 / 10.00        |  |  |  |
| <b>% Solids / % Sand</b>                | 3 / 0.25         | 10.2 / 0.25      |  |  |  |
| <b>% Oil / Oil:Water Ratio</b>          | N/A / N/A        | N/A / N/A        |  |  |  |
| <b>Rm @ Measured Temp (degF)</b>        | N/A @ N/A        | N/A @ N/A        |  |  |  |
| <b>Rmf @ Measured Temp (degF)</b>       | N/A @ N/A        | N/A @ N/A        |  |  |  |
| <b>Rmc @ Measured Temp (degF)</b>       | N/A @ N/A        | N/A @ N/A        |  |  |  |
| <b>Max Tool Temp (deg F) @ 100 ft</b>   | 145.00 / 100 ft  | 170.00 / 100 ft  |  |  |  |

|                               |                  |                  |  |  |  |
|-------------------------------|------------------|------------------|--|--|--|
| Max Tool Temp (degF) / Source | 145.90 / PCM     | 172.78 / PCM     |  |  |  |
| Rm @ Max Tool Temp (degF)     | N/A @ N/A        | N/A @ N/A        |  |  |  |
| Lead MWD Engineer             | Henry Schmeidler | Henry Schmeidler |  |  |  |
| Customer Representative       | Martin Suarez    | Martin Suarez    |  |  |  |

## SENSOR INFORMATION

### Downhole Processor Information

|                           |                 |                 |  |  |  |
|---------------------------|-----------------|-----------------|--|--|--|
| Tool Type                 | PCM             | PCM             |  |  |  |
| Software Version          | 5.76            | 5.76            |  |  |  |
| Sub Serial Number         | 246130          | 246130          |  |  |  |
| Insert Serial Number      | 11680744        | 11680744        |  |  |  |
| Date and Time Initialized | 25-Oct-12 06:44 | 25-Oct-12 06:44 |  |  |  |
| Date and Time Read        | 28-Oct-12 16:57 | 28-Oct-12 16:51 |  |  |  |
| ECMB SW Version           | N/A             | N/A             |  |  |  |

### Directional Sensor Information

|                        |          |          |  |  |  |
|------------------------|----------|----------|--|--|--|
| Tool Type              | PCDC     | PCDC     |  |  |  |
| Distance From Bit (ft) | 55.81    | 53.39    |  |  |  |
| Software Version       | 6.21     | 6.21     |  |  |  |
| Sub Serial Number      | 246130   | 246130   |  |  |  |
| Sonde Serial Number    | 11478107 | 11478107 |  |  |  |
| Sensor ID Number       | N/A      | N/A      |  |  |  |
| Toolface Offset (deg)  | 306.56   | 248.53   |  |  |  |

### Gamma Ray Sensor Information

|                              |          |          |  |  |  |
|------------------------------|----------|----------|--|--|--|
| Tool Type                    | PCG      | PCG      |  |  |  |
| Distance From Bit (ft)       | 51.01    | 48.59    |  |  |  |
| Recorded Sample Period (sec) | 10       | 10       |  |  |  |
| Software Version             | 8.15     | 8.15     |  |  |  |
| Sub Serial Number            | 246130   | 246130   |  |  |  |
| Insert/Sonde Serial Number   | 11579845 | 11579845 |  |  |  |

## REMARKS

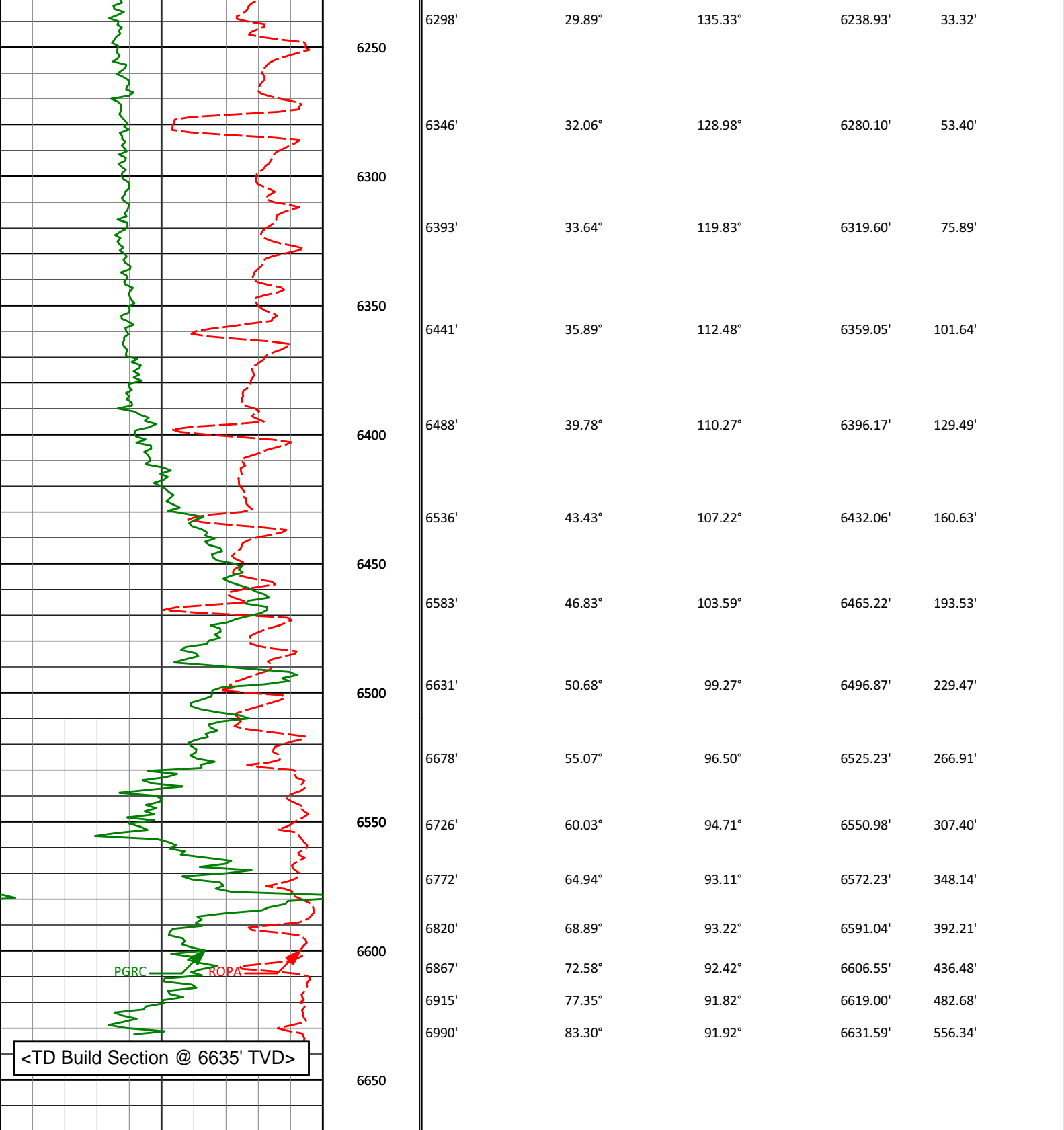
1. All depths are calibrated to the driller's pipe tally and are measured from the Rig drill floor.
2. No depth corrections have been made for pipe stretch or compression.
3. All data presented is recorded (memory data) unless otherwise stated.
  - ROPA: Average Rate of Penetration is real time data.
  - PGRC: Smooth Pressure Case Gamma Ray Borehole corrected is recorded data.
4. The following smoothing parameters have been applied to the data:
  - All 2" (1:600) logs - 1 ft. interval, 3 ft. coercion distance.
  - All 5" (1:240) logs - .5 ft. interval, .6 ft. coercion distance.
5. INSITE version 7.4.01

## WARRANTY

HALLIBURTON WILL USE ITS BEST EFFORTS TO FURNISH CUSTOMERS WITH ACCURATE INFORMATION AND INTERPRETATIONS THAT ARE PART OF, AND INCIDENT TO, THE SERVICES PROVIDED. HOWEVER, HALLIBURTON CANNOT AND DOES NOT WARRANT THE ACCURACY OR CORRECTNESS OF SUCH INFORMATION AND INTERPRETATIONS UNDER NO CIRCUMSTANCES.

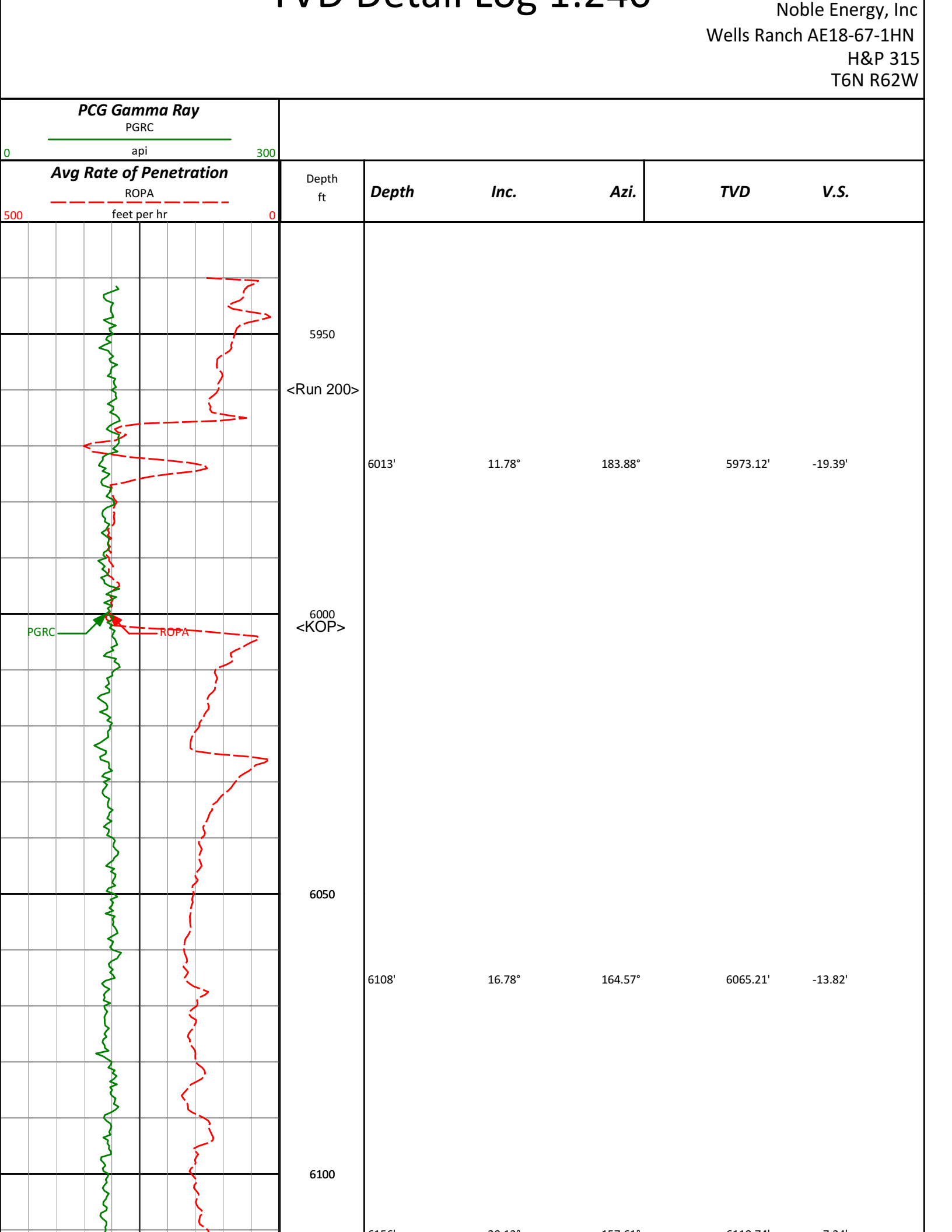
**HALLIBURTON**  
**Sperry Drilling Services**  
TVD Main Log 1:600

| Avg Rate of Penetration |  |           |        |         |          |         |
|-------------------------|--|-----------|--------|---------|----------|---------|
| ROPA                    |  |           |        |         |          |         |
| feet per hr             |  |           |        |         |          |         |
| 500                     |  | 0         |        |         |          |         |
| PCG Gamma Ray           |  | Depth     |        |         |          |         |
| PGRC                    |  | ft        | Depth  | Inc.    | Azi.     | TVD     |
| api                     |  |           |        |         |          | V.S.    |
| 0                       |  |           |        |         |          |         |
| 300                     |  |           |        |         |          |         |
|                         |  | <Run 200> |        |         |          |         |
|                         |  | 5950      |        |         |          |         |
|                         |  | 6013'     | 11.78° | 183.88° | 5973.12' | -19.39' |
| PGRC                    |  | 6000      |        |         |          |         |
| ROPA                    |  | <KOP>     |        |         |          |         |
|                         |  | 6050      |        |         |          |         |
|                         |  | 6108'     | 16.78° | 164.57° | 6065.21' | -13.82' |
|                         |  | 6100      |        |         |          |         |
|                         |  | 6156'     | 20.12° | 157.61° | 6110.74' | -7.24'  |
|                         |  | 6150      |        |         |          |         |
|                         |  | 6203'     | 23.79° | 149.51° | 6154.33' | 2.37'   |
|                         |  | 6200      |        |         |          |         |
|                         |  | 6251'     | 27.28° | 139.25° | 6197.66' | 16.29'  |



|   |             |       |      |      |     |      |
|---|-------------|-------|------|------|-----|------|
| <div>PCG Gamma Ray</div> <div>PGRC</div> <div>0300</div> <div>api</div> | Depth<br>ft | Depth | Inc. | Azi. | TVD | V.S. |
|---|-------------|-------|------|------|-----|------|

|   |
|---|
| <div>Avg Rate of Penetration</div> <div>ROPA</div> <div>5000</div> <div>feet per hr</div> |
|---|

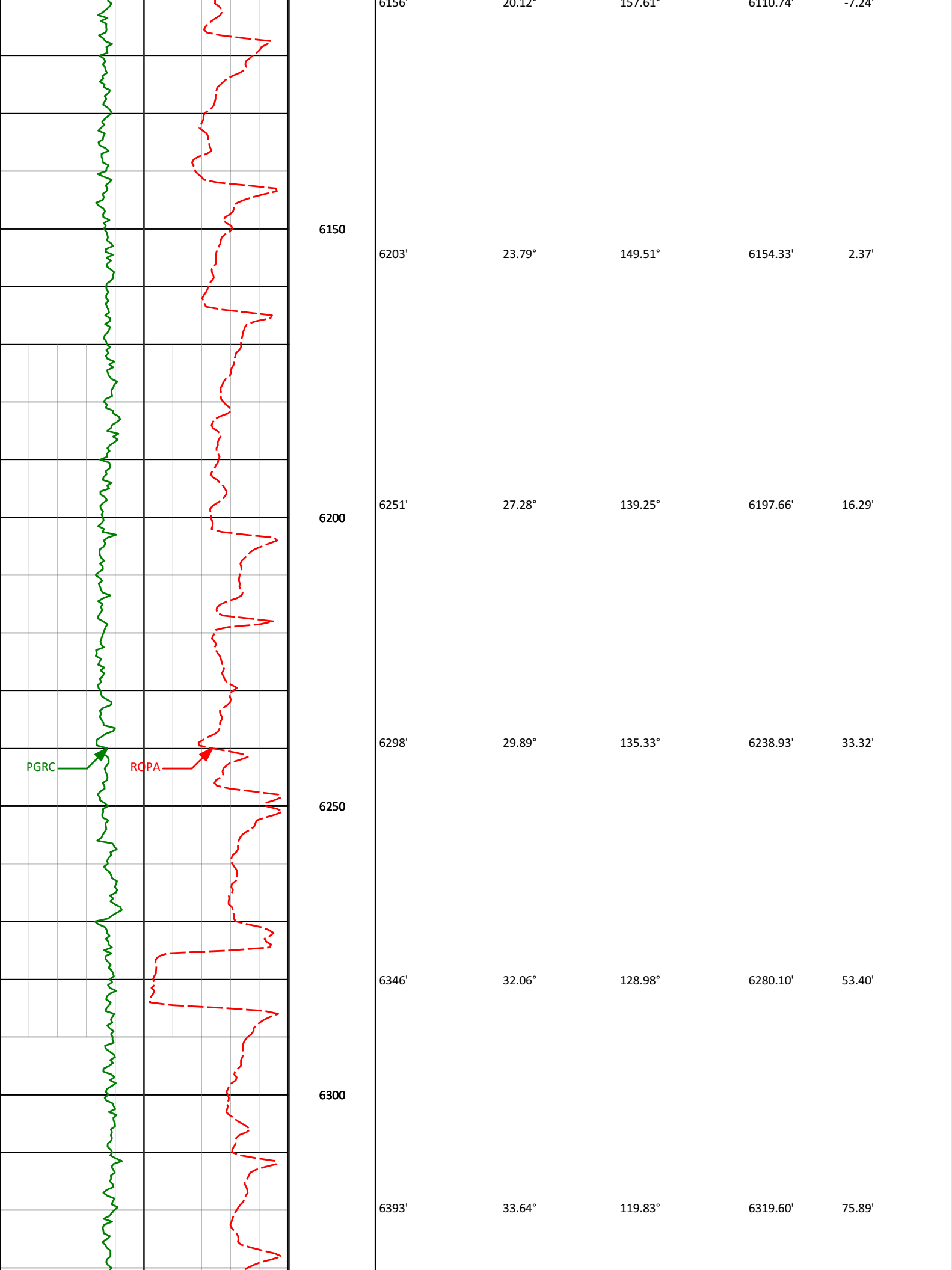


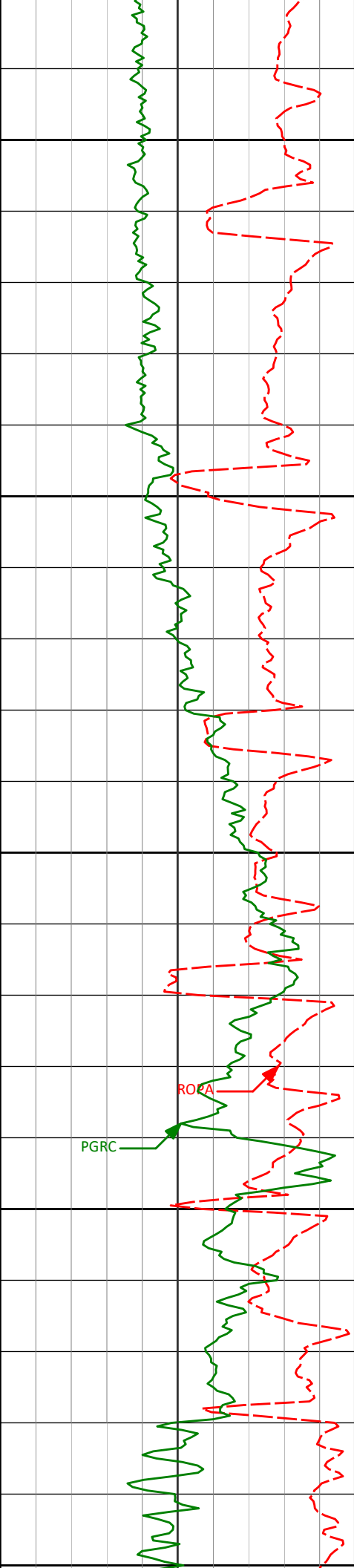
Noble Energy, Inc

Wells Ranch AE18-67-1HN

H&P 315

T6N R62W





6350

6441'

35.89°

112.48°

6359.05'

101.64'

6400

6488'

39.78°

110.27°

6396.17'

129.49'

6450

6536'

43.43°

107.22°

6432.06'

160.63'

6500

6583'

46.83°

103.59°

6465.22'

193.53'

6550

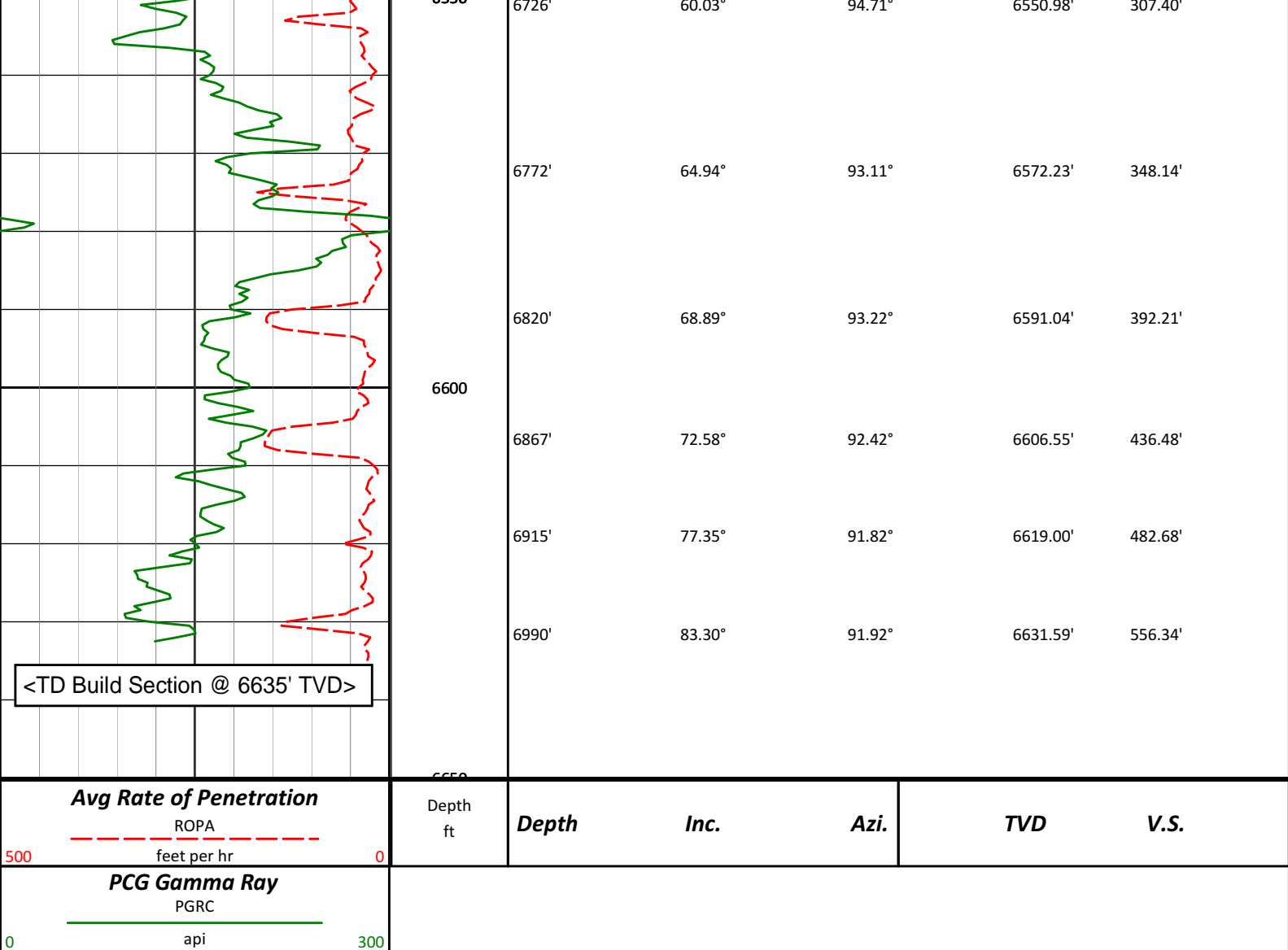
6678'

55.07°

96.50°

6525.23'

266.91'



## HALLIBURTON

### DIRECTIONAL SURVEY REPORT

Noble Energy  
Wells Ranch AE18-67-1HN  
Wattenberg  
Weld Colorado  
USA  
CA-XX-0009860519

Survey depth 622 ft created to tie surveys onto bottom of the surface casing shoe.

Last survey is a projection to TD.

| Measured Depth (feet) | Inclination (degrees) | Direction (degrees) | Vertical Depth (feet) | Latitude (feet) | Departure (feet) | Vertical Section (feet) | Dogleg (deg/100ft) |
|-----------------------|-----------------------|---------------------|-----------------------|-----------------|------------------|-------------------------|--------------------|
| 622.00                | 0.00                  | 0.00                | 622.00                | 0.00 N          | 0.00 E           | 0.00                    | TIE-IN             |
| 812.00                | 0.64                  | 220.46              | 812.00                | 0.80 S          | 0.68 W           | -0.59                   | 0.33               |
| 1090.00               | 1.15                  | 238.87              | 1089.96               | 3.42 S          | 4.08 W           | -3.67                   | 0.21               |
| 1367.00               | 1.42                  | 259.06              | 1366.89               | 5.52 S          | 9.85 W           | -9.16                   | 0.19               |
| 1651.00               | 0.59                  | 231.19              | 1650.85               | 7.11 S          | 14.46 W          | -13.56                  | 0.33               |
| 1936.00               | 0.72                  | 234.14              | 1935.83               | 9.08 S          | 17.06 W          | -15.92                  | 0.05               |
| 2221.00               | 0.81                  | 166.09              | 2220.81               | 12.09 S         | 18.03 W          | -16.55                  | 0.30               |
| 2505.00               | 0.11                  | 233.69              | 2504.80               | 14.20 S         | 17.77 W          | -16.05                  | 0.27               |
| 2790.00               | 0.35                  | 354.66              | 2789.80               | 13.49 S         | 18.08 W          | -16.43                  | 0.15               |
| 3074.00               | 0.85                  | 308.23              | 3073.78               | 11.33 S         | 19.81 W          | -18.40                  | 0.23               |
| 3359.00               | 0.22                  | 356.07              | 3358.77               | 9.48 S          | 21.50 W          | -20.28                  | 0.25               |
| 3412.00               | 0.22                  | 344.40              | 3410.70               | 9.78 S          | 20.44 W          | -19.22                  | 0.22               |



|         |       |        |         |          |          |        |       |
|---------|-------|--------|---------|----------|----------|--------|-------|
| 3549.00 | 0.92  | 104.19 | 3548.76 | 9.50 S   | 20.04 W  | -18.83 | 0.53  |
| 3644.00 | 1.85  | 135.99 | 3643.73 | 10.79 S  | 18.23 W  | -16.89 | 1.23  |
| 3739.00 | 3.07  | 169.35 | 3738.65 | 14.38 S  | 16.70 W  | -14.96 | 1.93  |
| 3834.00 | 5.64  | 174.67 | 3833.37 | 21.53 S  | 15.80 W  | -13.26 | 2.74  |
| 3928.00 | 7.59  | 181.30 | 3926.74 | 32.33 S  | 15.51 W  | -11.75 | 2.23  |
| 4023.00 | 8.52  | 190.61 | 4020.80 | 45.52 S  | 16.95 W  | -11.68 | 1.68  |
| 4118.00 | 8.93  | 190.88 | 4114.71 | 59.68 S  | 19.63 W  | -12.75 | 0.43  |
| 4213.00 | 9.72  | 185.52 | 4208.45 | 74.90 S  | 21.79 W  | -13.18 | 1.24  |
| 4308.00 | 10.45 | 190.24 | 4301.98 | 91.36 S  | 24.10 W  | -13.60 | 1.16  |
| 4403.00 | 11.01 | 186.87 | 4395.32 | 108.85 S | 26.71 W  | -14.22 | 0.89  |
| 4498.00 | 11.35 | 187.14 | 4488.52 | 127.14 S | 28.96 W  | -14.38 | 0.35  |
| 4593.00 | 11.53 | 188.81 | 4581.63 | 145.79 S | 31.58 W  | -14.87 | 0.40  |
| 4688.00 | 11.50 | 191.89 | 4674.72 | 164.43 S | 34.98 W  | -16.14 | 0.65  |
| 4783.00 | 11.82 | 191.61 | 4767.76 | 183.23 S | 38.89 W  | -17.90 | 0.35  |
| 4878.00 | 11.03 | 191.74 | 4860.88 | 201.66 S | 42.70 W  | -19.59 | 0.84  |
| 4973.00 | 11.43 | 189.56 | 4954.06 | 219.84 S | 46.11 W  | -20.92 | 0.62  |
| 5068.00 | 11.61 | 187.43 | 5047.15 | 238.60 S | 48.91 W  | -21.58 | 0.48  |
| 5163.00 | 11.04 | 187.20 | 5140.30 | 257.10 S | 51.28 W  | -21.85 | 0.60  |
| 5258.00 | 11.62 | 187.63 | 5233.45 | 275.60 S | 53.69 W  | -22.15 | 0.62  |
| 5353.00 | 11.46 | 187.34 | 5326.53 | 294.44 S | 56.17 W  | -22.47 | 0.17  |
| 5447.00 | 11.37 | 191.06 | 5418.67 | 312.80 S | 59.14 W  | -23.35 | 0.79  |
| 5542.00 | 11.85 | 187.87 | 5511.73 | 331.65 S | 62.27 W  | -24.33 | 0.84  |
| 5637.00 | 11.48 | 187.22 | 5604.76 | 350.70 S | 64.80 W  | -24.68 | 0.41  |
| 5732.00 | 11.87 | 181.93 | 5697.80 | 369.84 S | 66.32 W  | -24.02 | 1.20  |
| 5827.00 | 11.70 | 179.17 | 5790.80 | 389.24 S | 66.51 W  | -22.01 | 0.62  |
| 5922.00 | 11.08 | 183.39 | 5883.93 | 407.99 S | 66.90 W  | -20.29 | 1.10  |
| 6013.00 | 11.78 | 183.88 | 5973.12 | 425.98 S | 68.05 W  | -19.39 | 0.78  |
| 6108.00 | 16.78 | 164.57 | 6065.21 | 448.90 S | 65.05 W  | -13.82 | 7.20  |
| 6156.00 | 20.12 | 157.61 | 6110.74 | 463.22 S | 60.07 W  | -7.24  | 8.33  |
| 6203.00 | 23.79 | 149.51 | 6154.33 | 478.88 S | 52.17 W  | 2.37   | 10.10 |
| 6251.00 | 27.28 | 139.25 | 6197.66 | 495.56 S | 40.07 W  | 16.29  | 11.72 |
| 6298.00 | 29.89 | 135.33 | 6238.93 | 512.06 S | 24.80 W  | 33.32  | 6.84  |
| 6346.00 | 32.06 | 128.98 | 6280.10 | 528.58 S | 6.48 W   | 53.40  | 8.16  |
| 6393.00 | 33.64 | 119.83 | 6319.60 | 542.92 S | 14.52 E  | 75.89  | 11.08 |
| 6441.00 | 35.89 | 112.48 | 6359.05 | 554.92 S | 39.07 E  | 101.64 | 9.89  |
| 6488.00 | 39.78 | 110.27 | 6396.17 | 565.40 S | 65.91 E  | 129.49 | 8.76  |
| 6536.00 | 43.43 | 107.22 | 6432.06 | 575.61 S | 96.09 E  | 160.63 | 8.70  |
| 6583.00 | 46.83 | 103.59 | 6465.22 | 584.42 S | 128.19 E | 193.53 | 9.06  |
| 6631.00 | 50.68 | 99.27  | 6496.87 | 591.53 S | 163.55 E | 229.47 | 10.49 |
| 6678.00 | 55.07 | 96.50  | 6525.23 | 596.65 S | 200.66 E | 266.91 | 10.45 |
| 6726.00 | 60.03 | 94.71  | 6550.98 | 600.59 S | 240.96 E | 307.40 | 10.81 |
| 6772.00 | 64.94 | 93.11  | 6572.23 | 603.35 S | 281.65 E | 348.14 | 11.12 |
| 6820.00 | 68.89 | 93.22  | 6591.04 | 605.79 S | 325.73 E | 392.21 | 8.21  |
| 6867.00 | 72.58 | 92.42  | 6606.55 | 607.97 S | 370.03 E | 436.48 | 8.02  |
| 6915.00 | 77.35 | 91.82  | 6619.00 | 609.68 S | 416.34 E | 482.68 | 10.03 |
| 6990.00 | 83.30 | 91.92  | 6631.59 | 612.09 S | 490.20 E | 556.34 | 7.93  |
| 7045.00 | 88.49 | 90.50  | 6635.53 | 613.25 S | 545.03 E | 610.95 | 9.78  |

**CALCULATION BASED ON MINIMUM CURVATURE METHOD**

**SURVEY COORDINATES RELATIVE TO WELL SYSTEM REFERENCE POINT  
TVD VALUES GIVEN RELATIVE TO DRILLING MEASUREMENT POINT**

**VERTICAL SECTION RELATIVE TO WELL HEAD  
VERTICAL SECTION IS COMPUTED ALONG A CLOSURE OF 138.37 DEGREES (GRID)  
A TOTAL CORRECTION OF 7.80 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.  
HORIZONTAL DISPLACEMENT(CLOSURE) AT 7045.00 FEET  
IS 820.45 FEET ALONG 138.37 DEGREES (GRID)**