



# NABORS

**COMPLETION  
& PRODUCTION  
SERVICES CO.**

**COMPENSATED  
DENSITY / NEUTRON  
PE LOG**

|                                                                                                                    |               |                                                                                                                    |  |
|--------------------------------------------------------------------------------------------------------------------|---------------|--------------------------------------------------------------------------------------------------------------------|--|
| Company MULL DRILLING COMPANY, INC.<br>Well #2-31 CURTIS UNIT<br>Field HORCHEM WEST<br>County GOVE<br>State KANSAS |               | Company MULL DRILLING COMPANY, INC.<br>Well #2-31 CURTIS UNIT<br>Field HORCHEM WEST<br>County GOVE<br>State KANSAS |  |
| Location: 1512' FNL & 2582' FEL<br>API # : 15-063-22197-0000                                                       |               | Other Services<br>DIL                                                                                              |  |
| Permanent Datum GROUND LEVEL<br>Log Measured From KELLY BUSHING 5' A.G.L.<br>Drilling Measured From KELLY BUSHING  |               | Elevation<br>K.B. 2513<br>D.F. 2511<br>G.L. 2508                                                                   |  |
| Date                                                                                                               | 4/23/14       |                                                                                                                    |  |
| Run Number                                                                                                         | ONE           |                                                                                                                    |  |
| Depth Driller                                                                                                      | 4500          |                                                                                                                    |  |
| Depth Logger                                                                                                       | 4502          |                                                                                                                    |  |
| Bottom Logged Interval                                                                                             | 4478          |                                                                                                                    |  |
| Top Log Interval                                                                                                   | 3600          |                                                                                                                    |  |
| Casing Driller                                                                                                     | 8 5/8"@215'   |                                                                                                                    |  |
| Casing Logger                                                                                                      | 220           |                                                                                                                    |  |
| Bit Size                                                                                                           | 7 7/8"        |                                                                                                                    |  |
| Type Fluid in Hole                                                                                                 | CHEMICAL MUD  | CHLORIDES 3,800 PPM                                                                                                |  |
| Density / Viscosity                                                                                                | 9.4/50        |                                                                                                                    |  |
| pH / Fluid Loss                                                                                                    | 10.0/7.2      |                                                                                                                    |  |
| Source of Sample                                                                                                   | FLOWLINE      |                                                                                                                    |  |
| Rim @ Meas. Temp                                                                                                   | .850@70F      |                                                                                                                    |  |
| Rmf @ Meas. Temp                                                                                                   | .638@70F      |                                                                                                                    |  |
| Rmc @ Meas. Temp                                                                                                   | 1.02@70F      |                                                                                                                    |  |
| Source of Rmf / Rmc                                                                                                | MEASUREMENT   |                                                                                                                    |  |
| Rim @ BHT                                                                                                          | .492@121F     |                                                                                                                    |  |
| Time Circulation Stopped                                                                                           | 2.5 HOURS     |                                                                                                                    |  |
| Time Logger on Bottom                                                                                              | 6:45 A.M.     |                                                                                                                    |  |
| Maximum Recorded Temperature                                                                                       | 121F          |                                                                                                                    |  |
| Equipment Number                                                                                                   | 4854          |                                                                                                                    |  |
| Location                                                                                                           | HAYS, KANSAS  |                                                                                                                    |  |
| Recorded By                                                                                                        | JEFF LUEBBERS |                                                                                                                    |  |
| Witnessed By                                                                                                       | KEVIN KESSLER |                                                                                                                    |  |

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All interpretations are opinions based on inferences from electrical or other measurements and we cannot and do not guarantee the accuracy or correctness of any interpretation, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages, or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees. These interpretations are also subject to our general terms and conditions set out in our current Price Schedule.

## Comments

THANK YOU FOR USING "NABORS" HAYS, KANSAS (785) 628-6395  
 DIRECTIONS  
 UTICA, KS., W. ON HWY 4 TO "CASTLE ROCK RD.", 5N. TO "RD. A", 1 W. & N. & W. TO FARM, N.  
 THROUGH CATTLE PENS, TAKE RIGHT FORK AROUND

Database File:

23816pe.db

Dataset Pathname:

pass3.7

Presentation Format:

ldt\_neu

Dataset Creation:

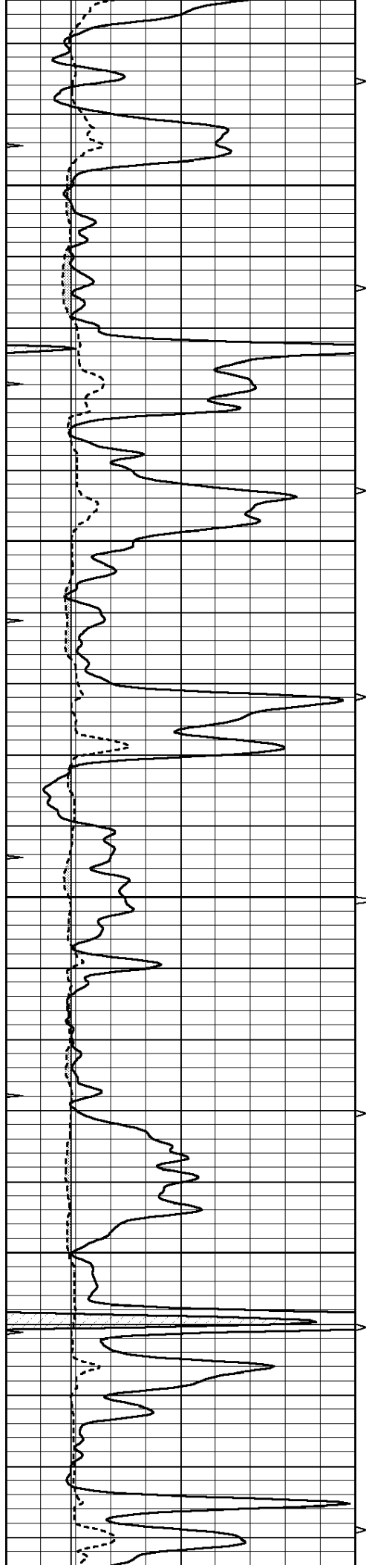
Wed Apr 23 08:28:07 2014 by Calc SOC 120430

Charted by:

Depth in Feet scaled 1:240

|       |                  |     |          |    |                          |                          |       |                   |      |     |
|-------|------------------|-----|----------|----|--------------------------|--------------------------|-------|-------------------|------|-----|
| 0     | GAMMA RAY (GAPI) | 150 | ABHV     | 30 | COMPENSATED DENSITY (pu) |                          |       |                   | -10  |     |
| 6     | CALIPER (in)     | 16  | 10 (ft3) | 0  | 30                       | COMPENSATED NEUTRON (pu) |       |                   |      | -10 |
| ----- |                  |     |          |    |                          |                          |       |                   |      |     |
| 0     | MINMK            | 20  | TBHV     | 0  | PE                       | 10                       | -0.25 | CORRECTION (g/cc) | 0.25 |     |
|       |                  |     | 0 (ft3)  | 10 |                          |                          |       |                   |      |     |
|       |                  |     |          |    |                          |                          |       |                   |      |     |



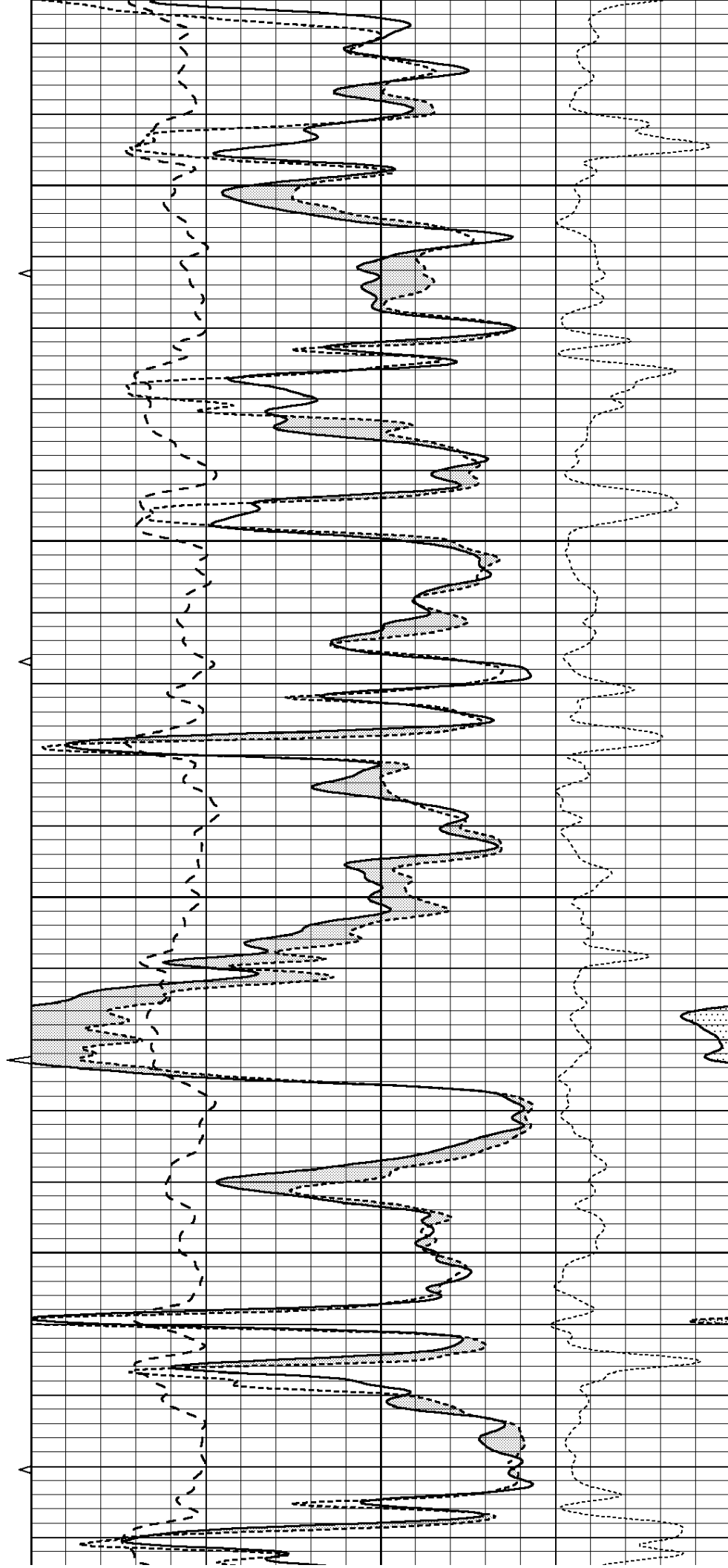


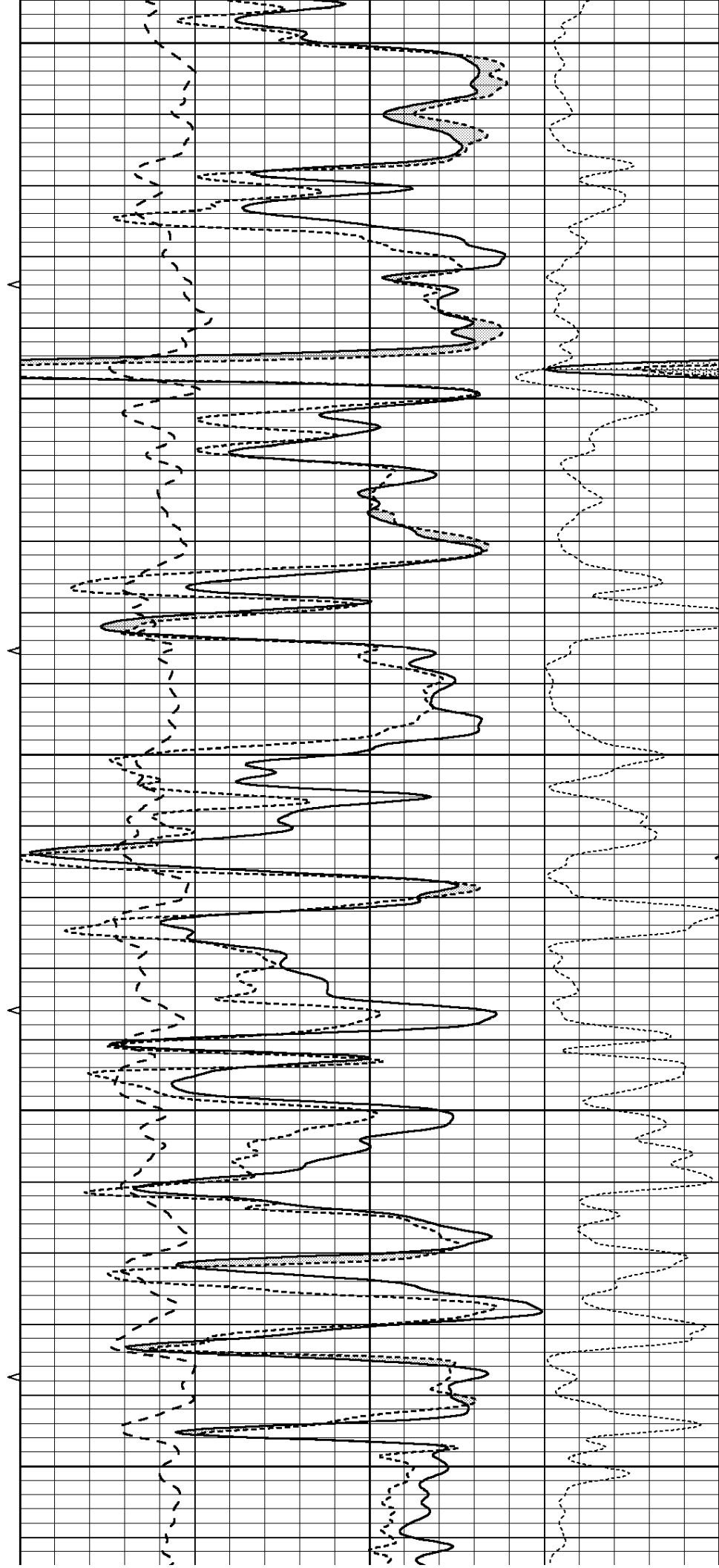
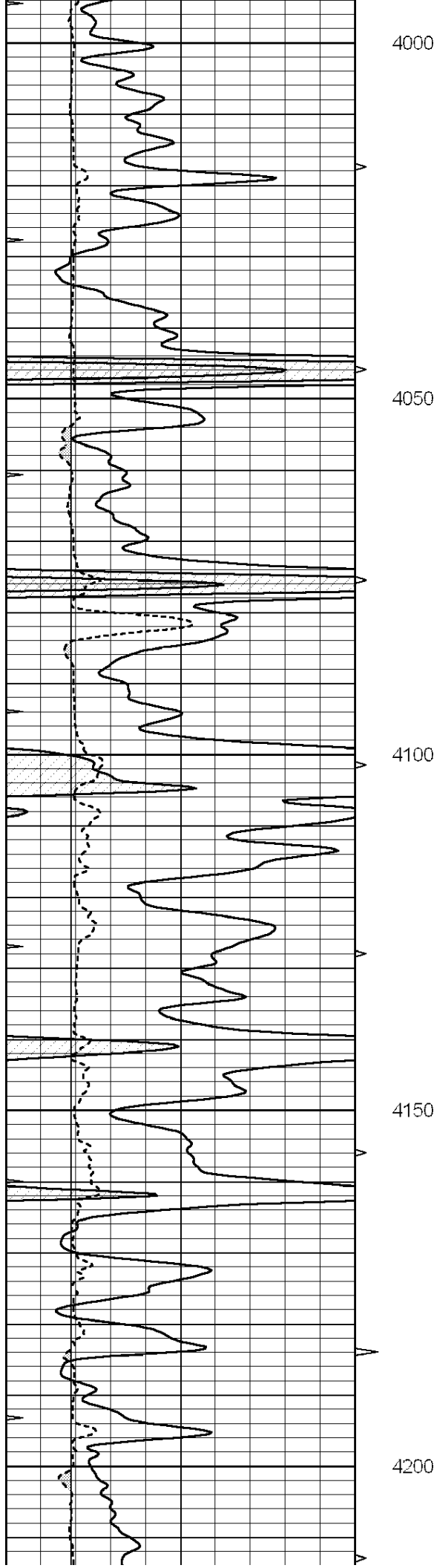
3800

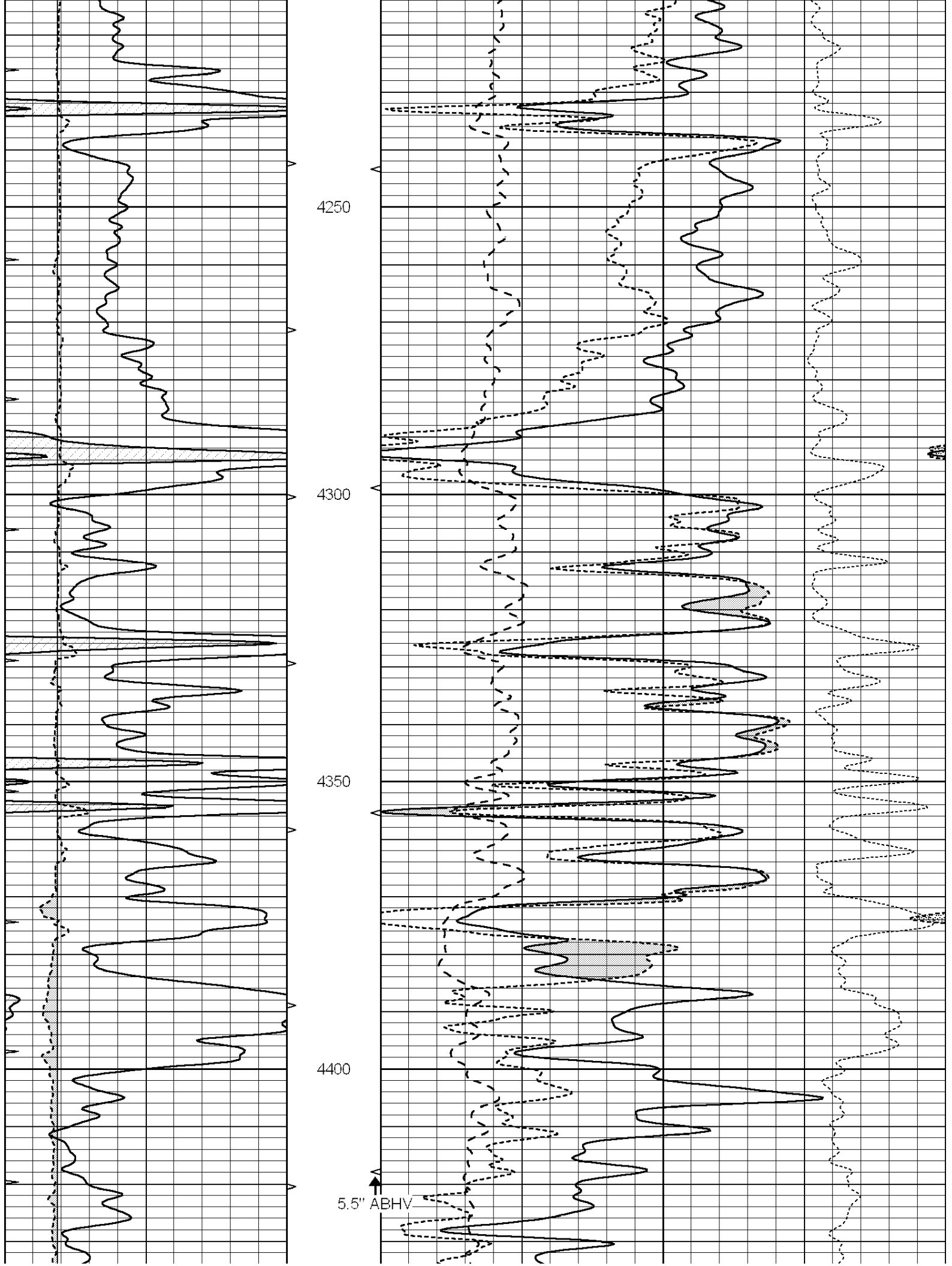
3850

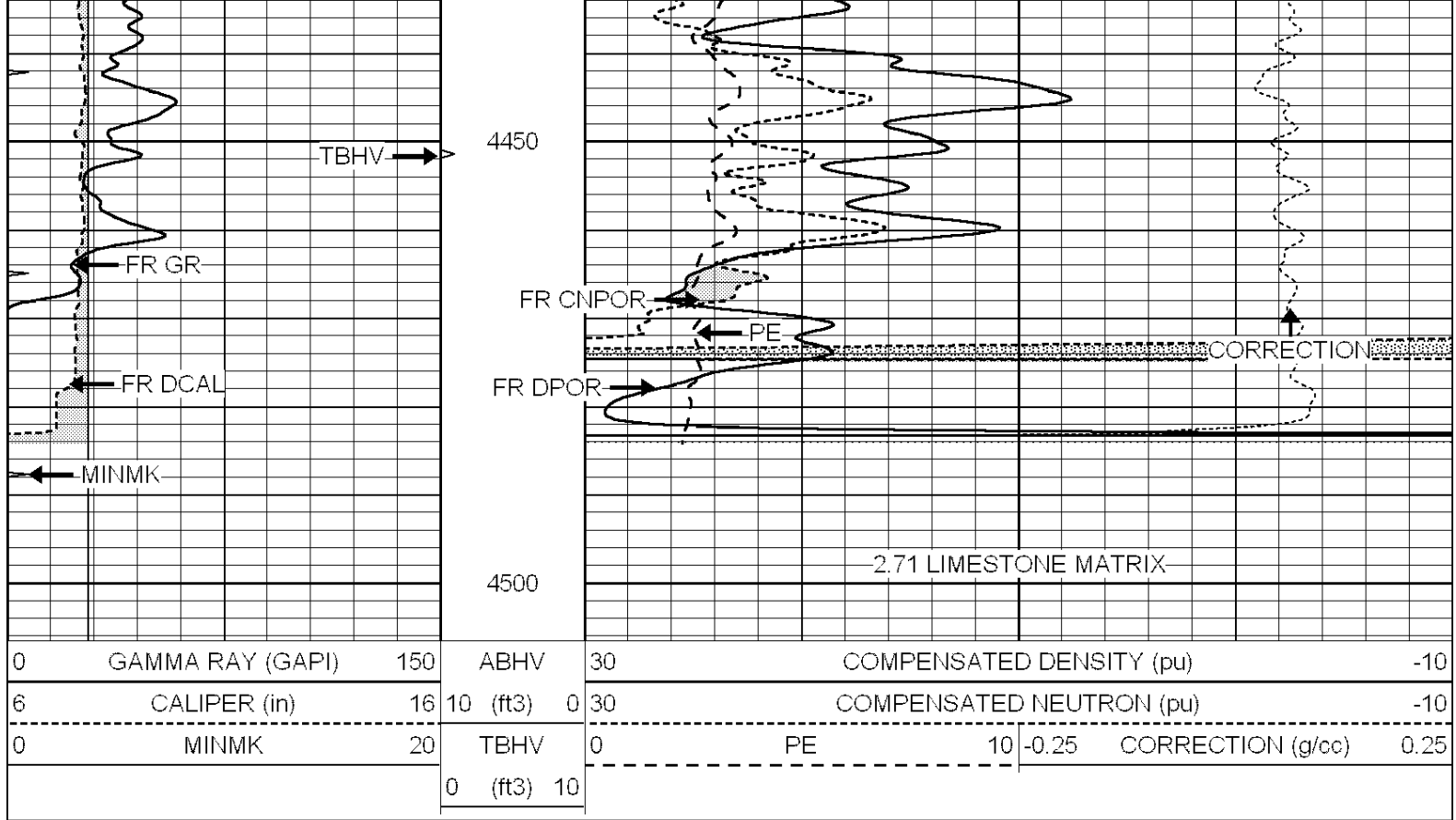
3900

3950





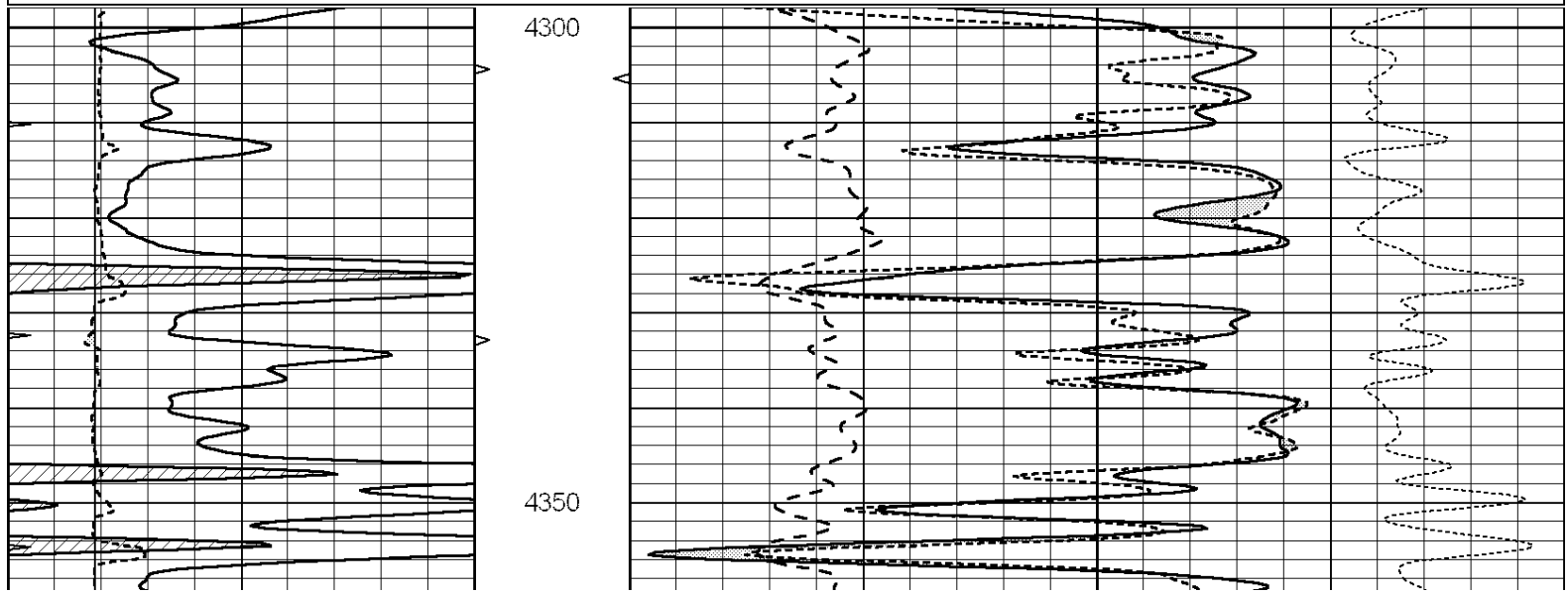


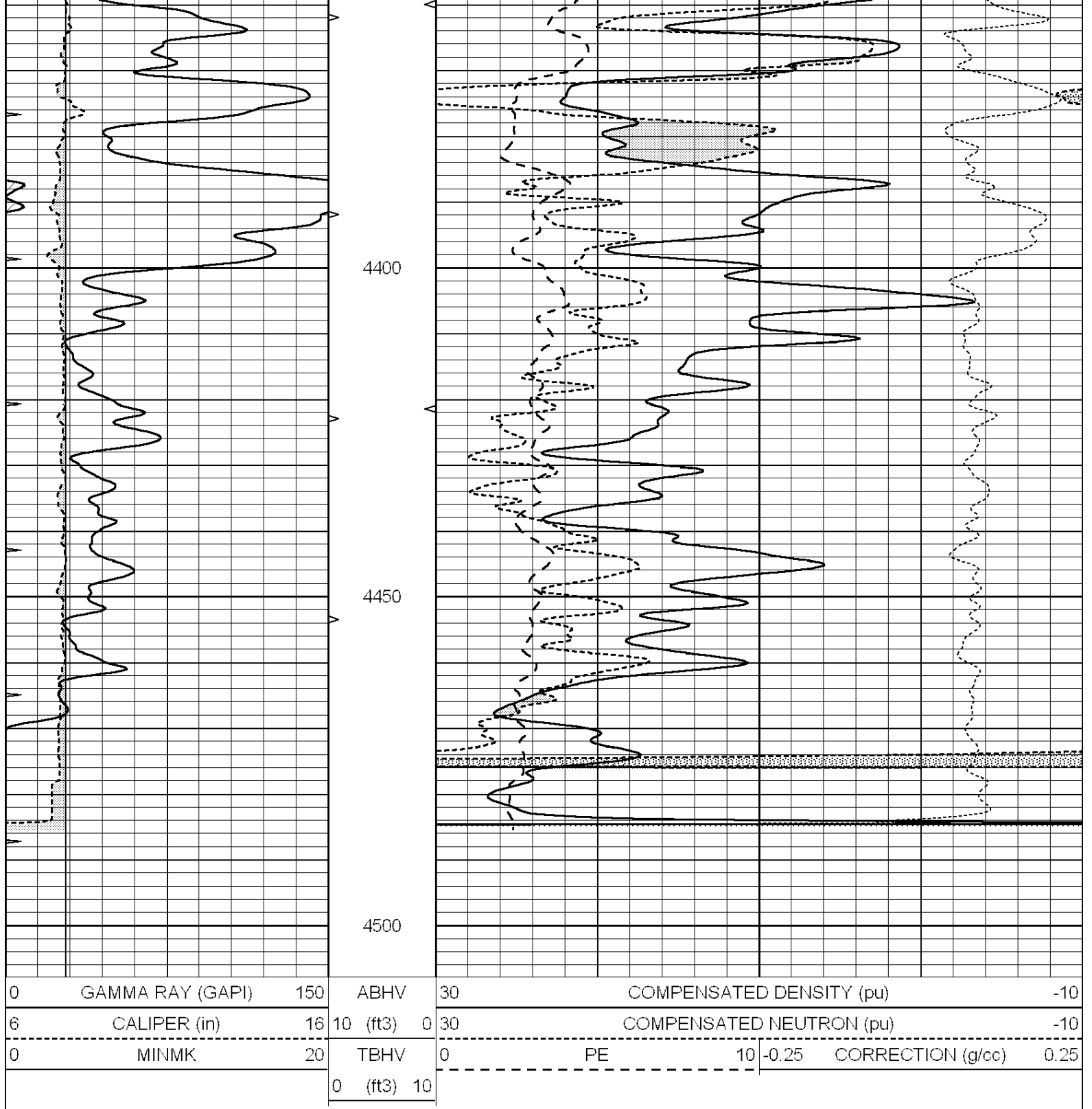


# REPEAT SECTION

Database File: 23816pe.db  
 Dataset Pathname: pass2.2  
 Presentation Format: ldt\_neu  
 Dataset Creation: Wed Apr 23 08:35:10 2014 by Calc SOC 120430  
 Charted by: Depth in Feet scaled 1:240

|   |                  |     |          |    |                          |                          |       |                   |      |     |
|---|------------------|-----|----------|----|--------------------------|--------------------------|-------|-------------------|------|-----|
| 0 | GAMMA RAY (GAPI) | 150 | ABHV     | 30 | COMPENSATED DENSITY (pu) |                          |       |                   | -10  |     |
| 6 | CALIPER (in)     | 16  | 10 (ft3) | 0  | 30                       | COMPENSATED NEUTRON (pu) |       |                   |      | -10 |
| 0 | MINMK            | 20  | TBHV     | 0  | PE                       | 10                       | -0.25 | CORRECTION (g/cc) | 0.25 |     |
|   |                  |     | 0 (ft3)  | 10 |                          |                          |       |                   |      |     |





### Calibration Report

Database File: 23816pe.db  
 Dataset Pathname: pass3.7  
 Dataset Creation: Wed Apr 23 08:28:07 2014 by Calc SOC 120430

### Dual Induction Calibration Report

Serial-Model: PROBE9-DILG  
 Surface Cal Performed: Wed Apr 23 01:07:33 2014  
 Downhole Cal Performed: Mon Jul 28 12:02:56 2008  
 After Survey Verification Performed: Mon Jul 28 12:02:56 2008

Surface Calibration

Readings

References

Results

| Loop:     | Air    | Loop  |   | Air   | Loop    |        | m       | b       |
|-----------|--------|-------|---|-------|---------|--------|---------|---------|
| Deep      | -0.014 | 0.629 | V | 0.000 | 400.000 | mmho/m | 650.000 | -22.000 |
| Medium    | 0.039  | 0.728 | V | 0.000 | 464.000 | mmho/m | 660.000 | -26.000 |
| Internal: | Zero   | Cal   |   | Zero  | Cal     |        | m       | b       |
| Deep      | 0.011  | 0.610 | V | 0.000 | 400.000 | mmho/m | 667.135 | -7.256  |
| Medium    | 0.005  | 0.712 | V | 0.000 | 464.000 | mmho/m | 655.677 | -3.102  |

| Downhole Calibration |       |        |            |         |          |         |       |       |
|----------------------|-------|--------|------------|---------|----------|---------|-------|-------|
| Readings             |       |        | References |         |          | Results |       |       |
|                      | Zero  | Cal    |            | Zero    | Cal      |         | m'    | b'    |
| Deep                 | 0.000 | 0.000  | mmho/m     | 14.508  | 388.384  | mmho/m  | 1.000 | 0.000 |
| Medium               | 0.000 | 0.000  | mmho/m     | 166.367 | 504.400  | mmho/m  | 1.000 | 0.000 |
| LL3                  |       | 7.500  | V          |         | 1400.000 | Ohm-m   |       |       |
|                      |       | 0.000  | V          |         | 20.000   | Ohm-m   |       |       |
|                      |       | -7.200 | V          |         | 4000.000 | mmho-m  |       |       |

| After Survey Verification |       |       |         |       |       |         |       |       |
|---------------------------|-------|-------|---------|-------|-------|---------|-------|-------|
| Readings                  |       |       | Targets |       |       | Results |       |       |
|                           | Zero  | Cal   |         | Zero  | Cal   |         | m'    | b'    |
| Deep                      | 0.000 | 0.000 | mmho/m  | 0.000 | 0.000 | mmho/m  | 0.000 | 0.000 |
| Medium                    | 0.000 | 0.000 | mmho/m  | 0.000 | 0.000 | mmho/m  | 0.000 | 0.000 |
| LL3                       |       | 1.000 | Ohm-m   |       | 1.000 | Ohm-m   |       |       |
|                           |       | 0.000 | Ohm-m   |       | 0.000 | Ohm-m   |       |       |
|                           |       | 1.000 | mmho-m  |       | 1.000 | mmho-m  |       |       |

| Litho Density Calibration Report |  |  |  |            |  |  |  |  |
|----------------------------------|--|--|--|------------|--|--|--|--|
| Serial: 003N                     |  |  |  | Model: PRB |  |  |  |  |

| Master Calibration |            |             |          |                     | Performed Tue Sep 08 14:14:44 2009 |  |         |      |
|--------------------|------------|-------------|----------|---------------------|------------------------------------|--|---------|------|
|                    | Background | Magnesium   | Aluminum | Sandstone           |                                    |  |         |      |
| Window 1           | 2042.6     | 12312.8     | 4225.8   | 13758.4             |                                    |  |         | cps  |
| Window 2           | 1855.8     | 10134.7     | 3624.2   | 11113.1             |                                    |  |         | cps  |
| Window 3           | 1639.4     | 6760.2      | 2716.3   | 7260.3              |                                    |  |         | cps  |
| Window 4           | 466.4      | 469.2       | 466.1    | 476.5               |                                    |  |         | cps  |
| Long Space         | 0.0        | 8278.9      | 1768.4   | 9257.4              |                                    |  |         | cps  |
| Short Space        | 2.2        | 2377.3      | 1544.1   | 2574.2              |                                    |  |         | cps  |
| Rho                |            | 1.7100      | 2.5900   | 1.3800              |                                    |  |         | g/cc |
| Pe                 |            | 0.0000      | 2.5700   | 1.5500              |                                    |  |         |      |
| Rib Angle          | : 44.4     | Rib Slope   | : 0.979  | Density/Spine Ratio |                                    |  | : 0.549 |      |
| Spine Angle        | : 74.4     | Spine Slope | : 3.577  | Spine Intercept     |                                    |  | : -18.8 |      |

| Before Survey Verification |     |        |        |        | Performed Wed Dec 31 18:00:00 1969 |  |  |      |
|----------------------------|-----|--------|--------|--------|------------------------------------|--|--|------|
|                            |     |        |        |        |                                    |  |  |      |
| Window 1                   | 0.0 | 0.0    | 0.0    | 0.0    |                                    |  |  | cps  |
| Window 2                   | 0.0 | 0.0    | 0.0    | 0.0    |                                    |  |  | cps  |
| Window 3                   | 0.0 | 0.0    | 0.0    | 0.0    |                                    |  |  | cps  |
| Window 4                   | 0.0 | 0.0    | 0.0    | 0.0    |                                    |  |  | cps  |
| Long Space                 | 0.0 | 0.0    | 0.0    | 0.0    |                                    |  |  | cps  |
| Short Space                | 0.0 | 0.0    | 0.0    | 0.0    |                                    |  |  | cps  |
| Measured Rho               |     | 0.0000 | 0.0000 | 0.0000 |                                    |  |  | g/cc |
| Measured Correction        |     | 0.0000 | 0.0000 | 0.0000 |                                    |  |  | g/cc |
| Measured Pe                |     |        | 0.0000 | 0.0000 |                                    |  |  |      |

| After Survey Verification |  |  |  |  | Performed Wed Dec 31 18:00:00 1969 |  |  |  |
|---------------------------|--|--|--|--|------------------------------------|--|--|--|
|---------------------------|--|--|--|--|------------------------------------|--|--|--|



|                                        |          |                          |          |        |      |
|----------------------------------------|----------|--------------------------|----------|--------|------|
| Window 1                               | 0.0      | 0.0                      | 0.0      | 0.0    | cps  |
| Window 2                               | 0.0      | 0.0                      | 0.0      | 0.0    | cps  |
| Window 3                               | 0.0      | 0.0                      | 0.0      | 0.0    | cps  |
| Window 4                               | 0.0      | 0.0                      | 0.0      | 0.0    | cps  |
| Long Space                             | 0.0      | 0.0                      | 0.0      | 0.0    | cps  |
| Short Space                            | 0.0      | 0.0                      | 0.0      | 0.0    | cps  |
| Measured Rho                           |          | 0.0000                   | 0.0000   | 0.0000 | g/cc |
| Measured Correction                    |          | 0.0000                   | 0.0000   | 0.0000 | g/cc |
| Measured Pe                            |          |                          | 0.0000   | 0.0000 |      |
|                                        |          |                          |          |        |      |
| Compensated Neutron Calibration Report |          |                          |          |        |      |
|                                        |          | Serial Number:           | 070808   |        |      |
|                                        |          | Tool Model:              | Probe    |        |      |
| PRE-SURVEY VERIFICATION                |          |                          |          |        |      |
| Detector                               | Readings | Measured                 | Target   |        |      |
| Short Space                            | cps      |                          |          |        |      |
| Long Space                             | cps      | pu                       | pu       |        |      |
| POST-SURVEY VERIFICATION               |          |                          |          |        |      |
| Detector                               | Readings | Measured                 | Target   |        |      |
| Short Space                            | cps      |                          |          |        |      |
| Long Space                             | cps      | pu                       | pu       |        |      |
| Gamma Ray Calibration Report           |          |                          |          |        |      |
| Serial Number:                         |          | 070558                   |          |        |      |
| Tool Model:                            |          | OPEN_GR                  |          |        |      |
| Performed:                             |          | Mon Mar 24 01:53:40 2014 |          |        |      |
| Calibrator Value:                      |          | 1.0                      | GAPI     |        |      |
| Background Reading:                    |          | 0.0                      | cps      |        |      |
| Calibrator Reading:                    |          | 1.0                      | cps      |        |      |
| Sensitivity:                           |          | 0.3000                   | GAPI/cps |        |      |