



# NABORS

**COMPLETION  
& PRODUCTION  
SERVICES CO.**

## DUAL INDUCTION LOG

|                                                                |                           |                                                                         |                                           |
|----------------------------------------------------------------|---------------------------|-------------------------------------------------------------------------|-------------------------------------------|
| Company                                                        |                           | MULL DRILLING COMPANY, INC.                                             |                                           |
| Well                                                           | #2-4 THORNBURG "B"        |                                                                         |                                           |
| Field                                                          | WILDCAT                   |                                                                         |                                           |
| County                                                         | NESS                      | State                                                                   | KANSAS                                    |
| Location:                                                      | APL # : 15-135-25581-0000 |                                                                         | Other Services<br>CDL/CNL/PE<br>MEL/SONIC |
| Permanent Datum<br>Log Measured From<br>Drilling Measured From |                           | GROUND LEVEL Elevation 2604<br>KELLY BUSHING 5' A.G.L.<br>KELLY BUSHING |                                           |
| SEC 4 TWP 16S RGE 26W                                          |                           | Elevation<br>K.B. 2609<br>D.F. 2607<br>G.L. 2604                        |                                           |
| Date                                                           | 5/11/13                   |                                                                         |                                           |
| Run Number                                                     | ONE                       |                                                                         |                                           |
| Depth Driller                                                  | 4600                      |                                                                         |                                           |
| Depth Logger                                                   | 4600                      |                                                                         |                                           |
| Bottom Logged Interval                                         | 4598                      |                                                                         |                                           |
| Top Log Interval                                               | 00                        |                                                                         |                                           |
| Casing Driller                                                 | 8 5/8"@220'               |                                                                         |                                           |
| Casing Logger                                                  | 217                       |                                                                         |                                           |
| Bit Size                                                       | 7 7/8"                    |                                                                         |                                           |
| Type Fluid in Hole                                             | CHEMICAL MUD              | CHLORIDES 2,500 PPM                                                     |                                           |
| Density / Viscosity                                            | 9.3/44                    |                                                                         |                                           |
| pH / Fluid Loss                                                | 10.5/6.8                  |                                                                         |                                           |
| Source of Sample                                               | FLOWLINE                  |                                                                         |                                           |
| Rin @ Meas. Temp                                               | .900@82F                  |                                                                         |                                           |
| Rinf @ Meas. Temp                                              | .675@82F                  |                                                                         |                                           |
| Rinc @ Meas. Temp                                              | 1.08@82F                  |                                                                         |                                           |
| Source of Rinf / Rinc                                          | MEASUREMENT               |                                                                         |                                           |
| Rin @ BHT                                                      | .610@121F                 |                                                                         |                                           |
| Time Circulation Stopped                                       | 2.5 HOURS                 |                                                                         |                                           |
| Time Logger on Bottom                                          | 6:30 P.M.                 |                                                                         |                                           |
| Maximum Recorded Temperature                                   | 121F                      |                                                                         |                                           |
| Equipment Number                                               | 4854                      |                                                                         |                                           |
| Location                                                       | HAYS, KANSAS              |                                                                         |                                           |
| Recorded By                                                    | JEFF LUEBBERS             |                                                                         |                                           |
| Witnessed By                                                   | KEVIN KESSLER             |                                                                         |                                           |

<<< Fold Here >>>

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. 2W. ON HWY 4 TO "RD. B", 4N. TO "T", 1/2E., S. INTO

Database File:

010903pe.db

Dataset Pathname:

pass3.2

Presentation Format:

dil2

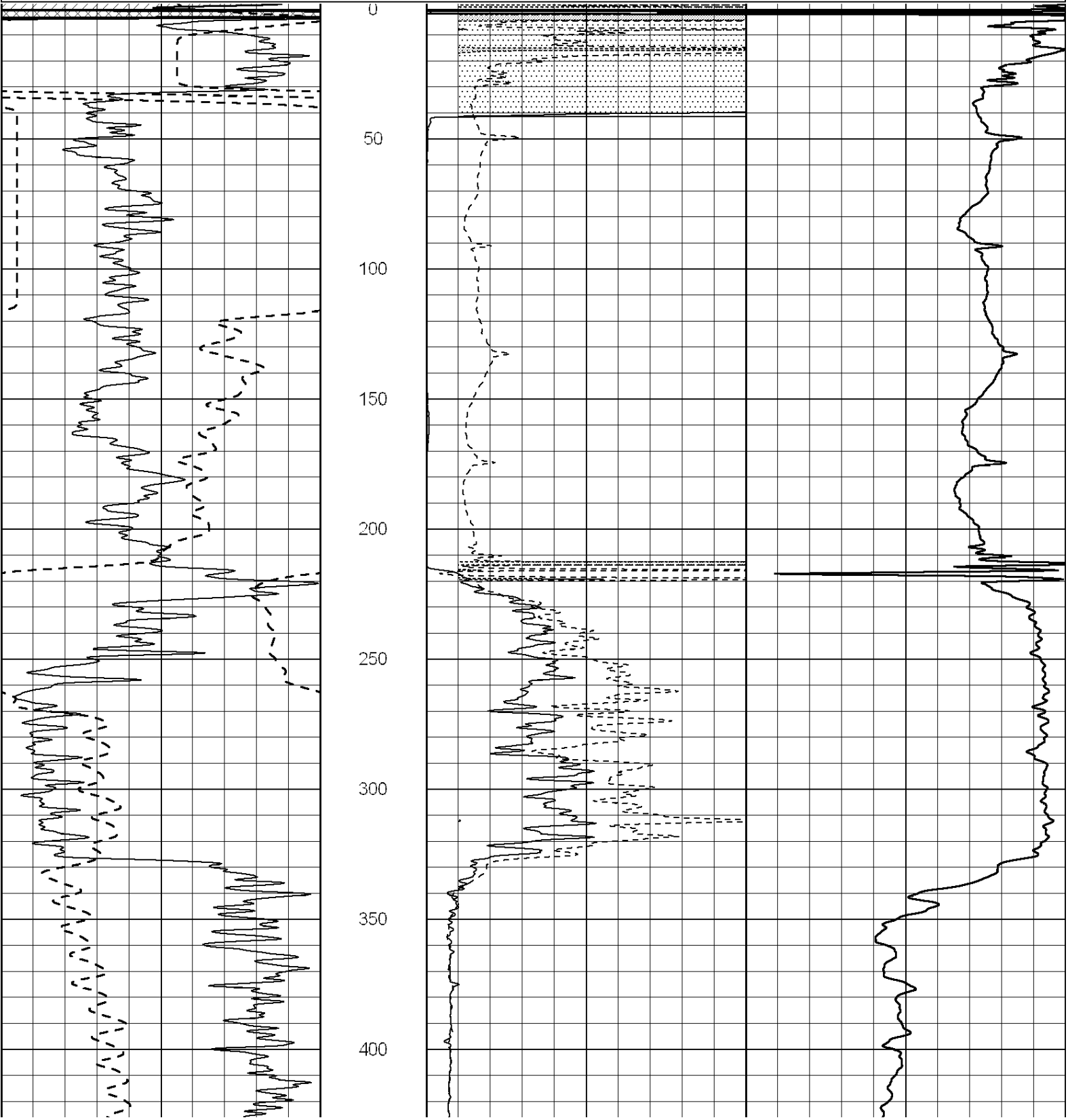
Dataset Creation:

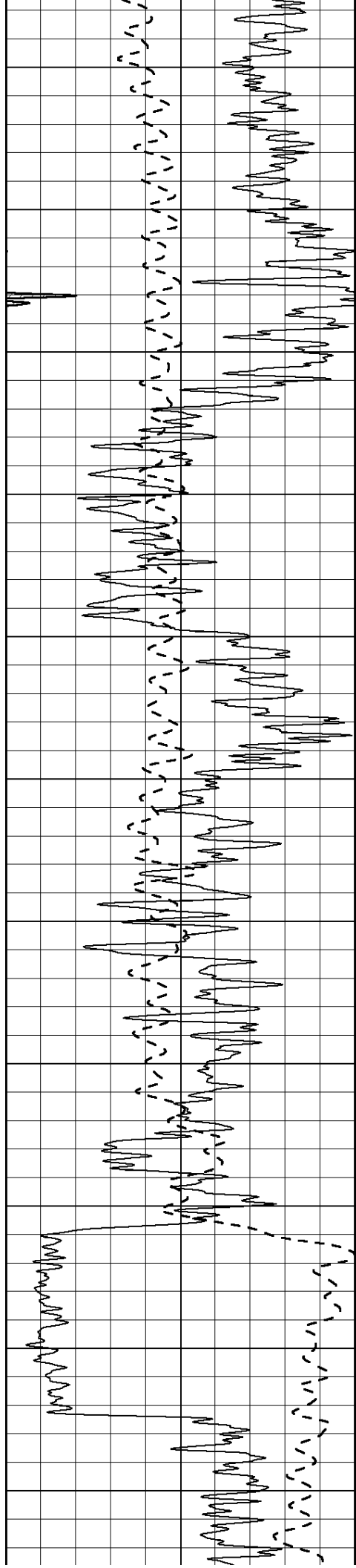
Sat May 11 19:58:45 2013 by Calc SOC 120430

Charted by:

Depth in Feet scaled 1:600

|       |                  |     |       |                  |               |   |
|-------|------------------|-----|-------|------------------|---------------|---|
| 0     | Gamma Ray (GAPI) | 150 | 0     | RLL3 (Ohm-m)     | 50            |   |
| -100  | SP (mV)          | 100 | 0     | RILD (Ohm-m)     | 50            |   |
| ----- |                  |     | ----- |                  |               |   |
|       |                  |     | 1000  |                  | CILD (mmho/m) | 0 |
|       |                  |     | 50    | RILD X10 (Ohm-m) | 500           |   |
|       |                  |     | 50    | RLL3 X10 (Ohm-m) | 500           |   |
|       |                  |     |       |                  |               |   |





450

500

550

600

650

700

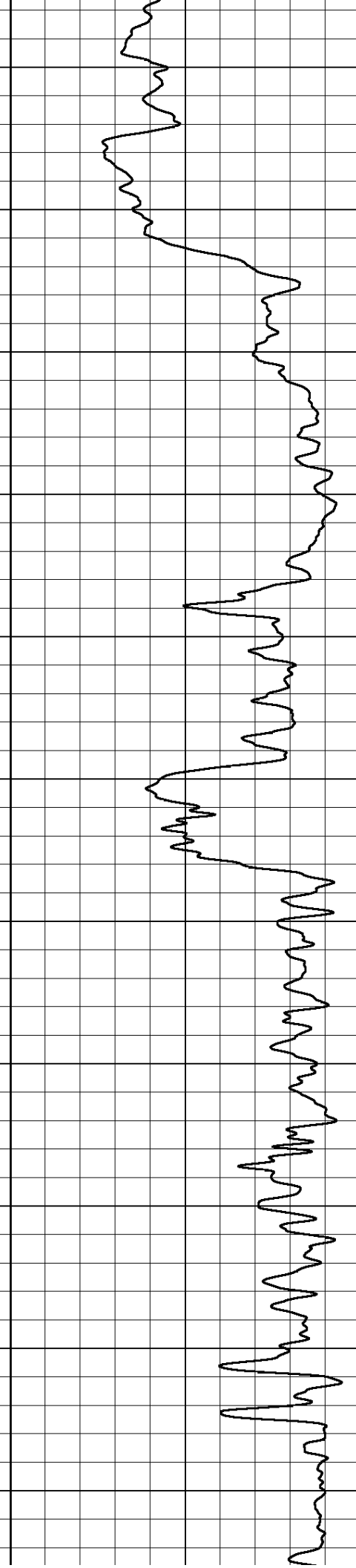
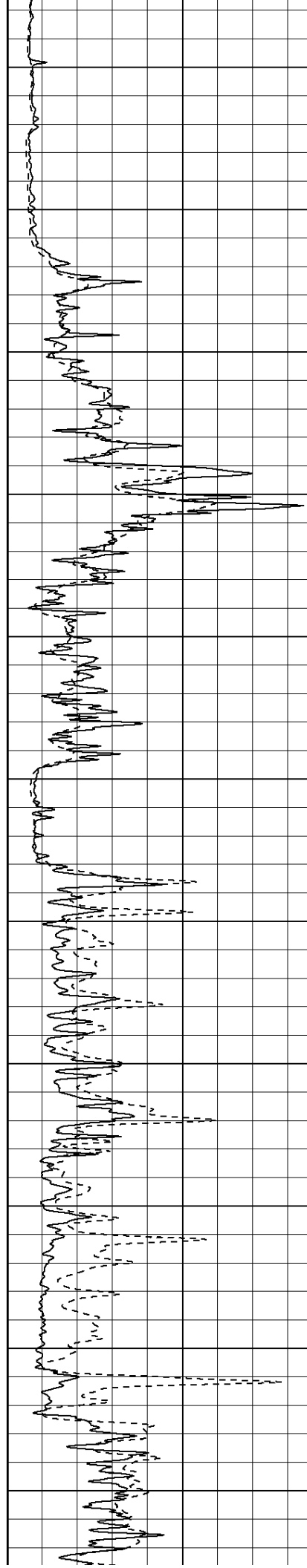
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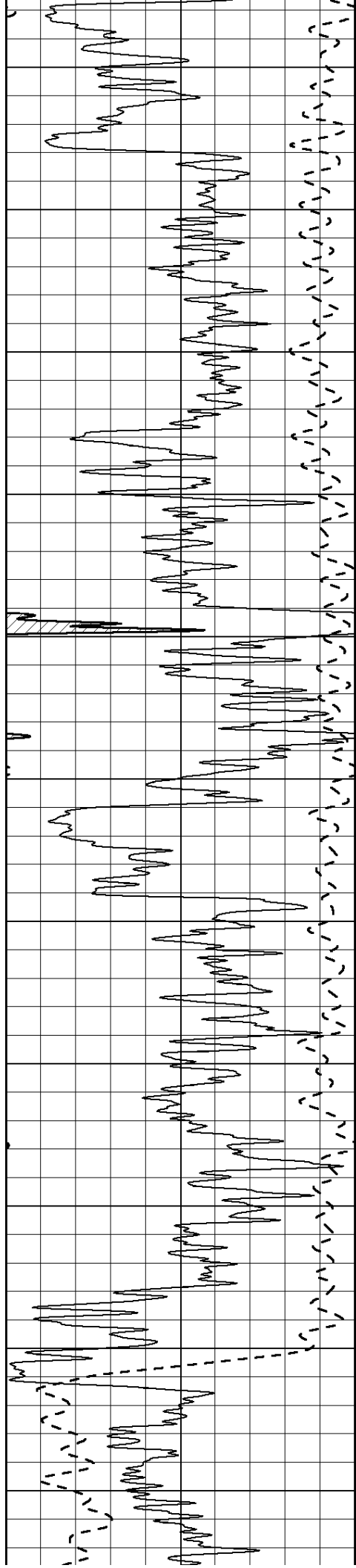
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850

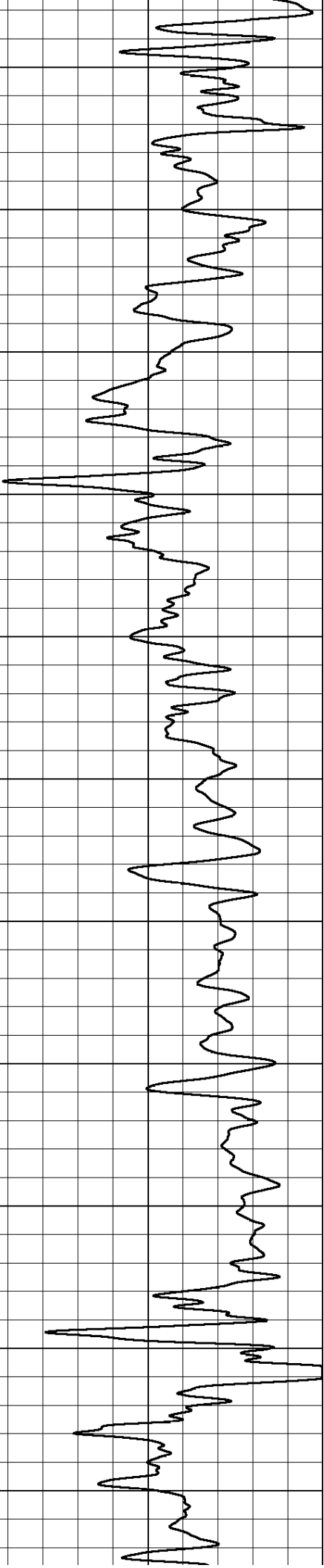
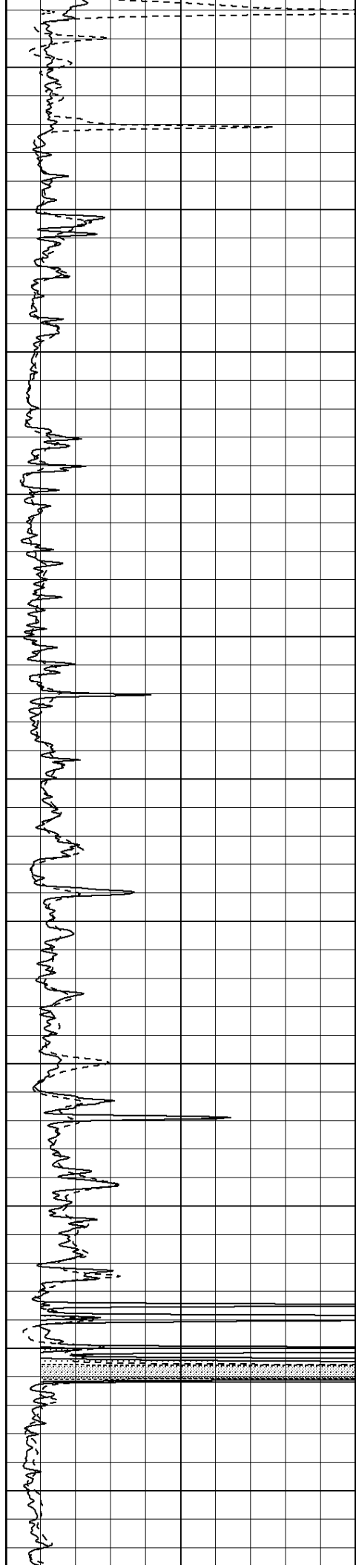
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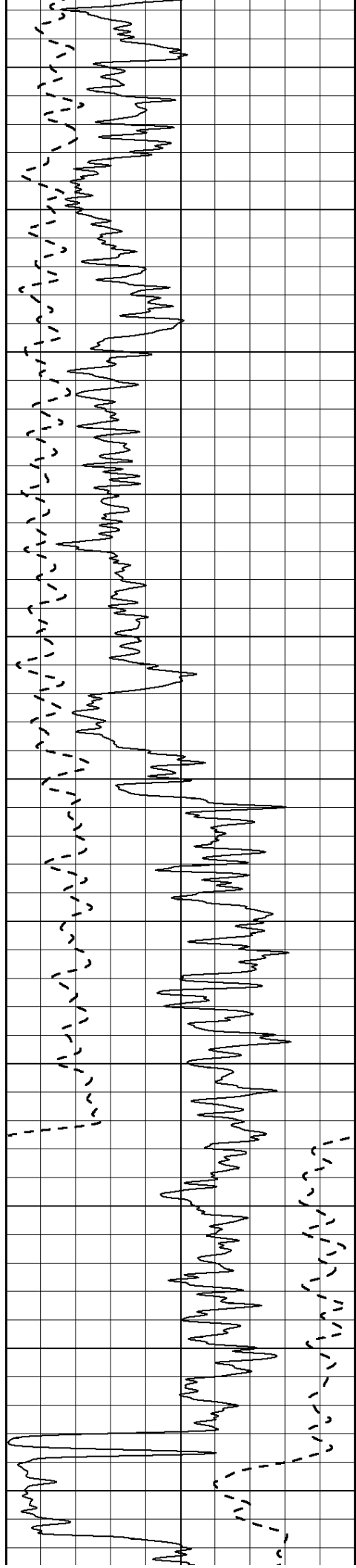
950





1000  
1050  
1100  
1150  
1200  
1250  
1300  
1350  
1400  
1450  
1500





1550

1600

1650

1700

1750

1800

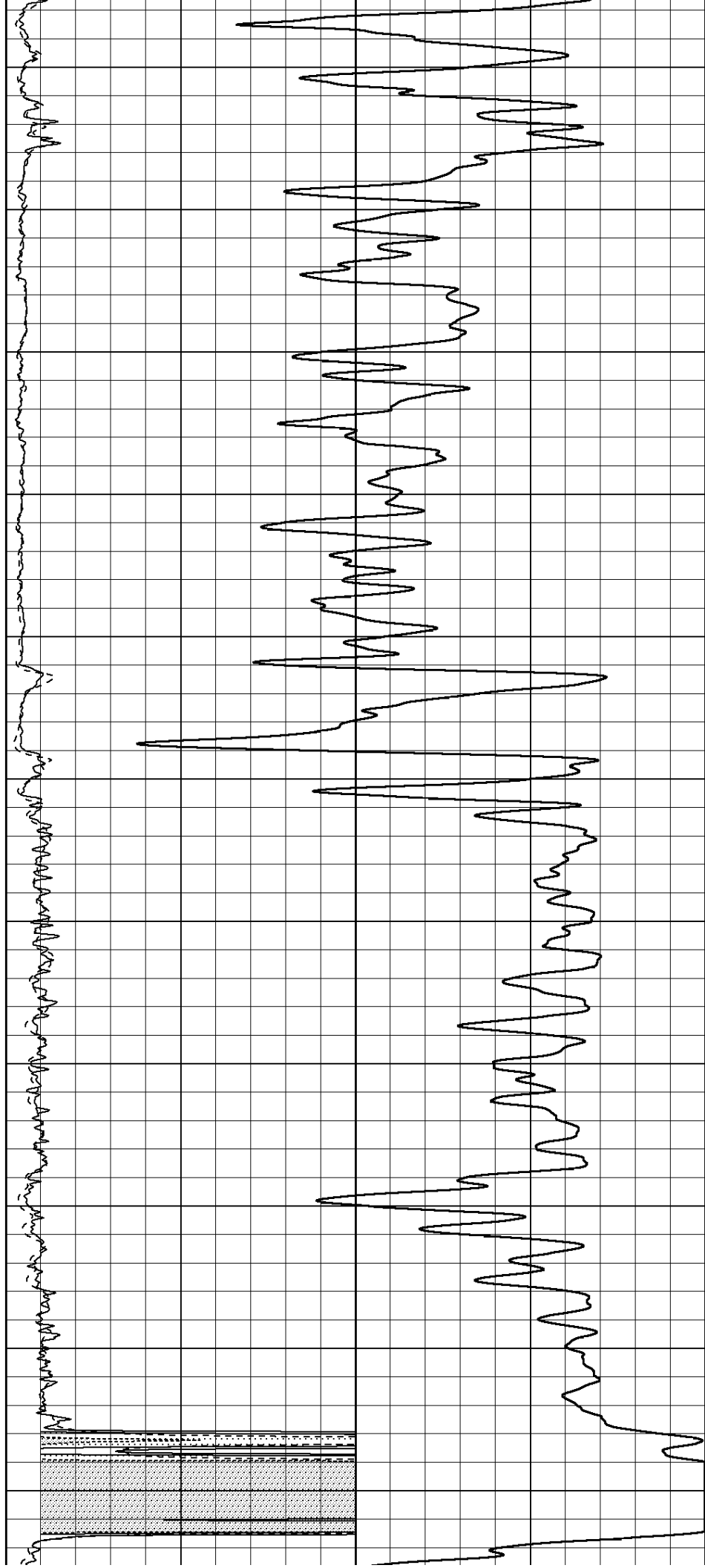
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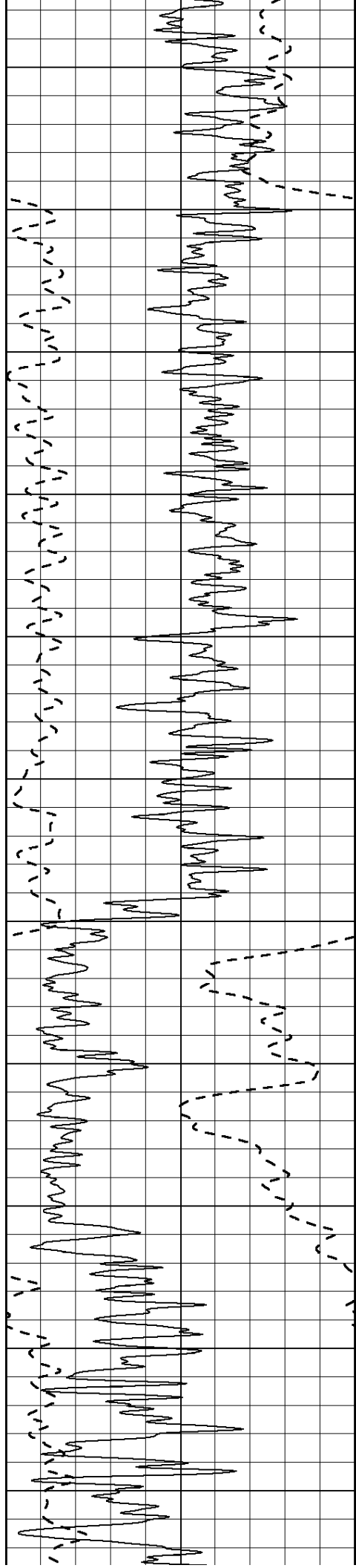
1900

1950

2000

2050





2100

2150

2200

2250

2300

2350

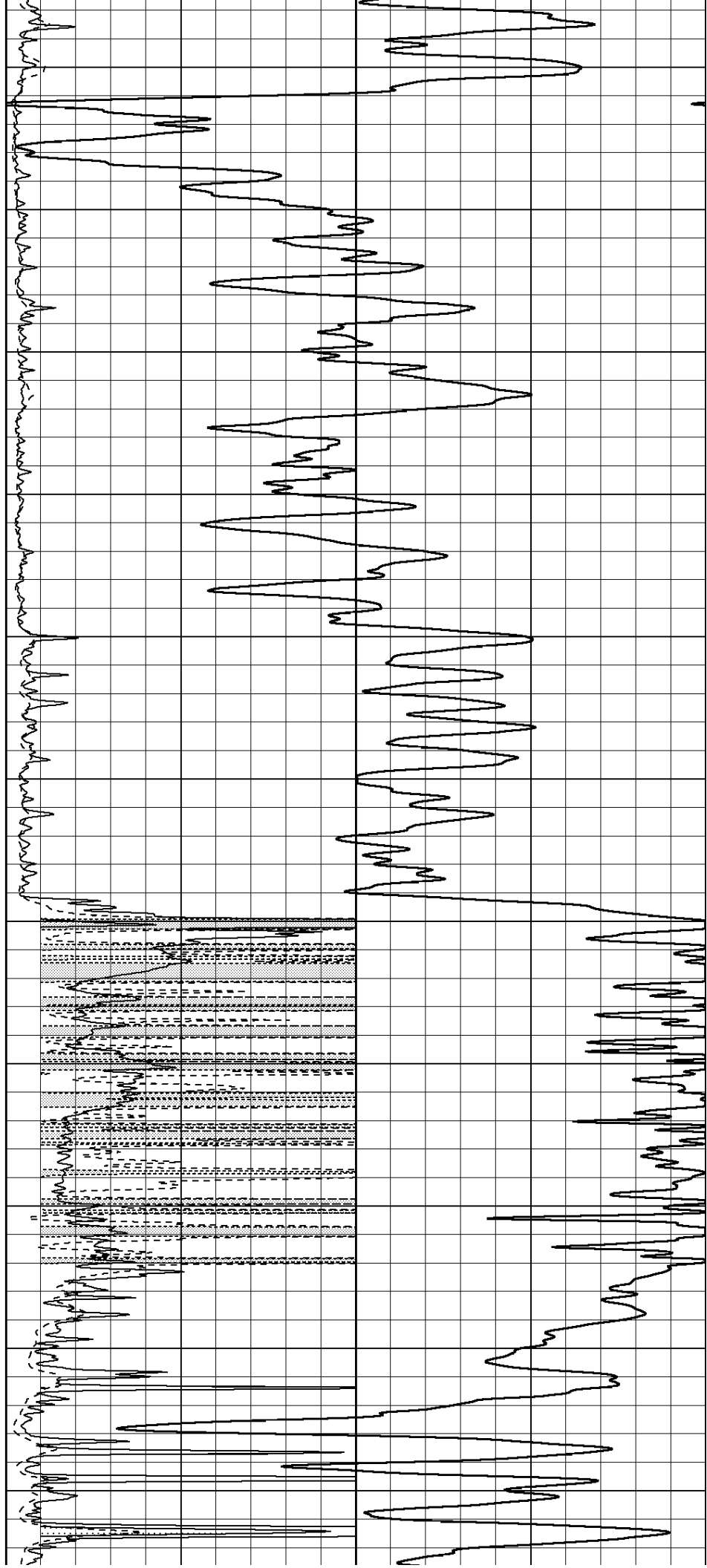
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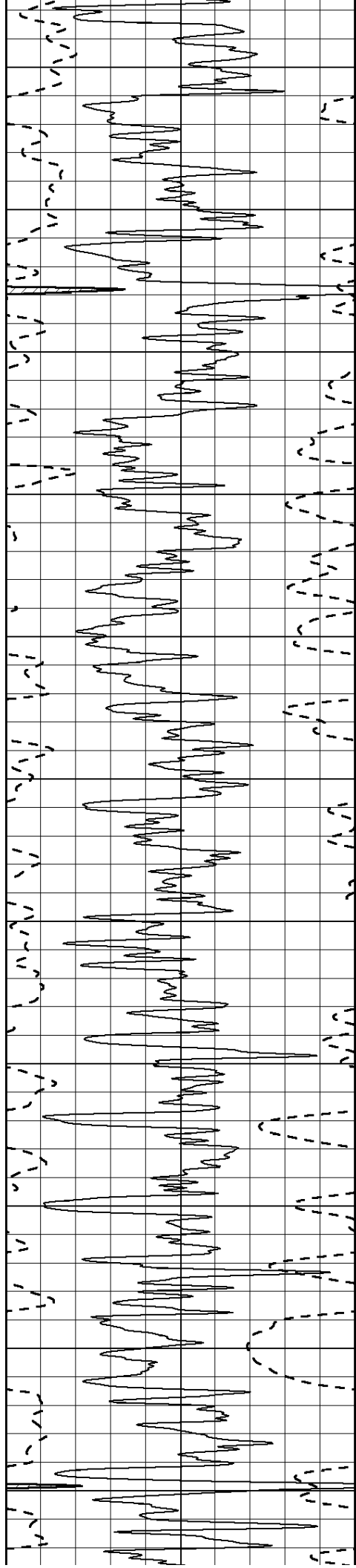
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2500

2550

2600





2650

2700

2750

2800

2850

2900

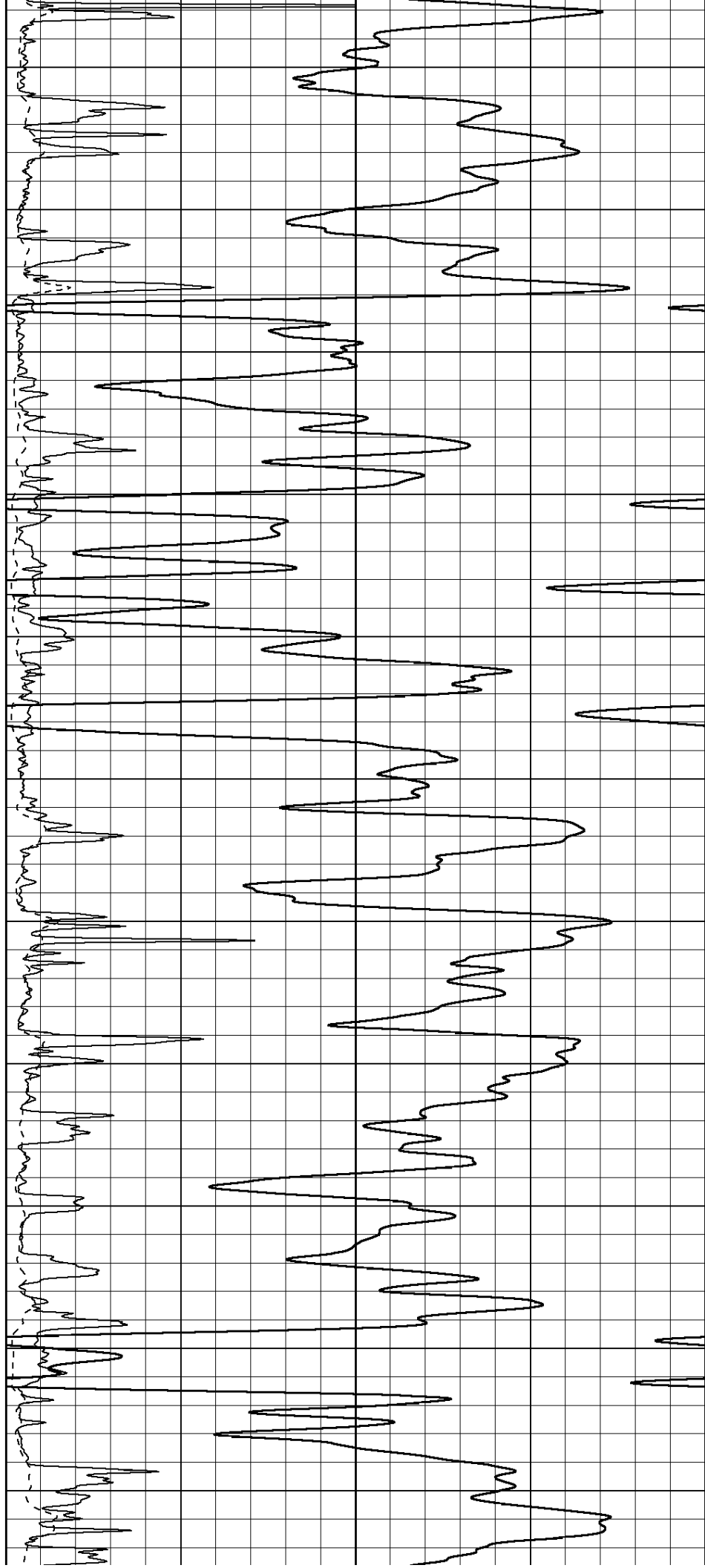
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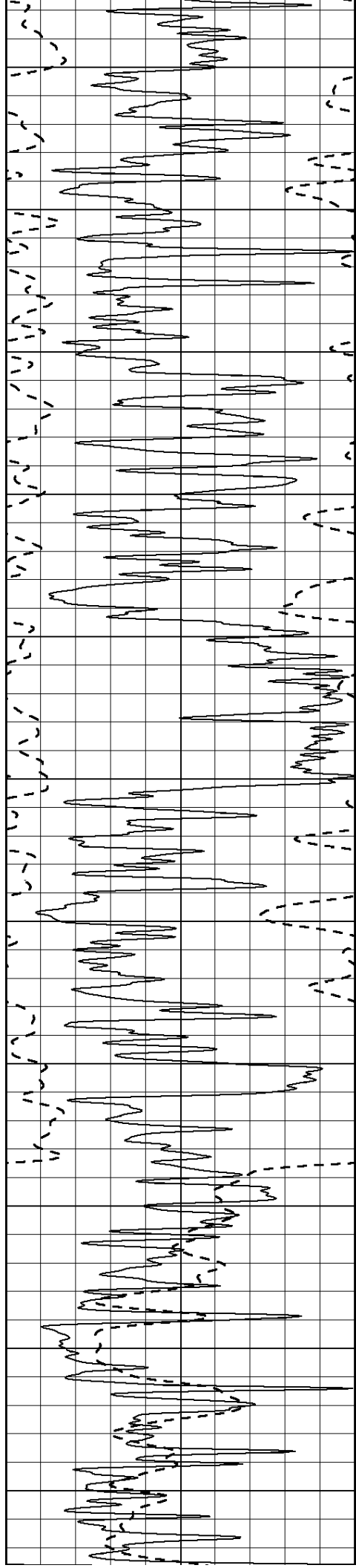
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3050

3100

3150





3200

3250

3300

3350

3400

3450

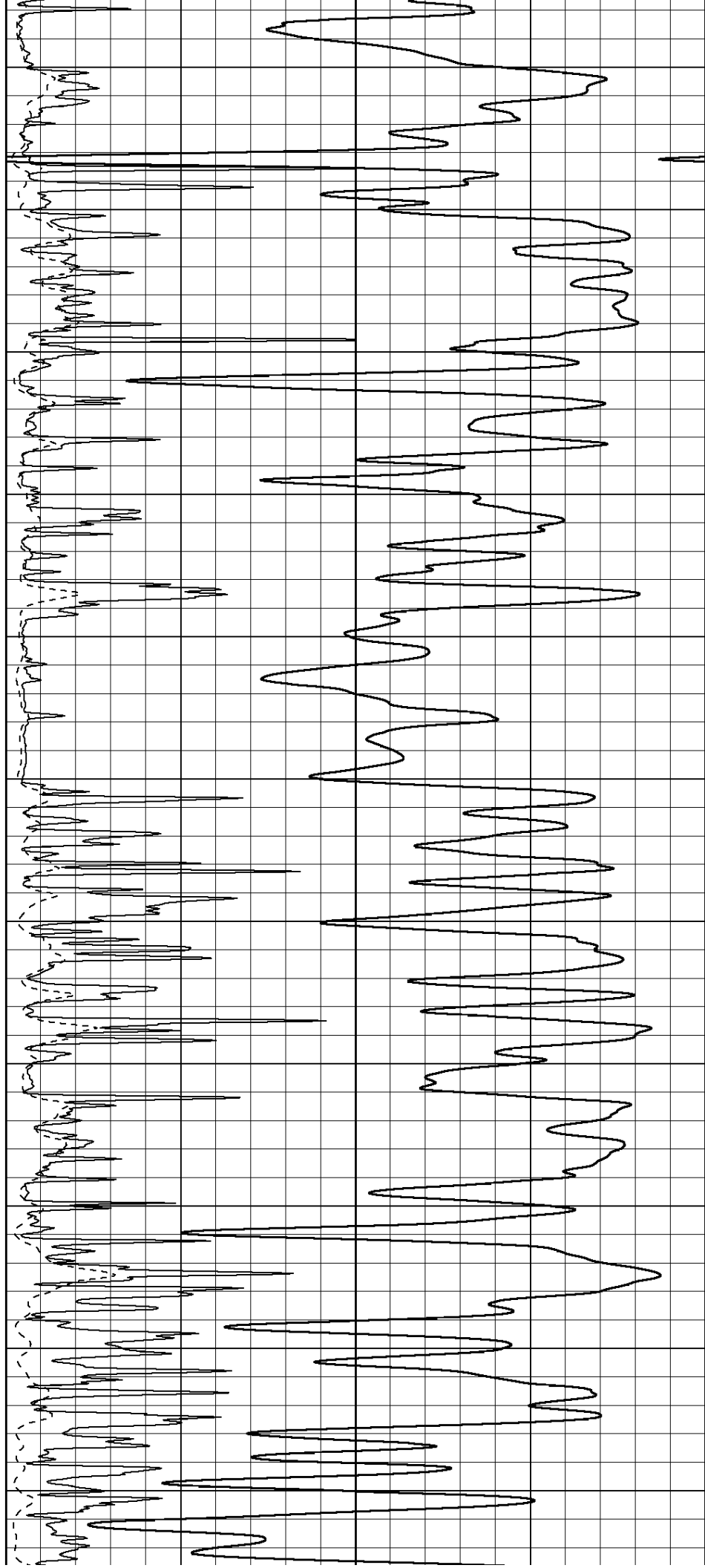
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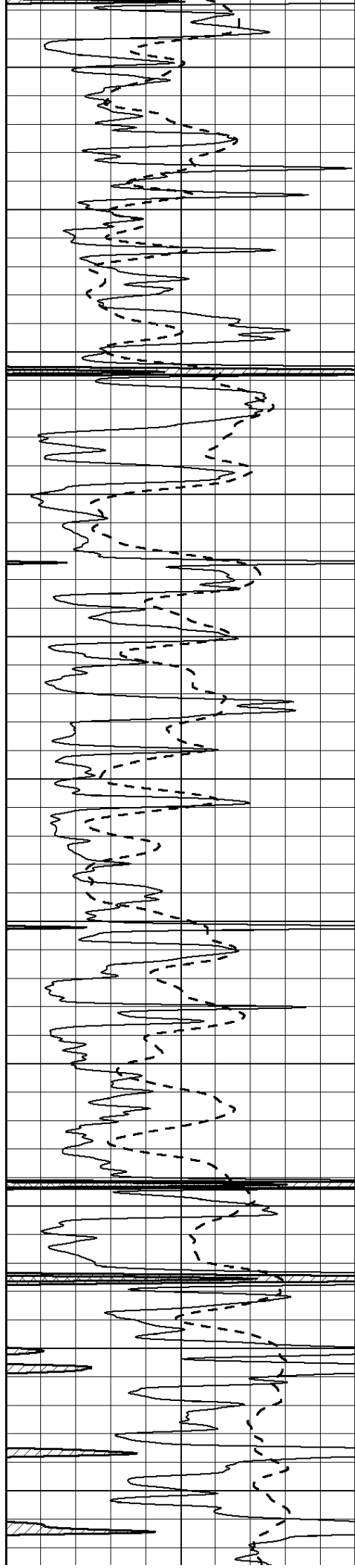
3550

3600

3650

3700





3750

3800

3850

3900

3950

4000

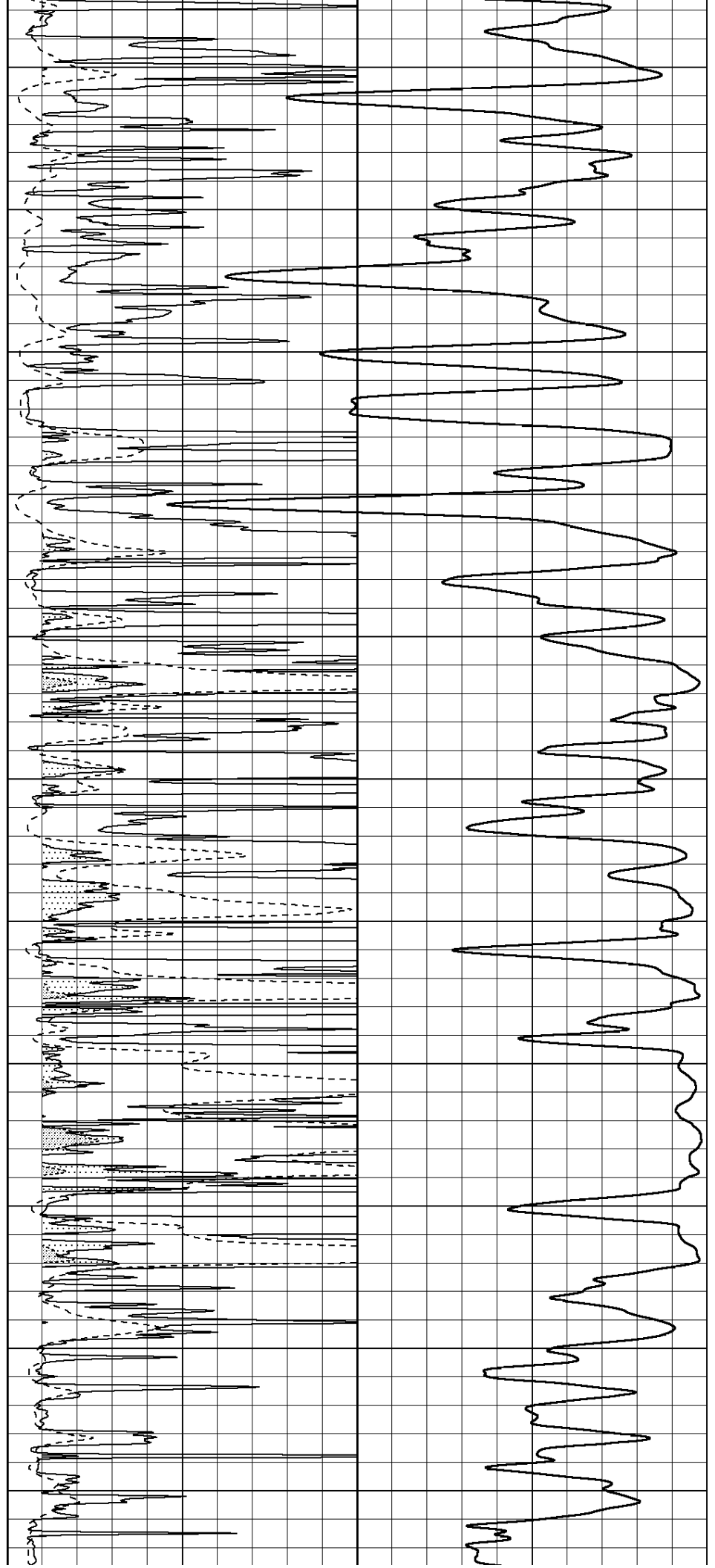
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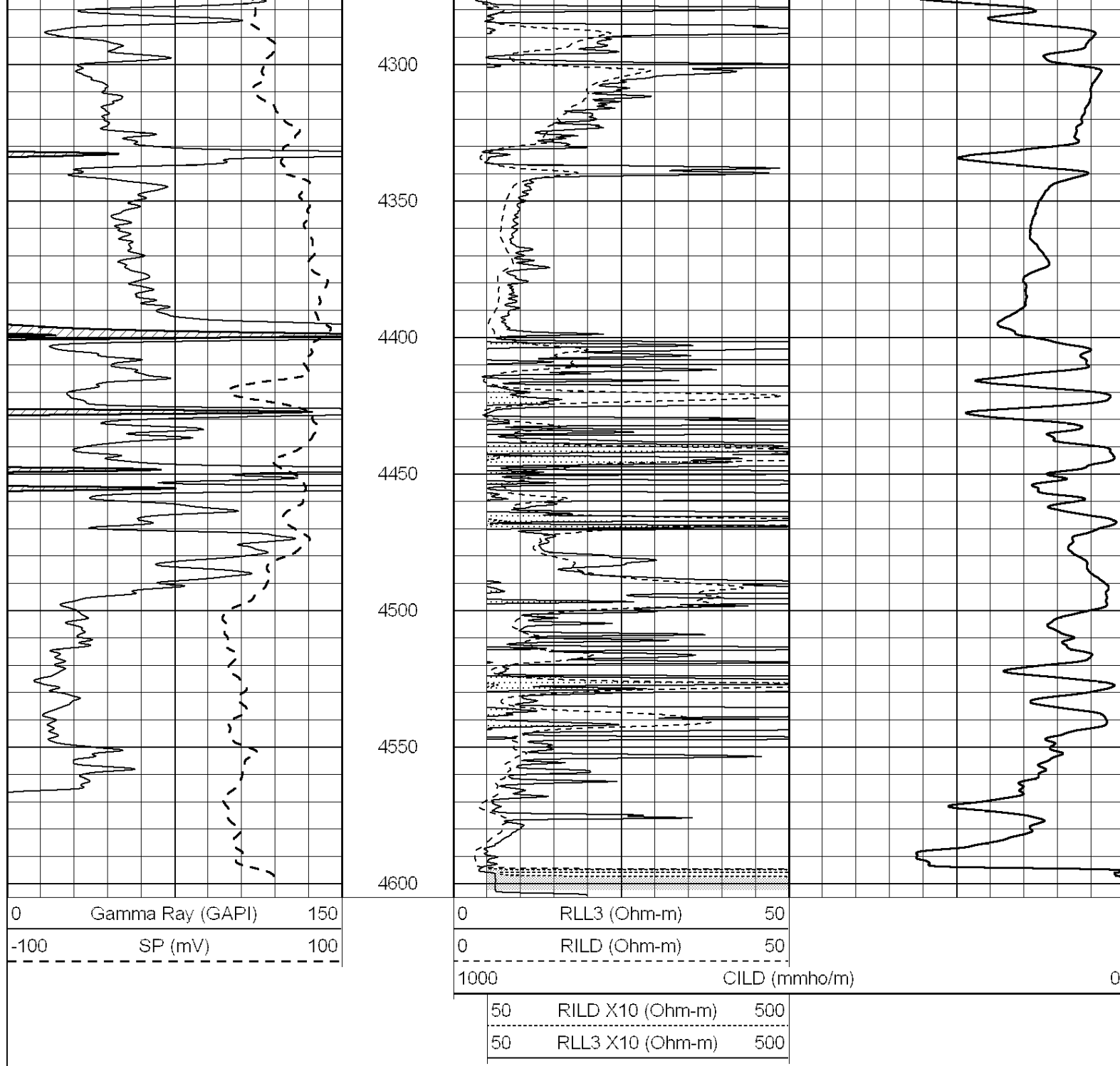
4100

4150

4200

4250



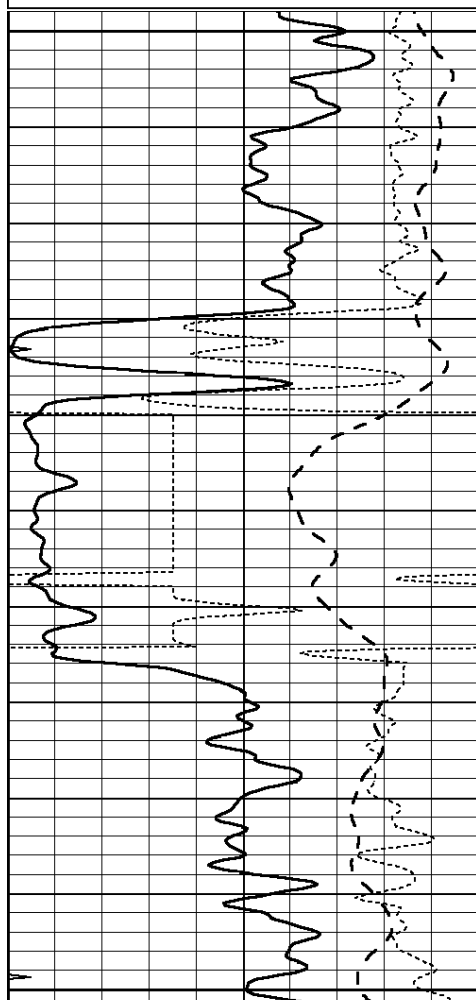


**NABORS**  
COMPLETION  
& PRODUCTION  
SERVICES CO.

# ANHYDRITE

Database File: 010903pe.db  
Dataset Pathname: pass3.3  
Presentation Format: \_dil  
Dataset Creation: Sat May 11 20:03:25 2013 by Calc SOC 120430  
Charted by: Depth in Feet scaled 1:240

|      |                  |     |     |                          |      |
|------|------------------|-----|-----|--------------------------|------|
| 0    | GAMMA RAY (GAPI) | 150 | 0.2 | SHALLOW GUARD (Ohm-m)    | 2000 |
| -100 | SP (mV)          | 100 | 0.2 | DEEP INDUCTION (Ohm-m)   | 2000 |
| -250 | Rxo/Rt           | 50  | 0.2 | MEDIUM INDUCTION (Ohm-m) | 2000 |
| 0    | MINMK            | 20  |     |                          |      |

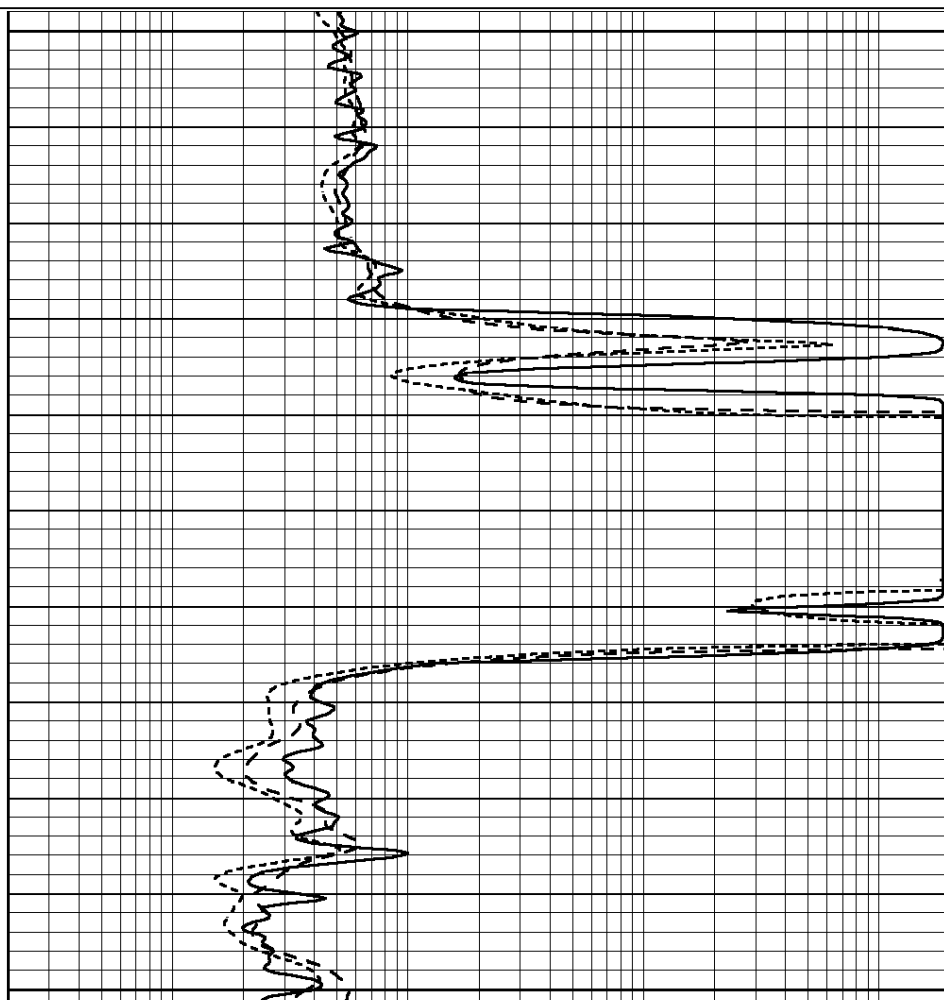


2000

2050

2100

|      |                  |     |
|------|------------------|-----|
| 0    | GAMMA RAY (GAPI) | 150 |
| -100 | SP (mV)          | 100 |
| -250 | Rxo/Rt           | 50  |
| 0    | MINMK            | 20  |



|     |                          |      |
|-----|--------------------------|------|
| 0.2 | SHALLOW GUARD (Ohm-m)    | 2000 |
| 0.2 | DEEP INDUCTION (Ohm-m)   | 2000 |
| 0.2 | MEDIUM INDUCTION (Ohm-m) | 2000 |

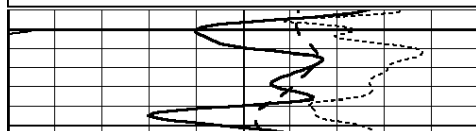


# MAIN SECTION

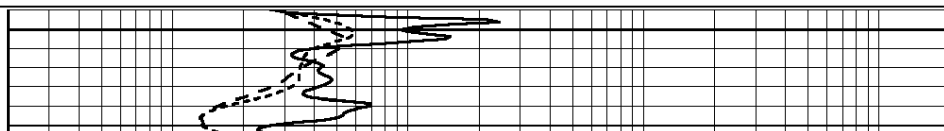
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 Dataset Pathname: pass3.2  
 Presentation Format: dil  
 Dataset Creation: Sat May 11 19:58:45 2013 by Calc SOC 120430  
 Charted by: Depth in Feet scaled 1:240

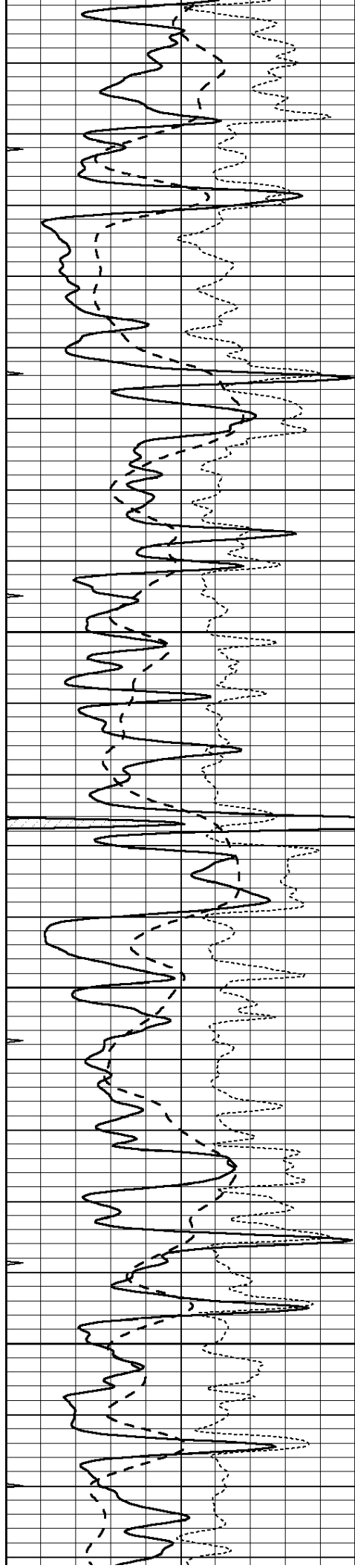
|      |                  |     |
|------|------------------|-----|
| 0    | GAMMA RAY (GAPI) | 150 |
| -100 | SP (mV)          | 100 |
| -250 | Rxo/Rt           | 50  |
| 0    | MINMK            | 20  |

|     |                          |      |
|-----|--------------------------|------|
| 0.2 | SHALLOW GUARD (Ohm-m)    | 2000 |
| 0.2 | DEEP INDUCTION (Ohm-m)   | 2000 |
| 0.2 | MEDIUM INDUCTION (Ohm-m) | 2000 |



3600



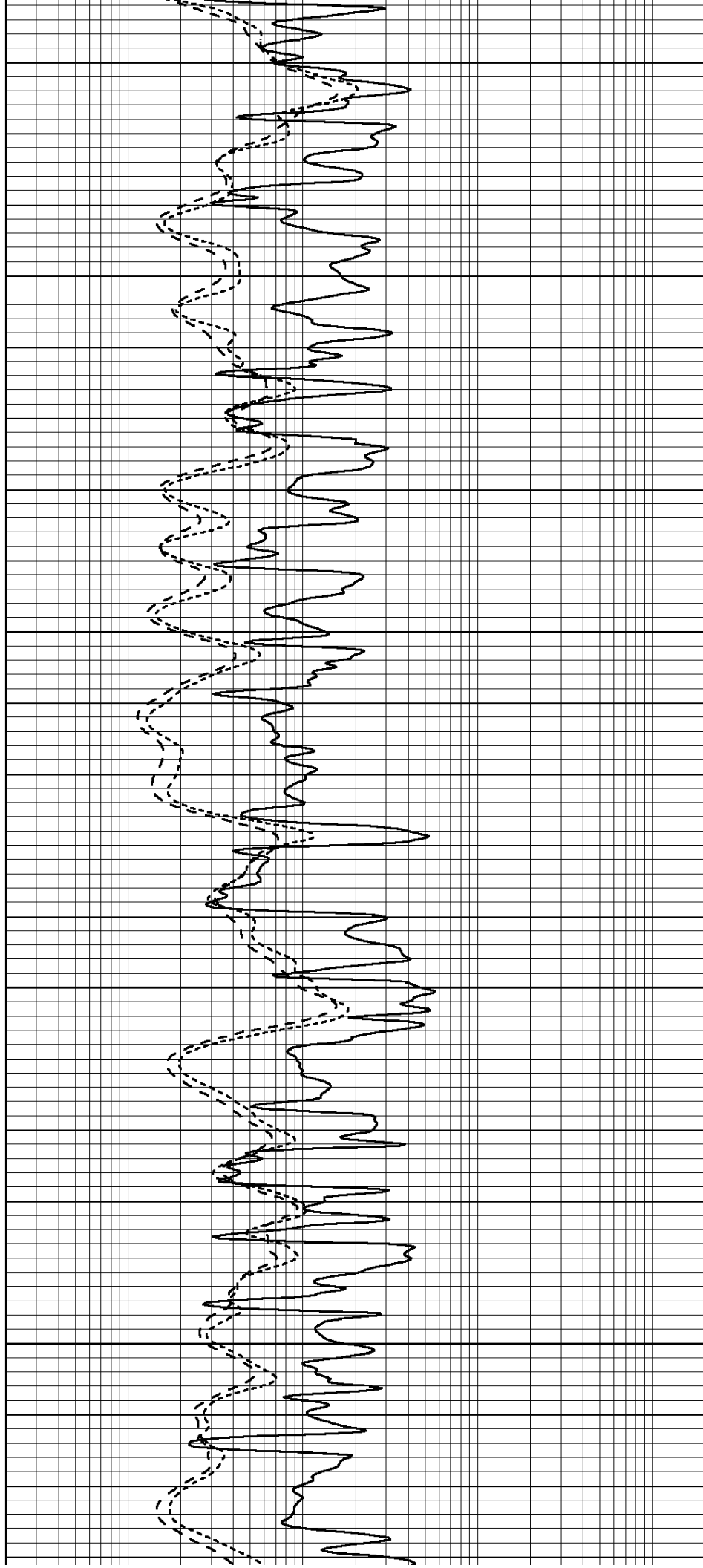


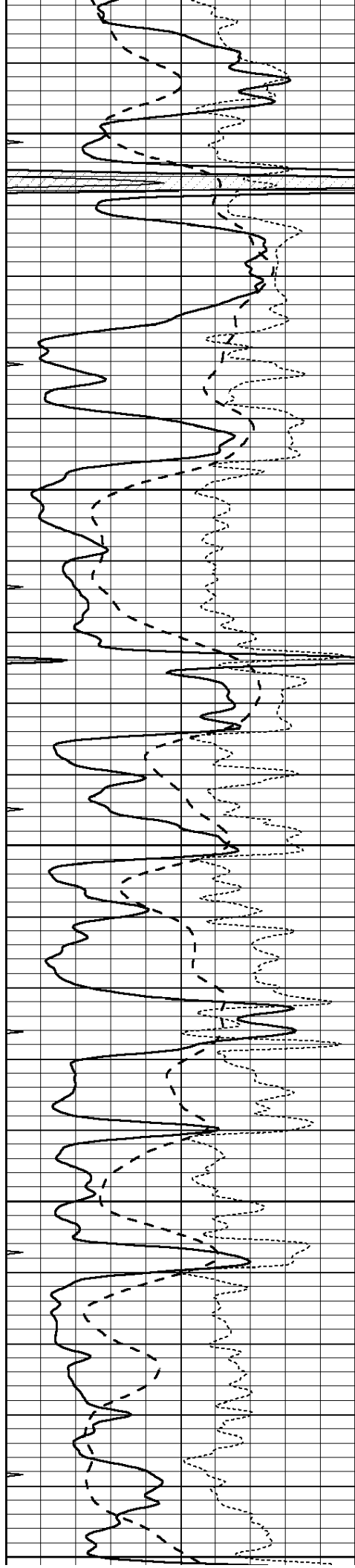
3650

3700

3750

3800





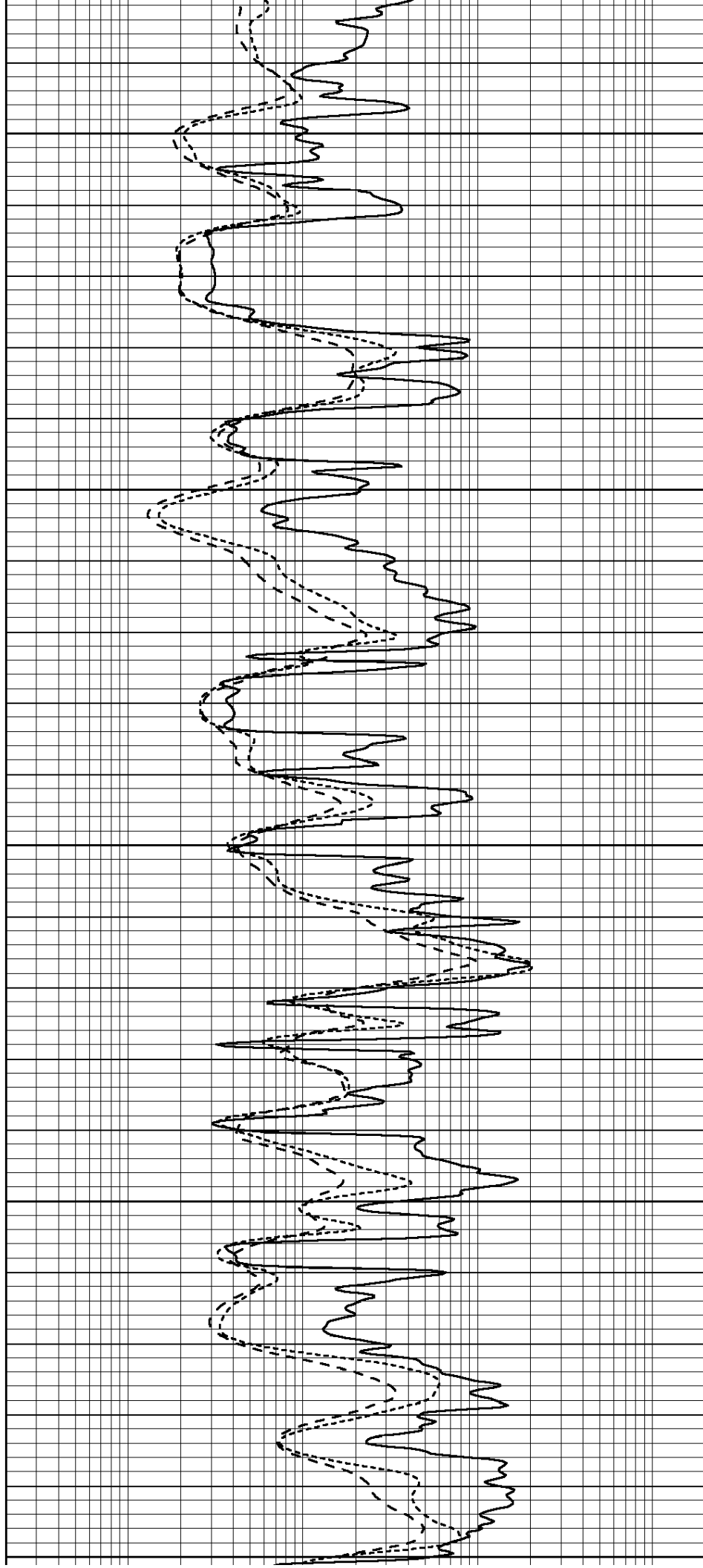
3850

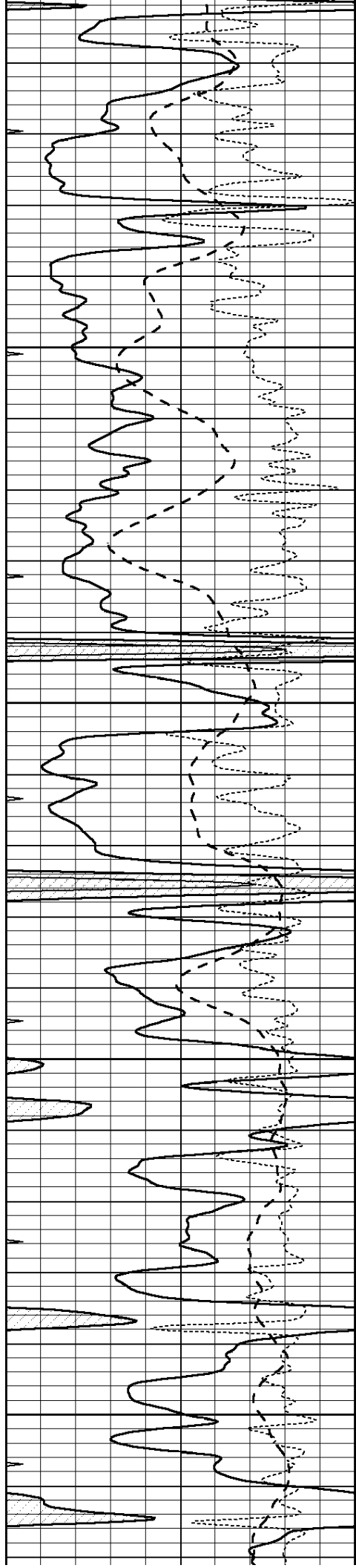
3900

3950

4000

4050



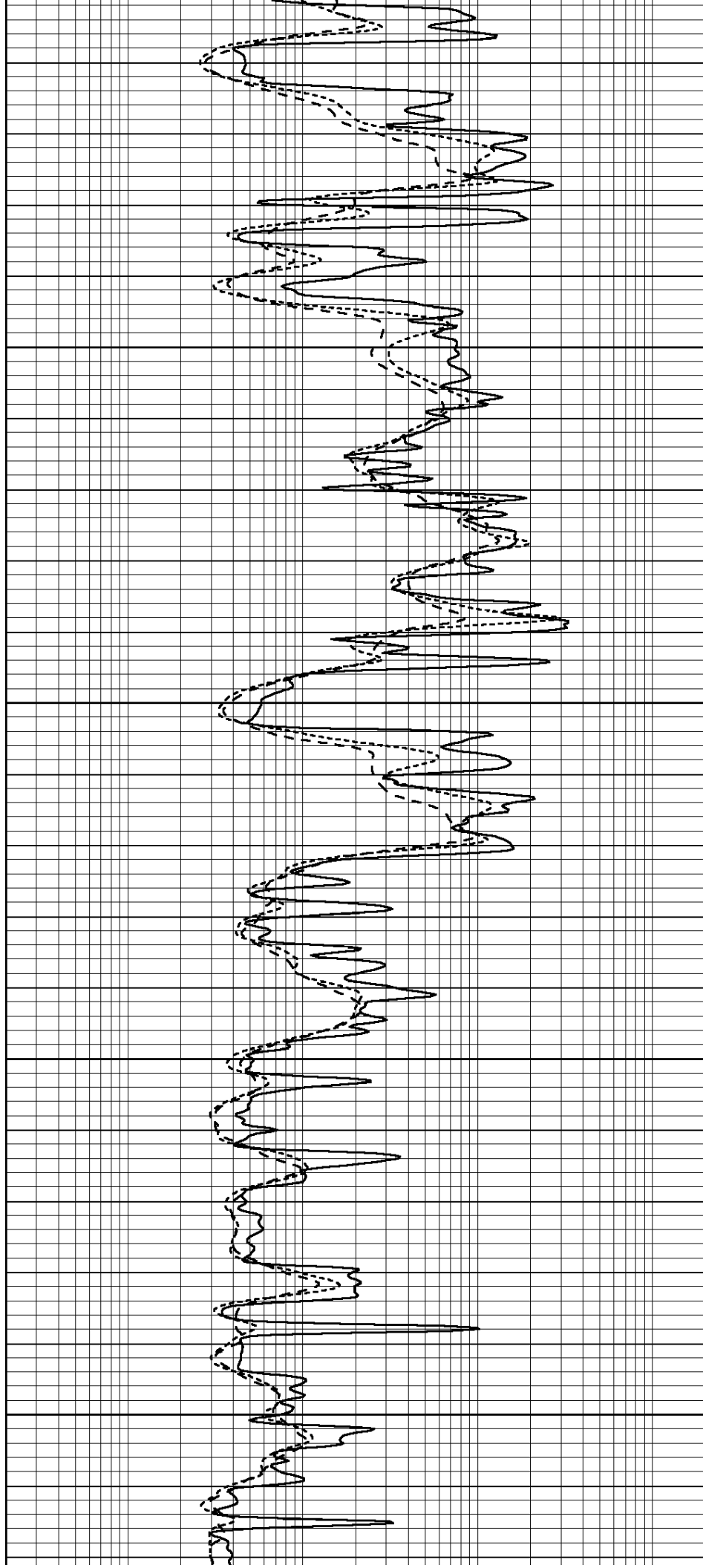


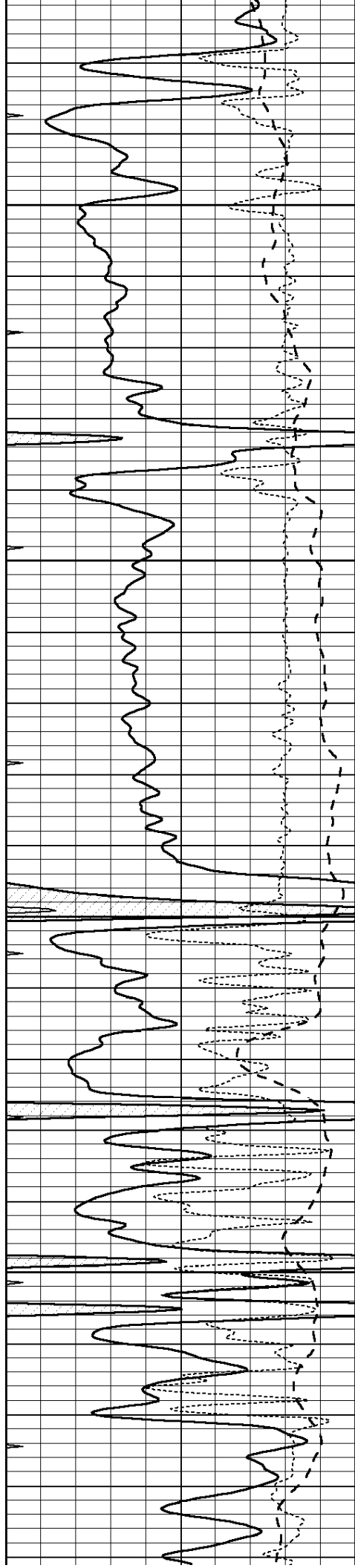
4100

4150

4200

4250



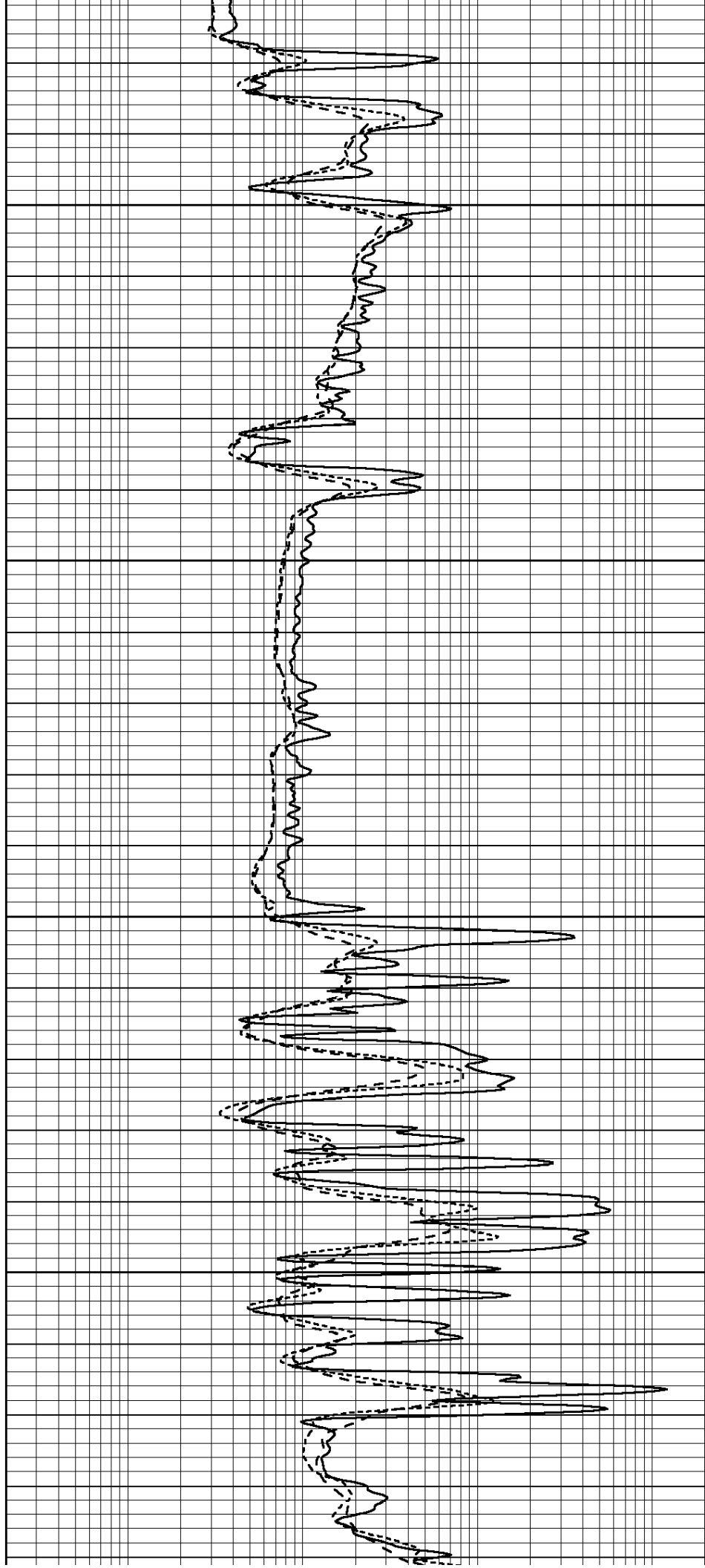


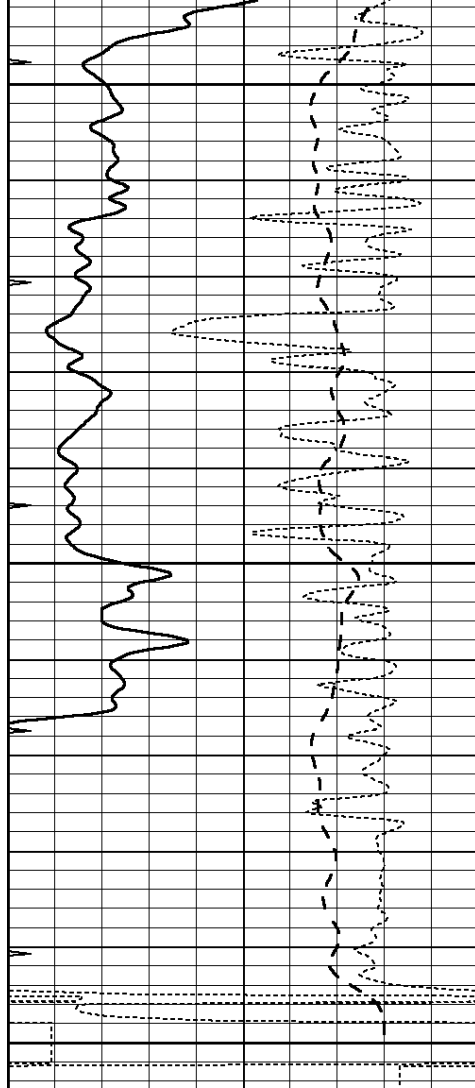
4300

4350

4400

4450



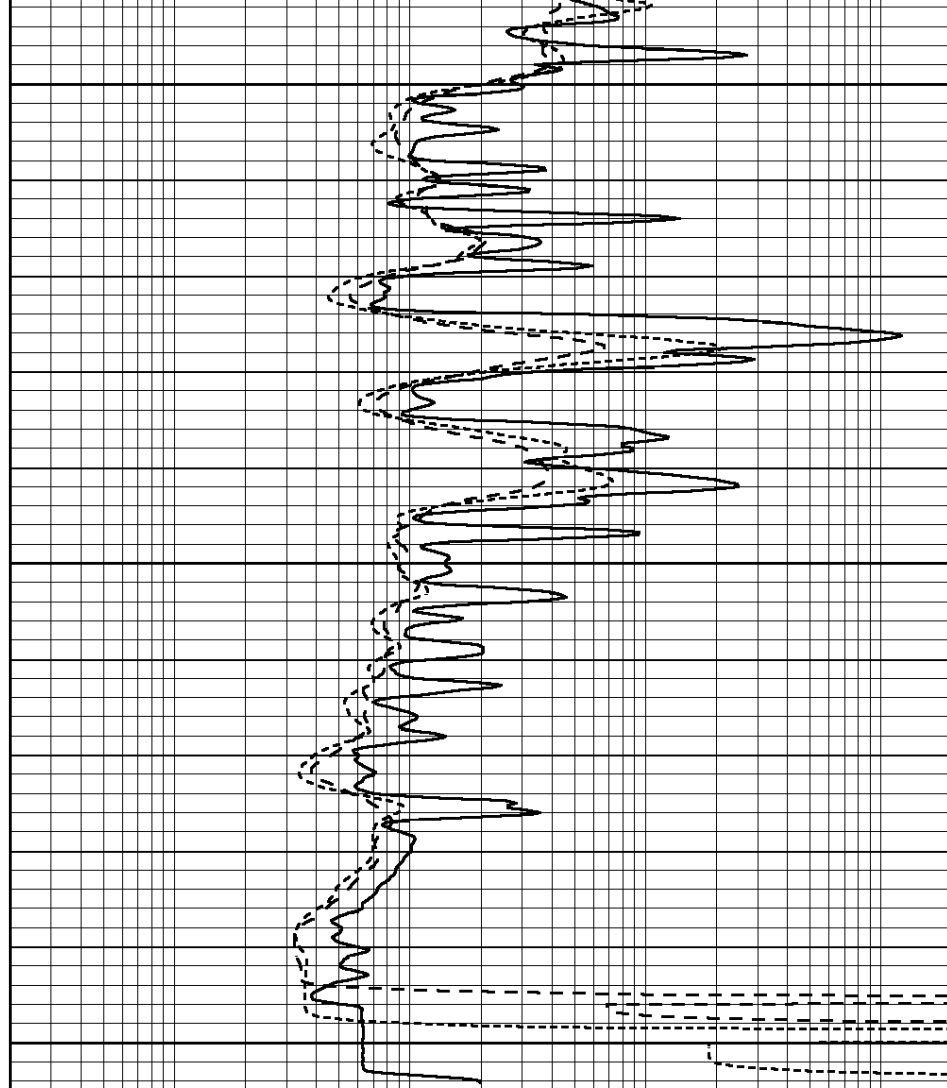


|      |                  |     |
|------|------------------|-----|
| 0    | GAMMA RAY (GAPI) | 150 |
| -100 | SP (mV)          | 100 |
| -250 | Rxo/Rt           | 50  |
| 0    | MINMK            | 20  |

4500

4550

4600



|     |                          |      |
|-----|--------------------------|------|
| 0.2 | SHALLOW GUARD (Ohm-m)    | 2000 |
| 0.2 | DEEP INDUCTION (Ohm-m)   | 2000 |
| 0.2 | MEDIUM INDUCTION (Ohm-m) | 2000 |



# REPEAT SECTION

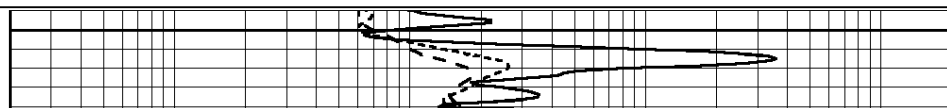
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 Presentation Format: dil  
 Dataset Creation: Sat May 11 19:05:24 2013 by Calc SOC 120430  
 Charted by: Depth in Feet scaled 1:240

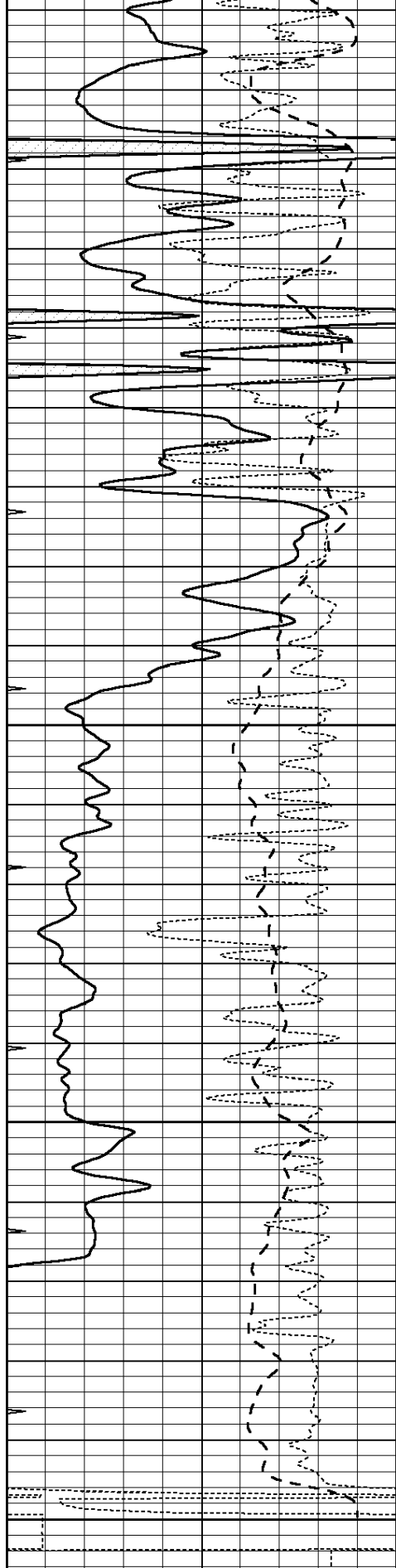
|      |                  |     |
|------|------------------|-----|
| 0    | GAMMA RAY (GAPI) | 150 |
| -100 | SP (mV)          | 100 |
| -250 | Rxo/Rt           | 50  |
| 0    | MINMK            | 20  |

|     |                          |      |
|-----|--------------------------|------|
| 0.2 | SHALLOW GUARD (Ohm-m)    | 2000 |
| 0.2 | DEEP INDUCTION (Ohm-m)   | 2000 |
| 0.2 | MEDIUM INDUCTION (Ohm-m) | 2000 |



4400





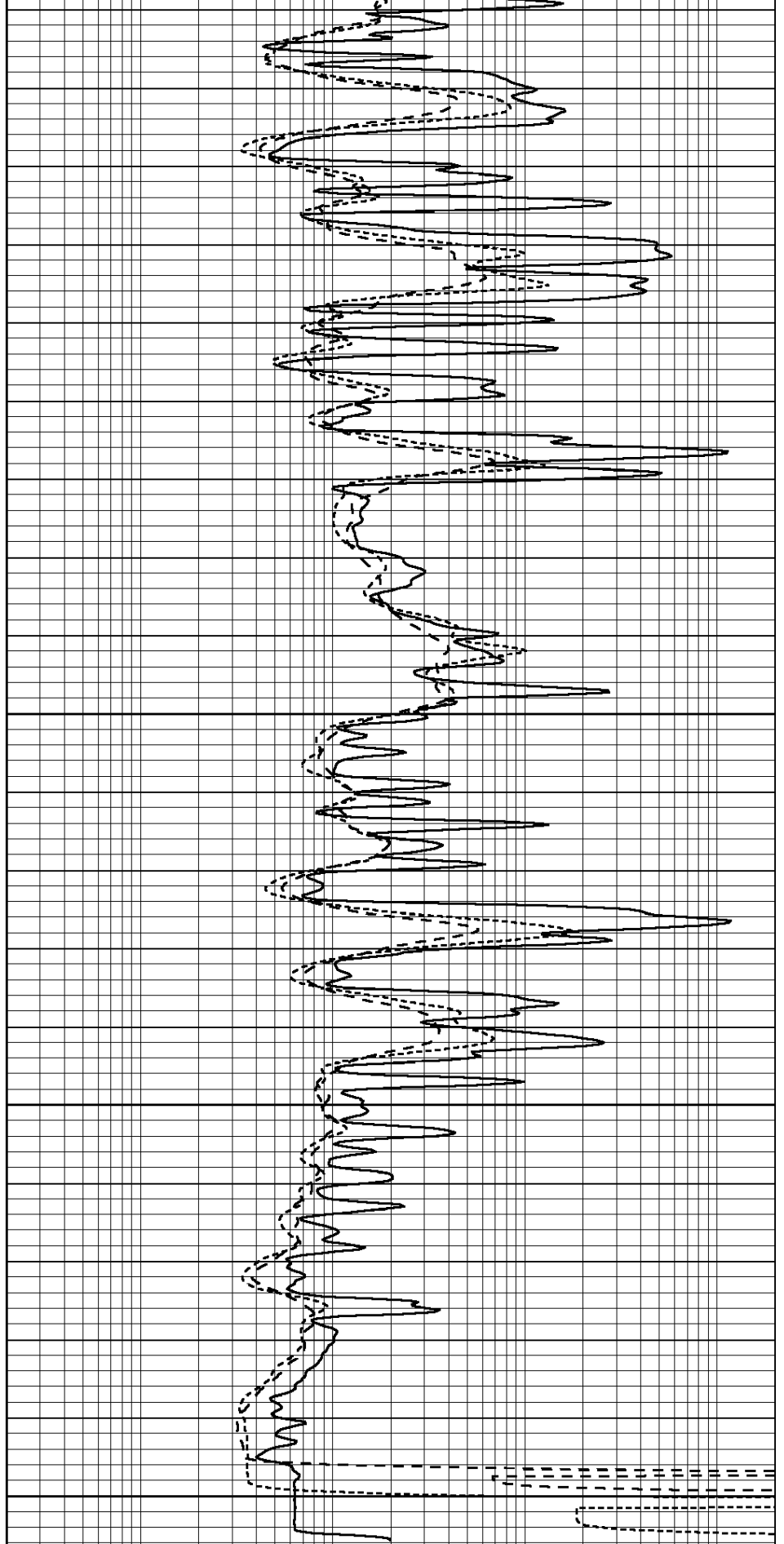
|      |                  |     |
|------|------------------|-----|
| 0    | GAMMA RAY (GAPI) | 150 |
| -100 | SP (mV)          | 100 |
| -250 | Rxo/Rt           | 50  |
| 0    | MINMK            | 20  |

4450

4500

4550

4600



|     |                          |      |
|-----|--------------------------|------|
| 0.2 | SHALLOW GUARD (Ohm-m)    | 2000 |
| 0.2 | DEEP INDUCTION (Ohm-m)   | 2000 |
| 0.2 | MEDIUM INDUCTION (Ohm-m) | 2000 |

# Calibration Report

Database File: 010903pe.db  
 Dataset Pathname: pass3.2  
 Dataset Creation: Sat May 11 19:58:45 2013 by Calc SOC 120430

## Dual Induction Calibration Report

Serial-Model: PROBE9-DILG  
 Surface Cal Performed: Thu Apr 25 06:19:30 2013  
 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 | 621.923 | -18.000 |
| Medium    | 0.039  | 0.728 | V | 0.000      | 464.000 | mmho/m | 640.000 | -22.000 |
| 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: 006 Model: PRB

### Master Calibration

Performed Sun Aug 15 09:48:41 2010

|             | Background | Magnesium   | Aluminum | Sandstone           |         |
|-------------|------------|-------------|----------|---------------------|---------|
| Window 1    | 1686.6     | 11612.8     | 3932.0   | 12718.8             | cps     |
| Window 2    | 1531.4     | 9204.7      | 3267.8   | 9851.9              | cps     |
| Window 3    | 1198.3     | 4733.6      | 1952.5   | 4920.6              | cps     |
| Window 4    | 317.3      | 321.2       | 325.9    | 303.6               | cps     |
| Long Space  | 0.0        | 7673.3      | 1736.4   | 8320.4              | cps     |
| Short Space | 1.7        | 2548.5      | 1657.2   | 2628.8              | cps     |
| Rho         |            | 1.7100      | 2.5900   | 1.3800              | g/cc    |
| Pe          |            | 0.0000      | 2.5700   | 1.5500              |         |
| Rib Angle   | : 43.8     | Rib Slope   | : 0.961  | Density/Spine Ratio | : 0.569 |
| Spine Angle | : 73.8     | Spine Slope | : 3.453  | Spine Intercept     | : -18.1 |

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: 070559  
Tool Model: OPEN\_GR  
Performed: Mon Apr 15 10:30:52 2013

Calibrator Value: 1.0 GAPI

Background Reading: 0.0 cps  
Calibrator Reading: 1.0 cps

Sensitivity: 0.3500 GAPI/cps