HALLIBURTON

# ARRAY COMPENSATED TRUE RESISTIVTY LOG

COMPANY SANDRIDGE ENERGY INC
WELL SKYLER RAE SWD 3505 1-3
FIELD/BLOCK WILLTEX NORTH
COUNTY HARPER
STATE KS

COMPANY **SANDRIDGE ENERGY INC**

WELL **SKYLER RAE SWD 3505 1-3**

FIELD/BLOCK **WILLTEX NORTH**

COUNTY **HARPER** STATE **KS**

API No. 15-077-22110-0000

Location SE-NW-NW-NW
350' FNL & 650' FWL

Sect. 3 Twp. 35S Rge. 5W

Other Services:
DSNT/SDLT/ML
WSTT
XRMI
MRIL
CSNG

| | | | |
|---|---|---|---|
| Permanent Datum | GL | Elev. 1257.00 ft | Elev.: K.B. 1274.00 ft |
| Log measured from | KB | , 17.00 ft above perm. Datum | D.F. 1272.00 ft |
| Drilling measured from | KB | | G.L. 1257.00 ft |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Date | | 03-Dec-14 | | | | | |
| Run No. | | ONE | | | | | |
| Depth - Driller | | 5555.00 ft | | | | | |
| Depth - Logger | | 5528.00 ft | | | | | |
| Bottom - Logged Interval | | 5528.0 ft | | | | | |
| Top - Logged Interval | | 680.0 ft | | | | | |
| Casing - Driller | | 9.625 in | @ 680.00 ft | @ | | @ | |
| Casing - Logger | | 680.00 ft | | | | | |
| Bit Size | | 8.750 in | | @ | | @ | |
| Type Fluid in Hole | | Water Based Mud | | | | | |
| Density | Viscosity | 9.1 ppg | 42.00 s/qt | | | | |
| PH | Fluid Loss | 10.90 pH | 4 cptm | | | | |
| Source of Sample | | FLOWLINE | | | | | |
| Rm @ Meas. Temperature | | 0.430 ohmm | @ 69.00 degF | @ | | @ | |
| Rmf @ Meas. Temperature | | 0.360 ohmm | @ 55.00 degF | @ | | @ | |
| Rmc @ Meas. Temperature | | 0.490 ohmm | @ 55.00 degF | @ | | @ | |
| Source Rmf | Rmc | MEASURED | MEASURED | | | | |
| Rm @ BHT | | 0.21 ohmm | @ 145.0 degF | @ | | @ | |
| Time Since Circulation | | 5.0 hr | | | | | |
| Time on Bottom | | 04-Dec-14 03:31 | | | | | |
| Max. Rec. Temperature | | 145.0 degF | @ 5528.0 ft | @ | | @ | |
| Equipment | Location | 592 | PVOK | | | | |
| Recorded By | | CHRIS MARLOWE | | | | | |
| Witnessed By | | BILL TOMLINSON | | | | | |

Fold here

Service Ticket No.: 901879224 API Serial No.: 15-077-22110-0000 PGM Version: WL INSITE R4.2.0 (Build 2)

CHANGE IN MUD TYPE OR ADDITIONAL SAMPLE

| | | | | | |
|---|---|---|---|---|---|
| Date | Sample No. | | | | |
| Depth-Driller | | | | | |
| Type Fluid in Hole | | | | | |
| Density | Viscosity | | | | |
| Ph | Fluid Loss | | | | |
| Source of Sample | | | | | |
| Rm @ Meas. Temp | | @ | @ | @ | @ |
| Rmf @ Meas. Temp. | | @ | @ | @ | @ |
| Rmc @ Meas. Temp. | | @ | @ | @ | @ |
| Source Rmf | Rmc | | | | |
| Rm @ BHT | | @ | @ | @ | @ |
| Rmf @ BHT | | @ | @ | @ | @ |
| Rmc @ BHT | | @ | @ | @ | @ |

RESISTIVITY SCALE CHANGES

| | Type Log | Depth | Scale Up Hole | Scale Down Hole |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |

RESISTIVITY EQUIPMENT DATA

| | Run No. | Tool Type & No. | Pad Type | Tool Pos. | Other |
|---|---|---|---|---|---|
| | ONE | ACRT | NA | 1.5" S.O. | NA |
| | | I822S202 | | | |

EQUIPMENT DATA

| | GAMMA | ACOUSTIC | DENSITY | NEUTRON |
|---|---|---|---|---|
| Run No. | ONE | ONE | ONE | ONE |
| Serial No. | 11021139 | 10650265 | 10960494 | 11020487 |
| Model No. | GTET | WSTT | SDLT | DSNT |
| Diameter | 3.625" | 2 | 4.5" | 3.625" |
| Detector Model No. | T-102 | 0.5' | GAM-GAM | NEU-NEU |
| Type | SCINT | | Cs137 | Am241Be |
| Length | 8" | Y | 5155GW | DSN382 |
| Distance to Source | 18' | Y | 1.5 Ci | 15 Ci |
| Run No. | ONE | ONE | ONE | ONE |
| Serial No. | 11021139 | 10650265 | 10960494 | 11020487 |
| Model No. | GTET | WSTT | SDLT | DSNT |
| Diameter | 3.625" | No. of Cent. | 4.5" | 3.625" |
| Detector Model No. | T-102 | Spacing | GAM-GAM | NEU-NEU |
| Type | SCINT | | Cs137 | Am241Be |
| Length | 8" | LSA [Y/N] | 5155GW | DSN382 |
| Distance to Source | 18' | FWDA [Y/N ] | 1.5 Ci | 15 Ci |
| Run No. | | | Run No. | |
| Serial No. | | | Serial No. | |
| Model No. | | | Model No. | |
| Diameter | | | Diameter | |
| Log Type | | | Log Type | |
| Source Type | | | Source Type | |
| Serial No. | | | Serial No. | |
| Strength | | | Strength | |

LOGGING DATA

| GENERAL | | | GAMMA | | ACOUSTIC | | | DENSITY | | | NEUTRON | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Run | Depth | | Speed | Scale | | Scale | | Matrix | Scale | | Matrix | Scale | | Matrix |
| No. | From | To | ft/min | L | R | L | R | | L | R | | L | R | |
| ONE | TD | CSG | REC | 0 | 150 | 30 | -10 | 47.6 | 30 | -10 | 2.71 | 30 | -10 | LIME |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |

DIRECTIONAL INFORMATION

| Maximum Deviation | @ | KOP | @ |
|---|---|---|---|

Remarks: ANNULAR HOLE VOLUME CALCULATED FOR 7 INCH CASING

CHLORIDES REPORTED AT 14000 MG/L

TODAY'S CREW: M. ALENA, S. GARLING, A. BENNETT, J. WOOD

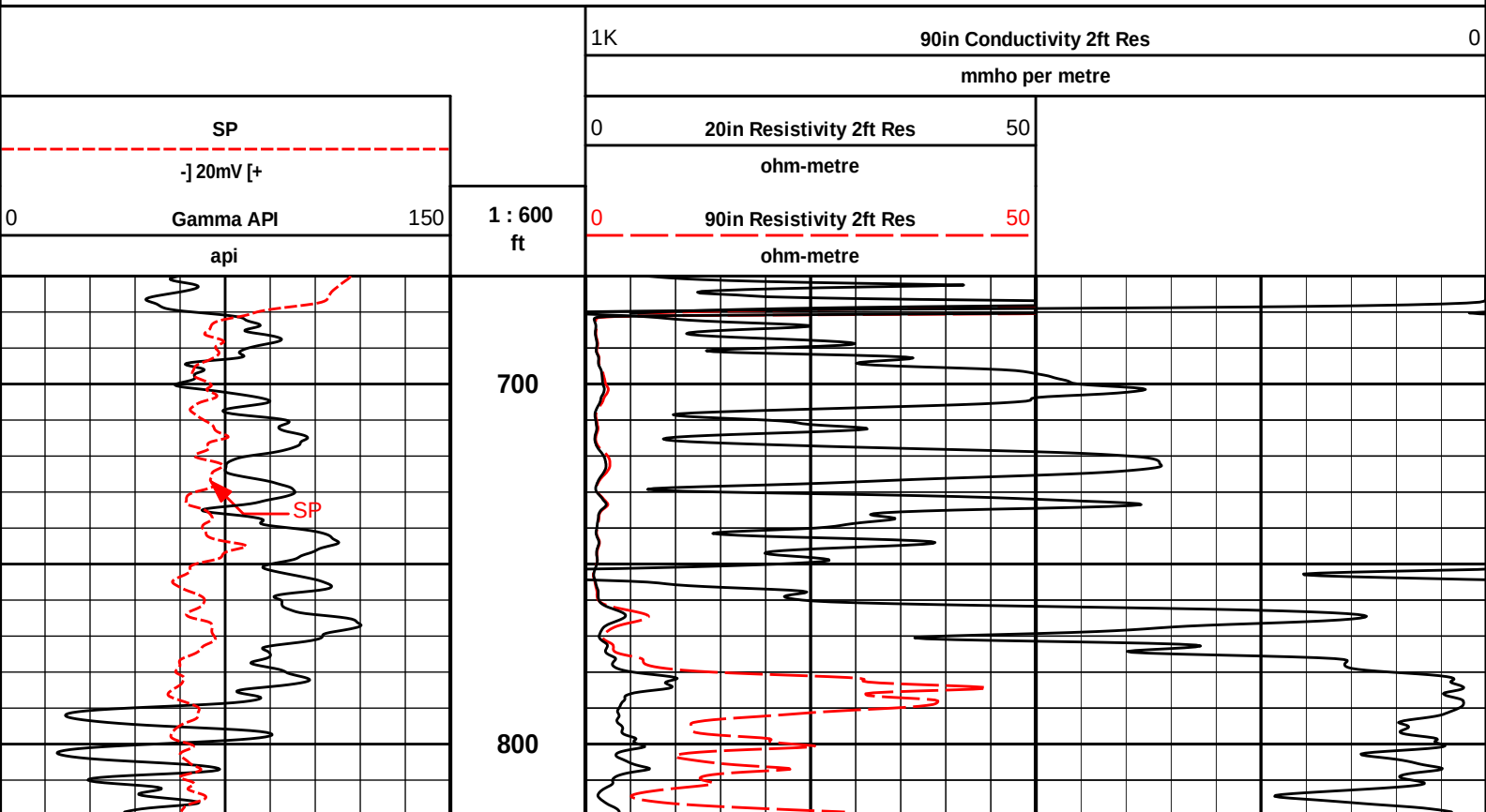
THANK YOU FOR CHOOSING HALLIBURTON ENERGY SERVICES: PAULS VALLEY, OK

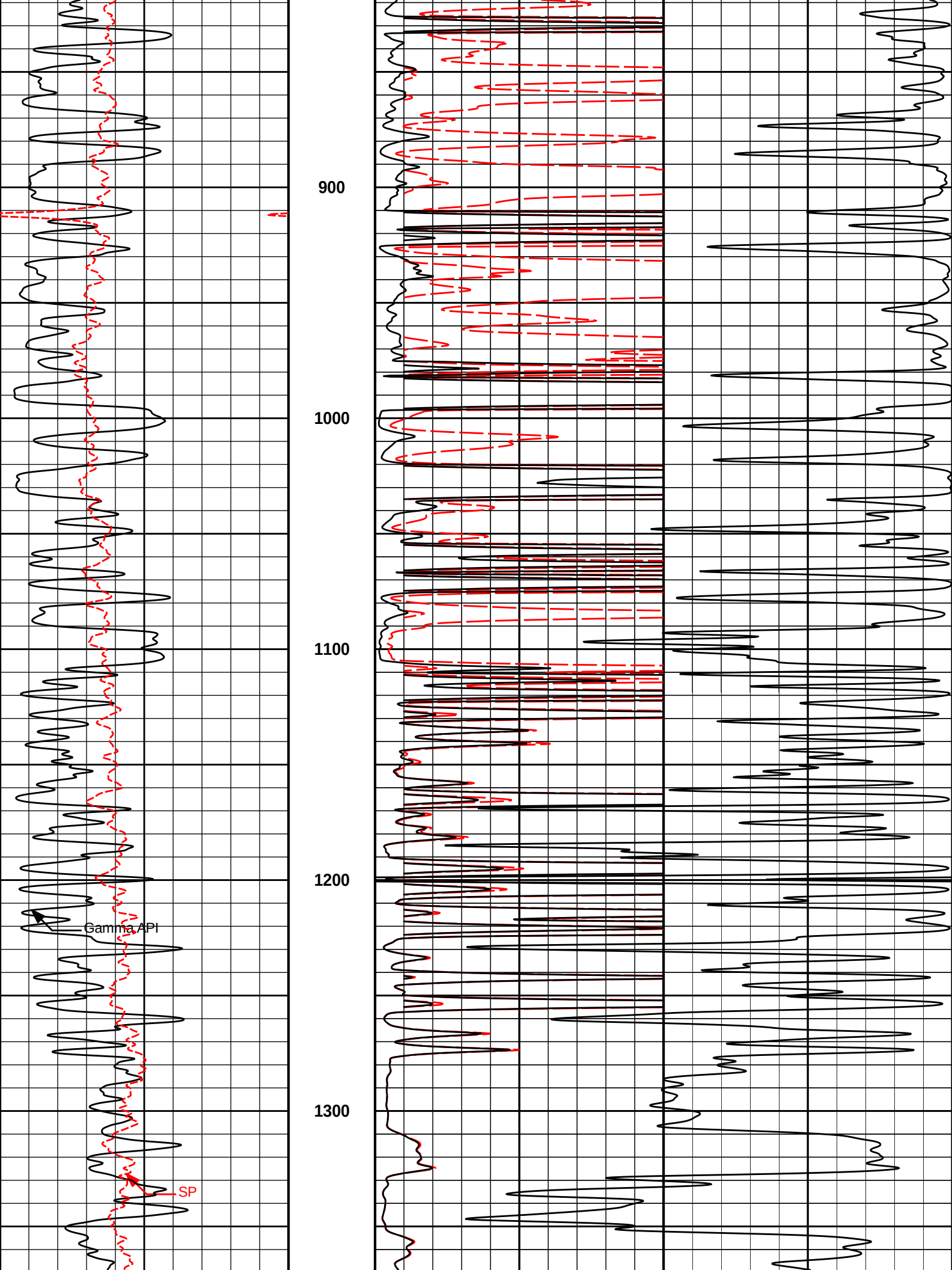


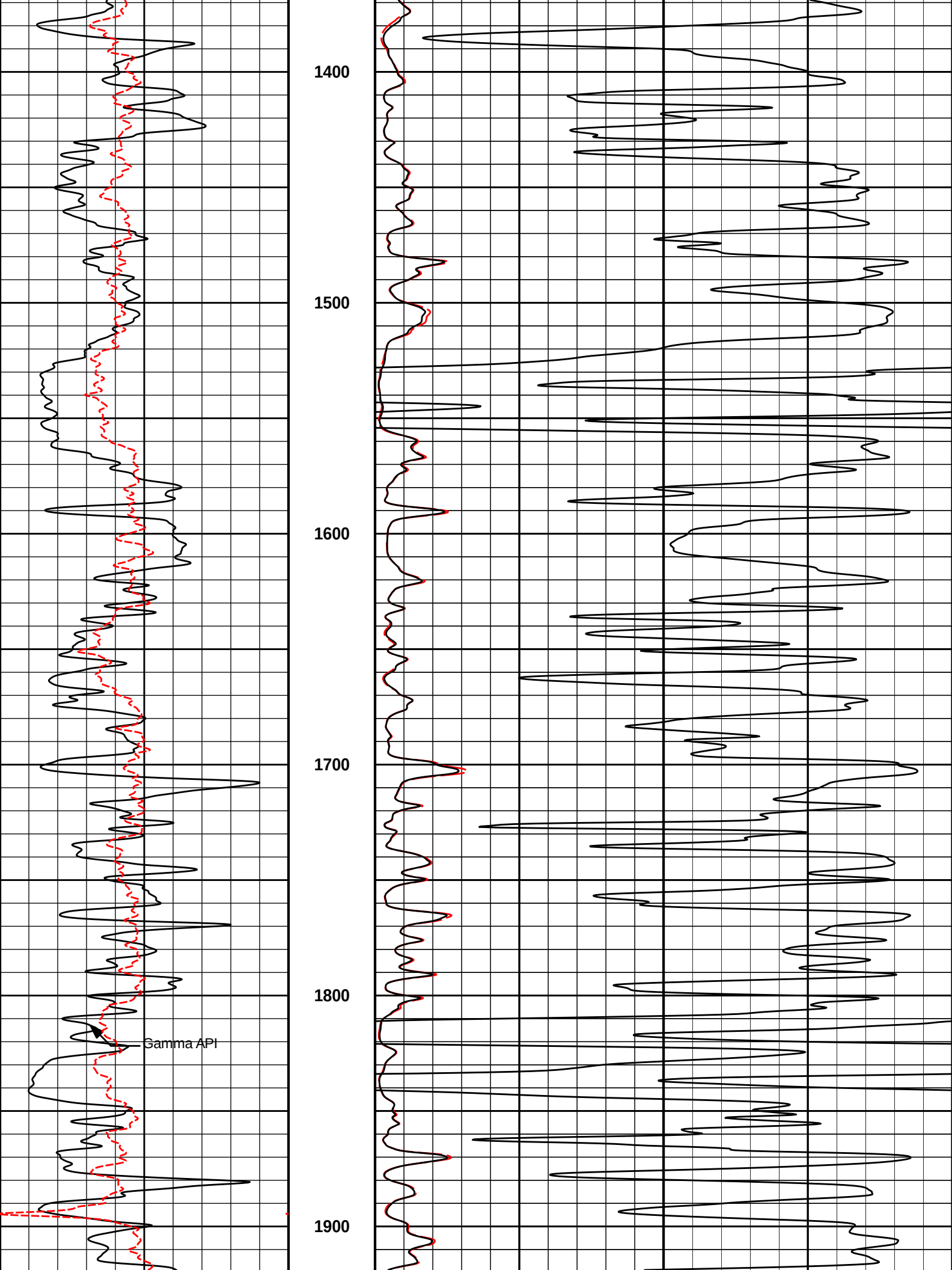
HALLIBURTON

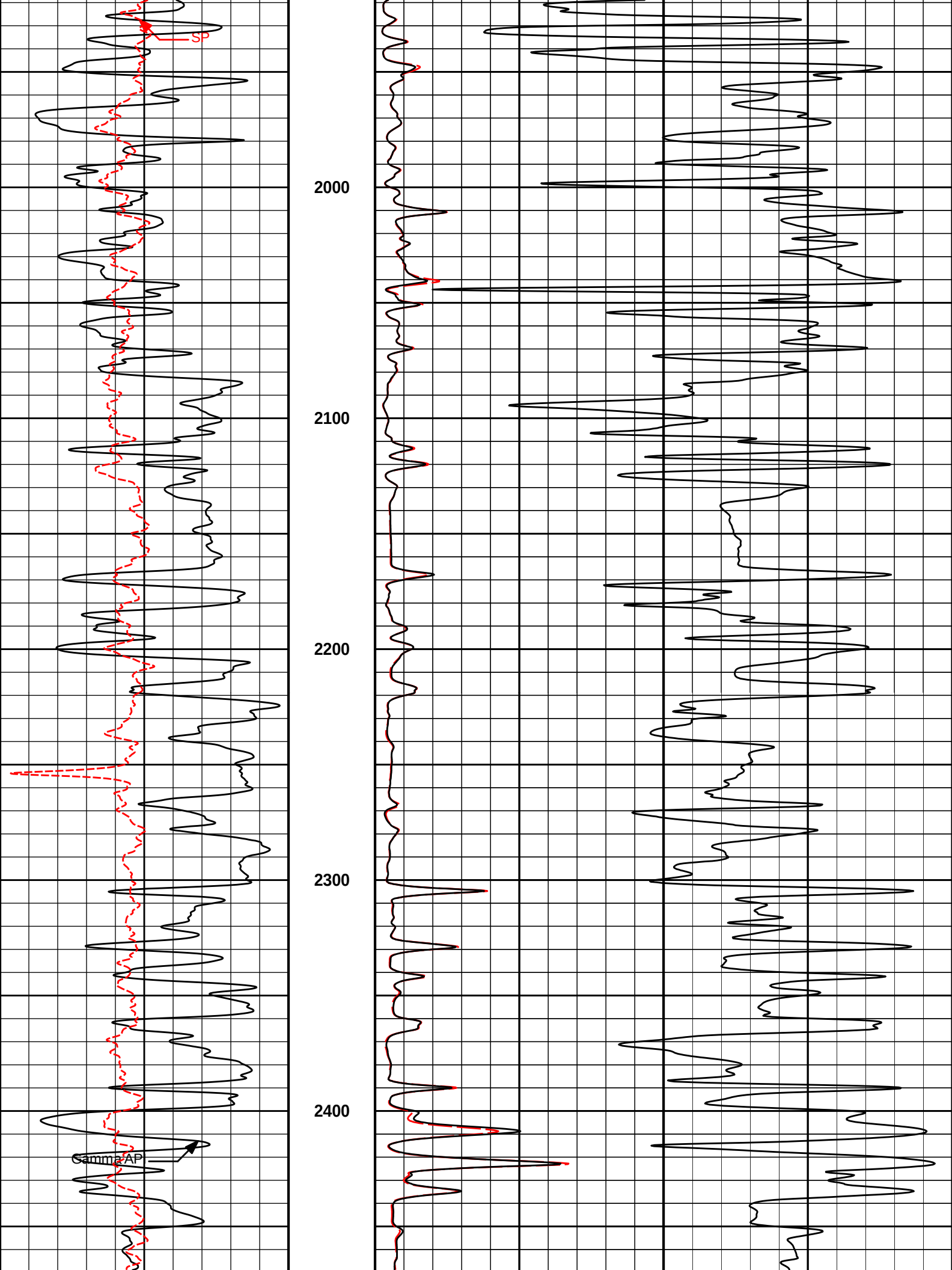
**Plot Time: 08-Dec-14 12:28:29**
**Plot Range: 670 ft to 5527.25 ft**
**Data: SKYLER_RAE_SWD_\Well Based***
**Plot File: \\-LOCAL-\SKYLER_RAE_SWD_\0001 RED_TRIPLE_CSNG_WSTT_XRMI\ACRT\1_ACRT_2inx**

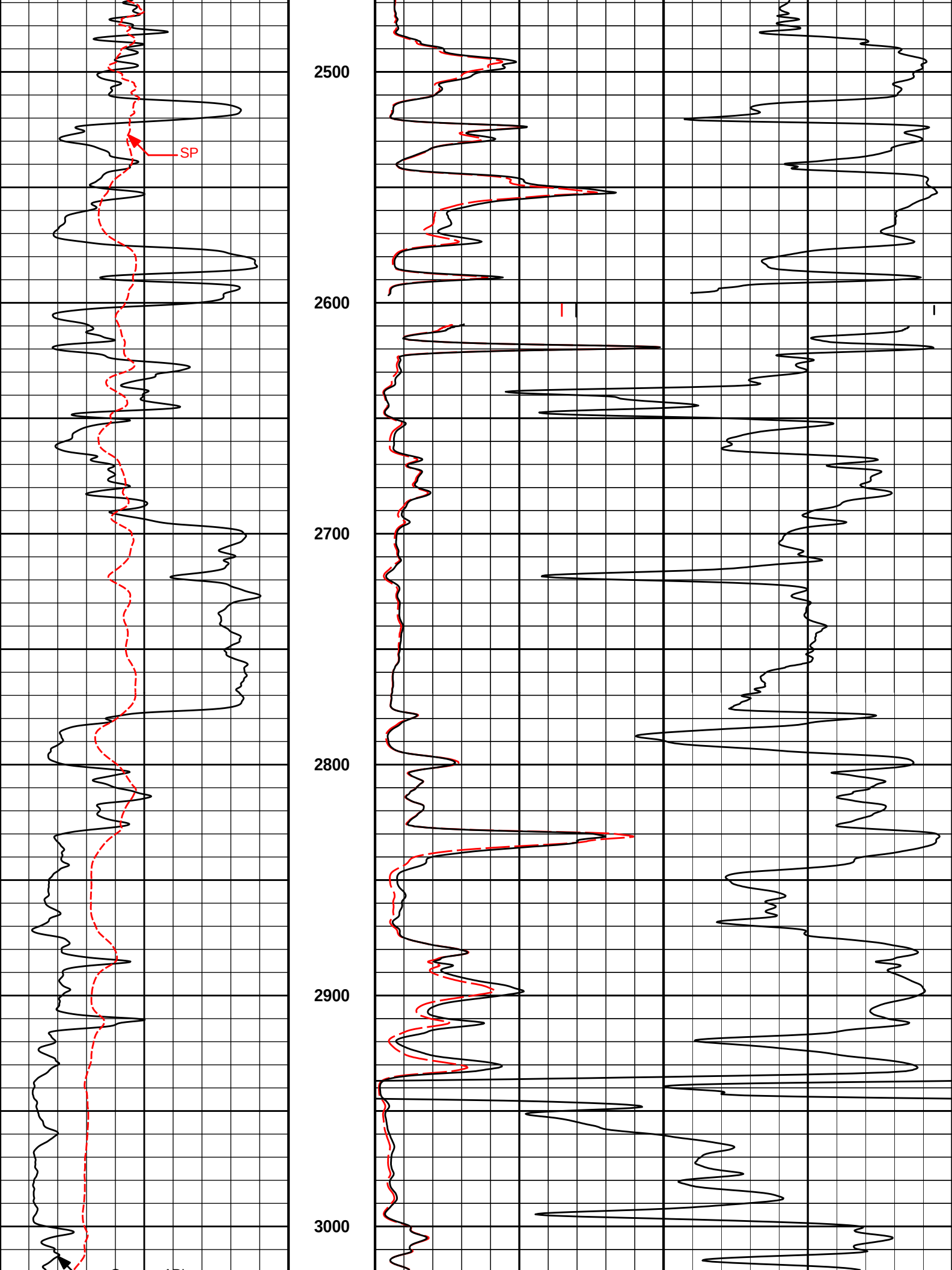
# 2 INCH MAIN LOG

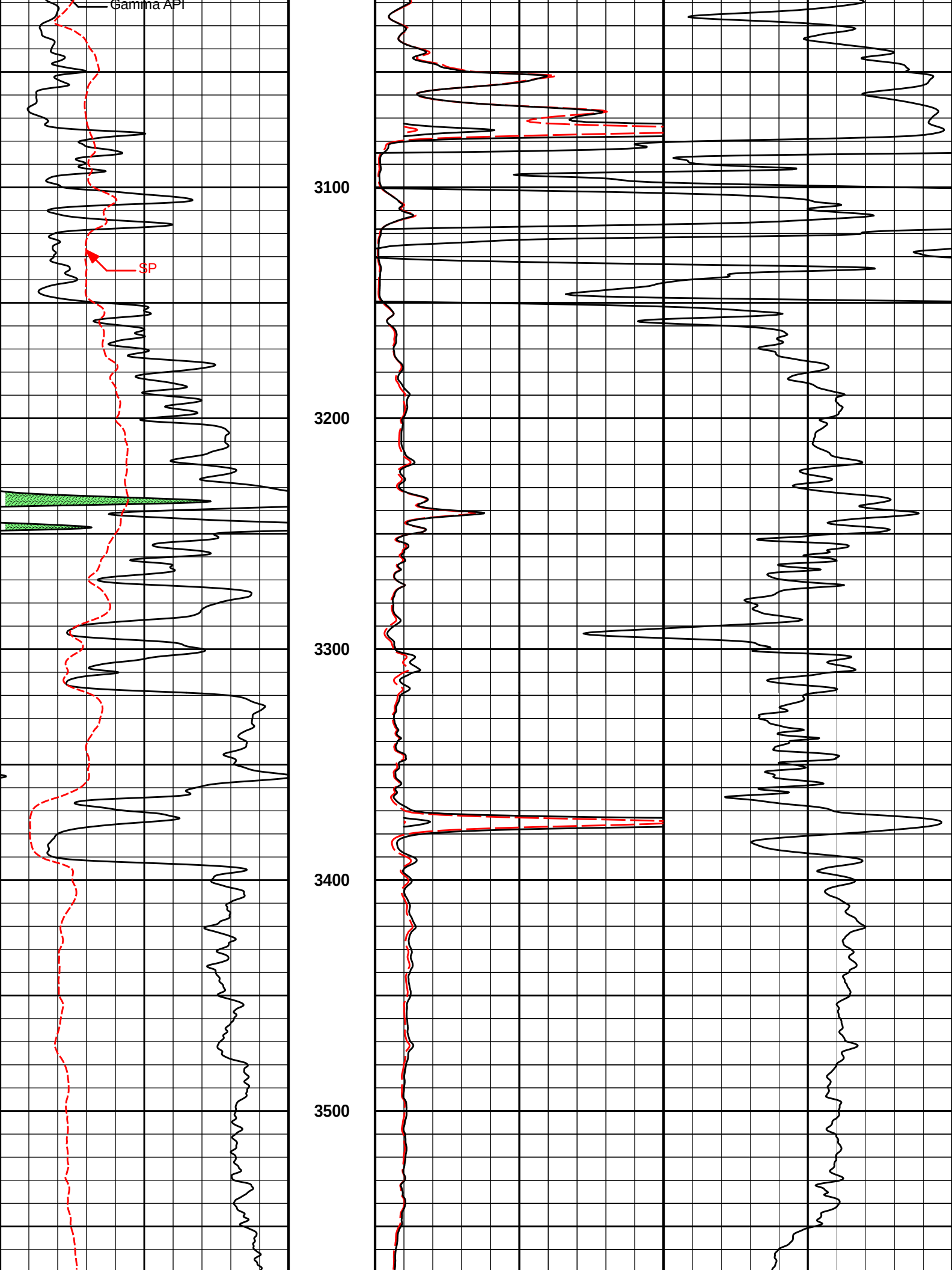


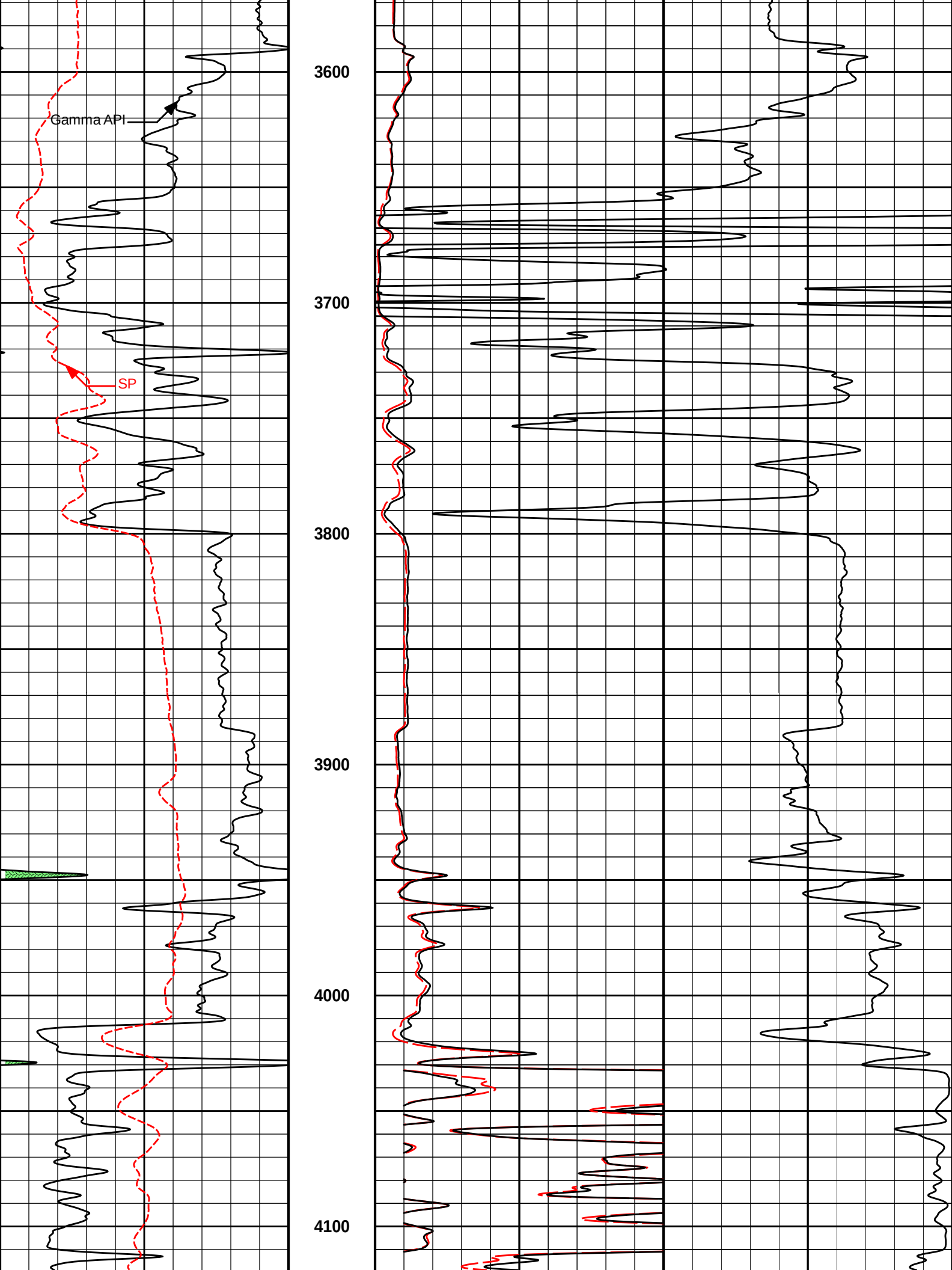

900
1000
1100
1200
1300
Gamma API
SP

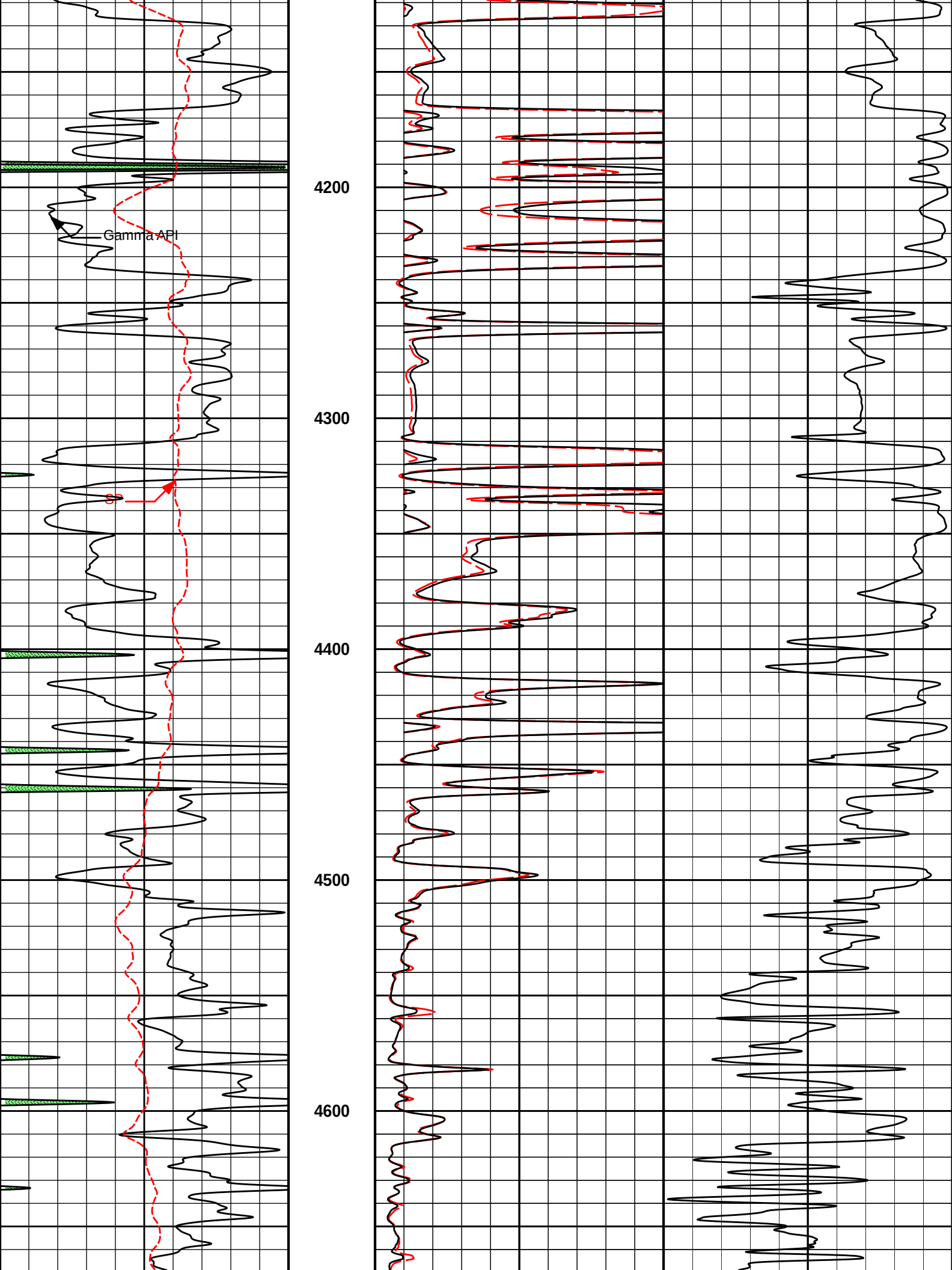

1400
1500
1600
1700
1800
1900
Gamma API

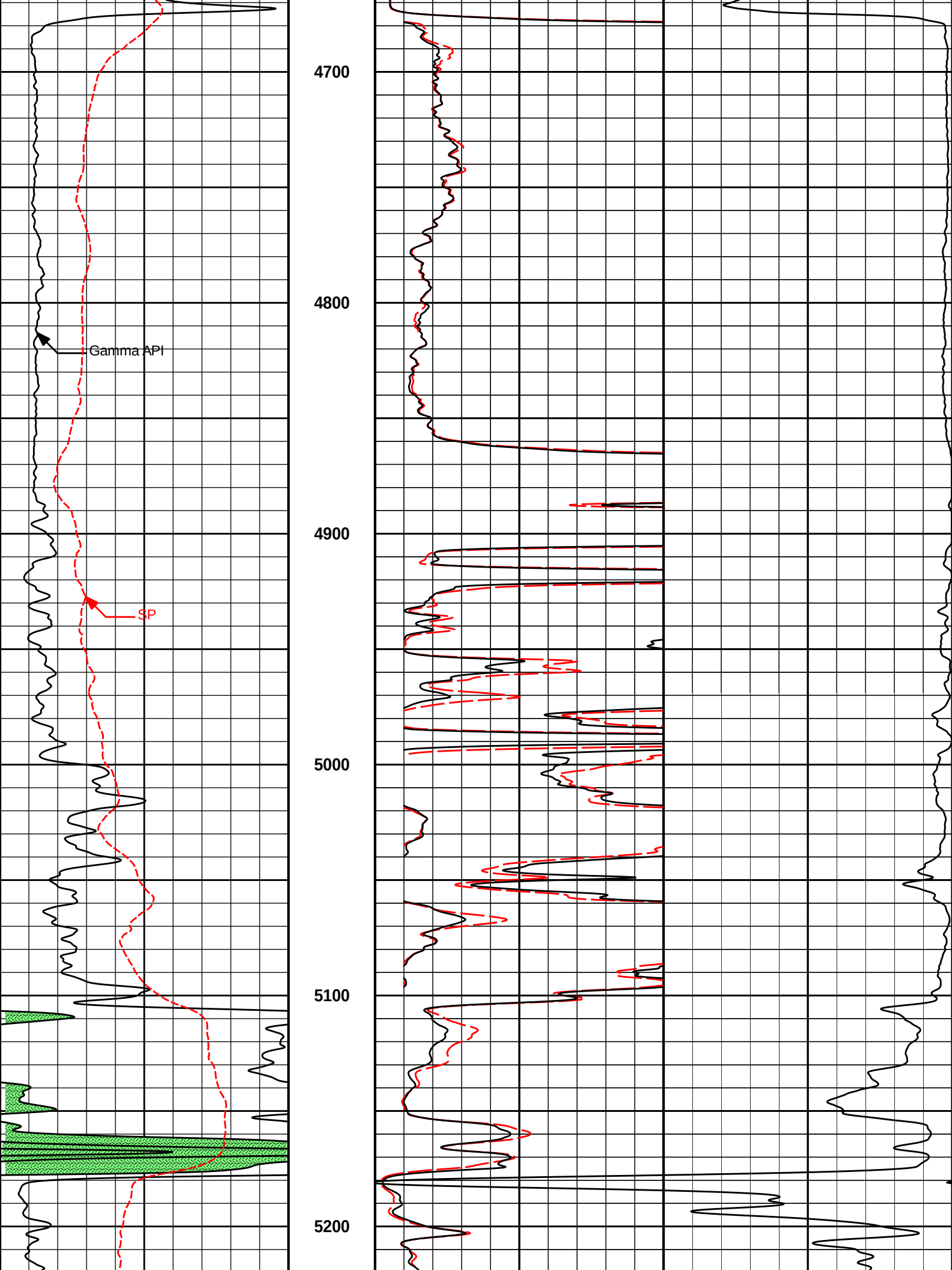

SP
2000
2100
2200
2300
2400
Gamma API

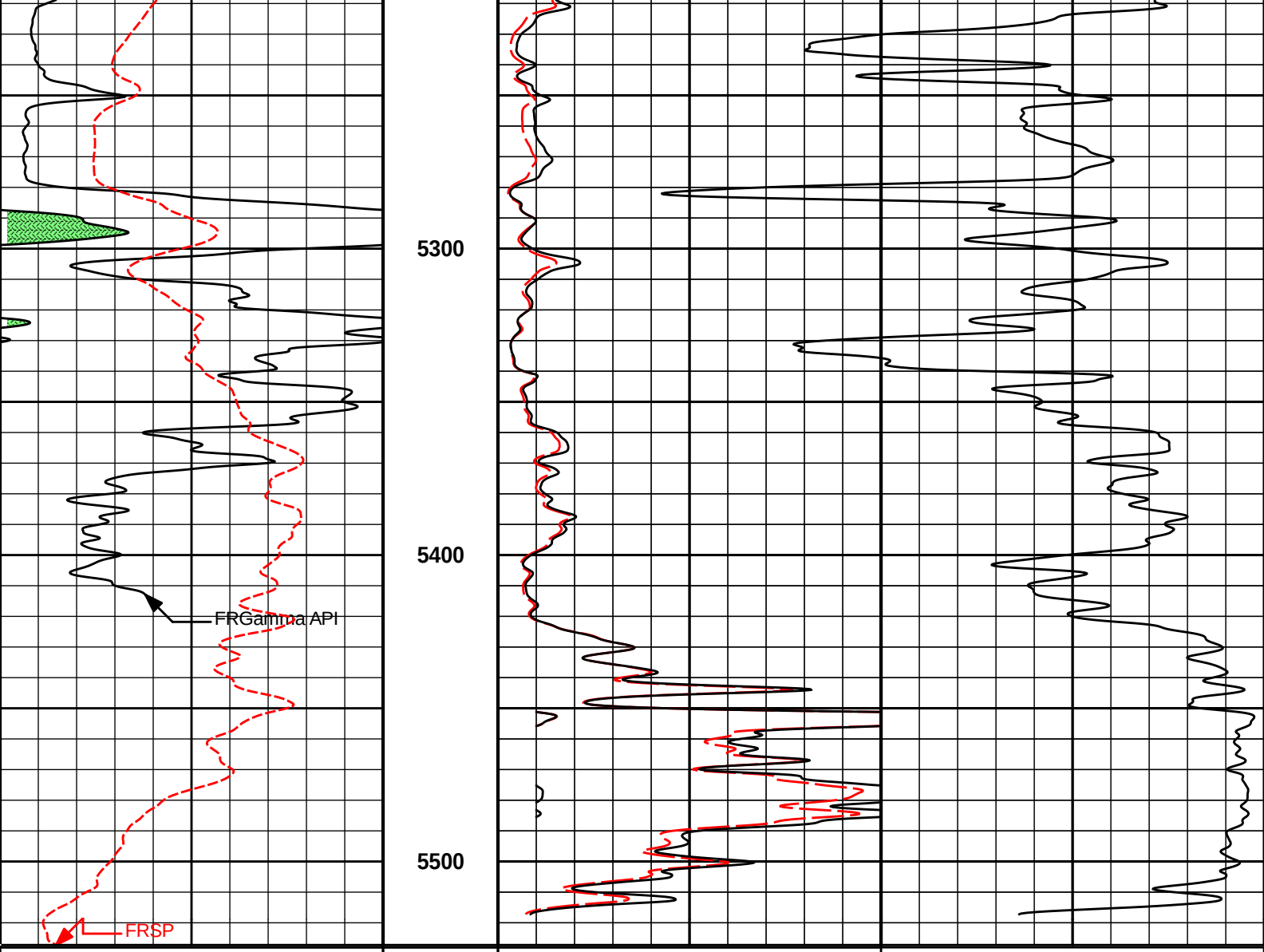

SP
2500
2600
2700
2800
2900
3000


Gamma API
SP
3100
3200
3300
3400
3500


Gamma API
SP
3600
3700
3800
3900
4000
4100


Gamma API
SP
4200
4300
4400
4500
4600


Gamma API
SP
4700
4800
4900
5000
5100
5200




| 0 Gamma API 150 | 1 : 600 ft | 0 90in Resistivity 2ft Res 50 |
|---|---|---|
| api | | ohm-metre |
| SP | | 0 20in Resistivity 2ft Res 50 |
| -] 20mV [+ | | ohm-metre |
| | | 1K 90in Conductivity 2ft Res 0 |
| | | mmho per metre |

HALLIBURTON

Plot Time: 08-Dec-14 12:28:34
Plot Range: 670 ft to 5527.25 ft
Data: SKYLER_RAE_SWD_\Well Based*\
Plot File: \\-LOCAL-\SKYLER_RAE_SWD_\0001 RED_TRIPLE_CSNG_WSTT_XRMI\ACRT\1_ACRT_2inx

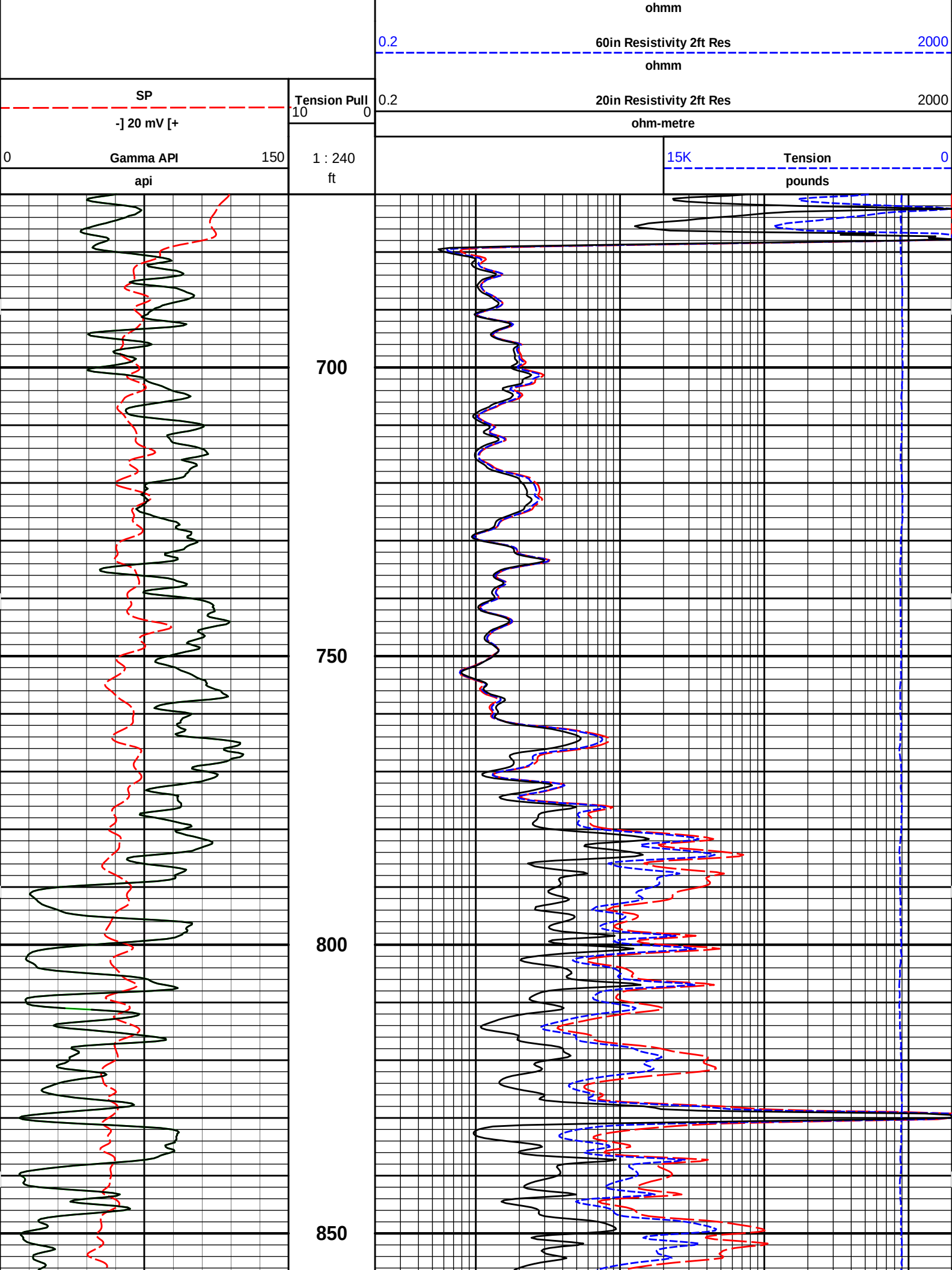
# 2 INCH MAIN LOG

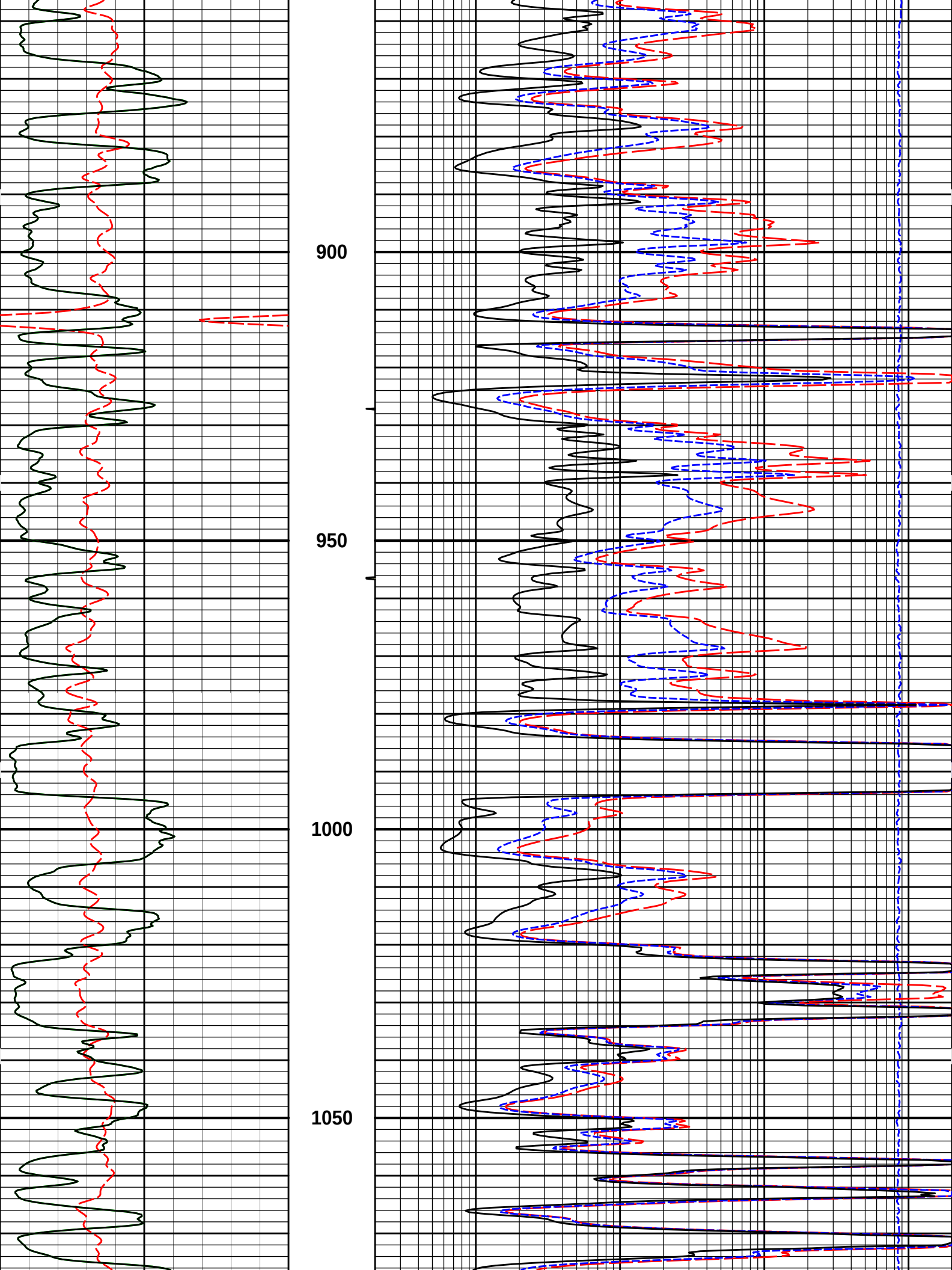
HALLIBURTON

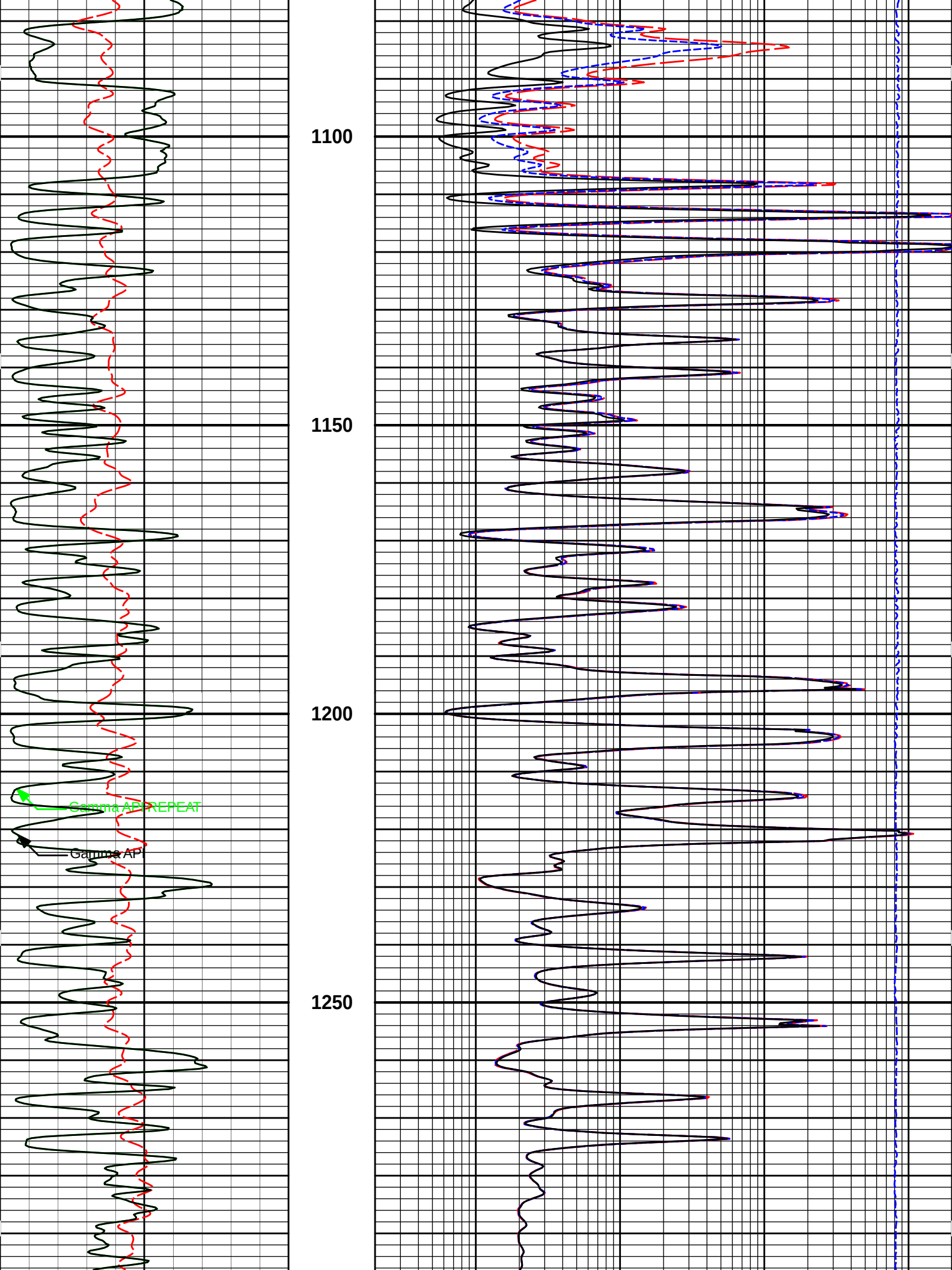
Plot Time: 08-Dec-14 12:28:35
Plot Range: 670 ft to 5530.17 ft
Data: SKYLER_RAE_SWD_\Well Based*\
Plot File: \\-LOCAL-\SKYLER_RAE_SWD_\0001 RED_TRIPLE_CSNG_WSTT_XRMI\ACRT\1_ACRT_5_mainx

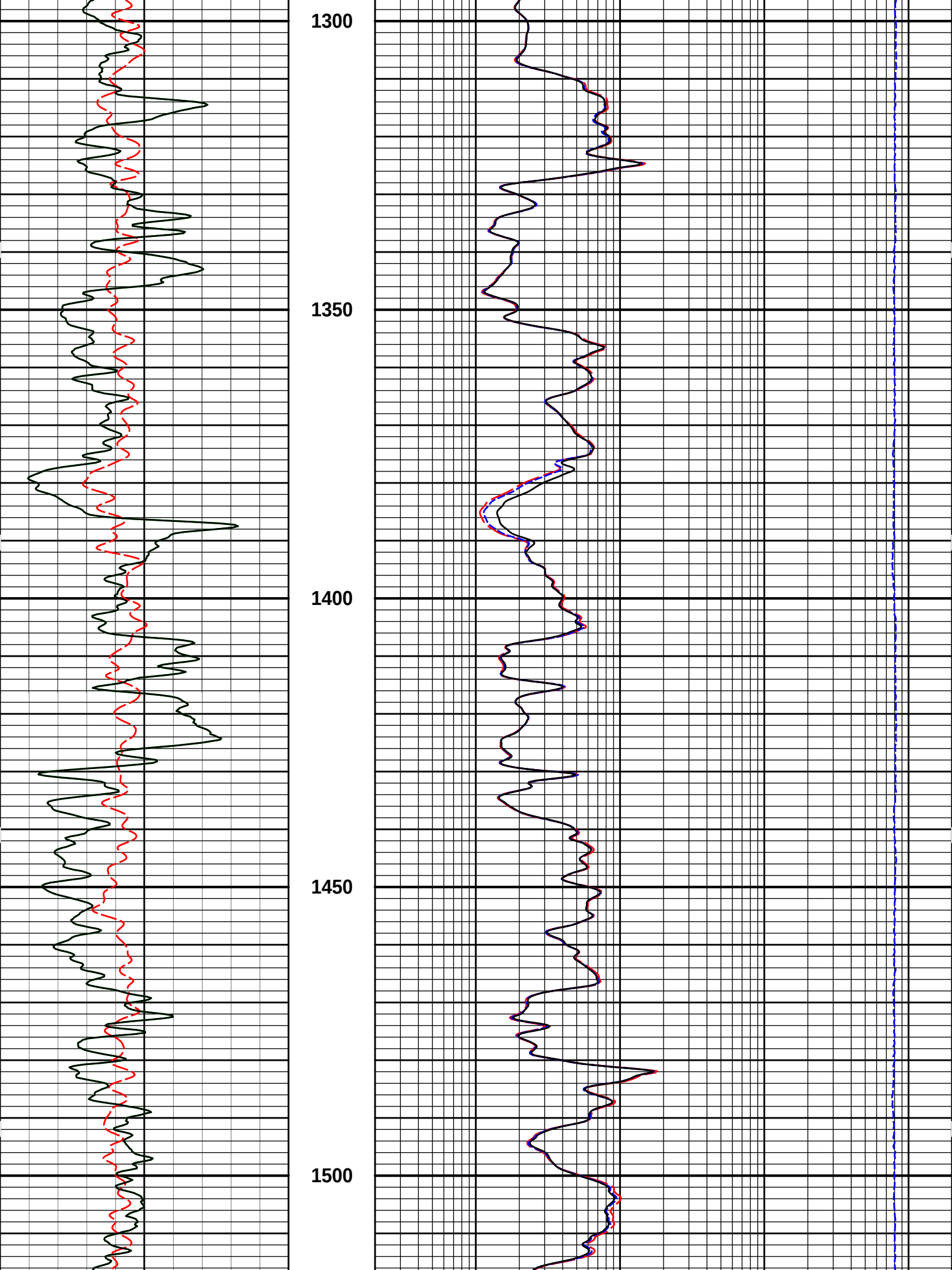
# 5 INCH MAIN LOG

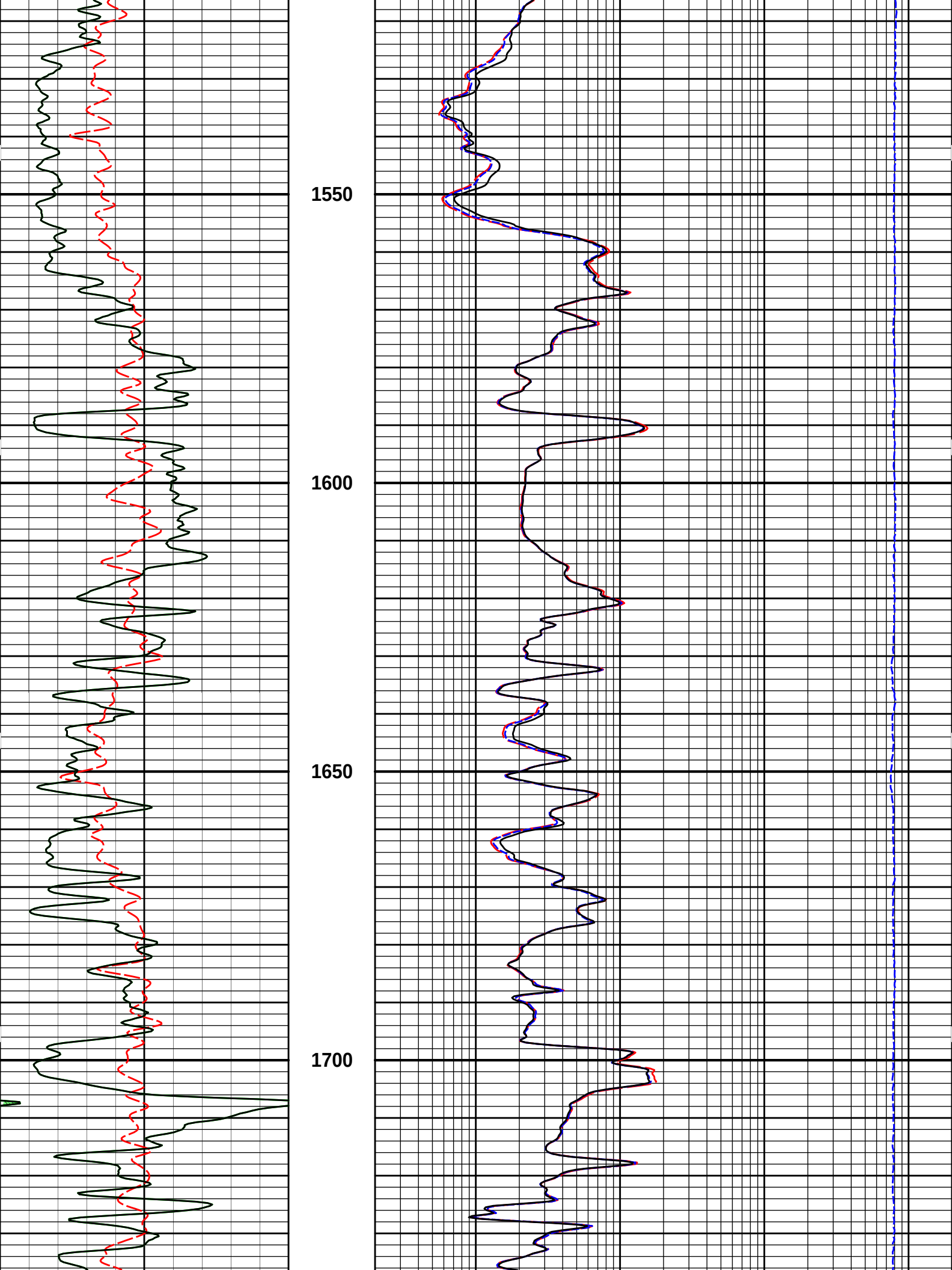
| | 0.2 90in Resistivity 2ft Res 2000 |
|---|---|
| | ohm-metre |
| | 0.2 20in Resistivity 2ft Res 2000 |
| | ohm-metre |
| | 1K 90in Conductivity 2ft Res 0 |
| | mmho per metre |

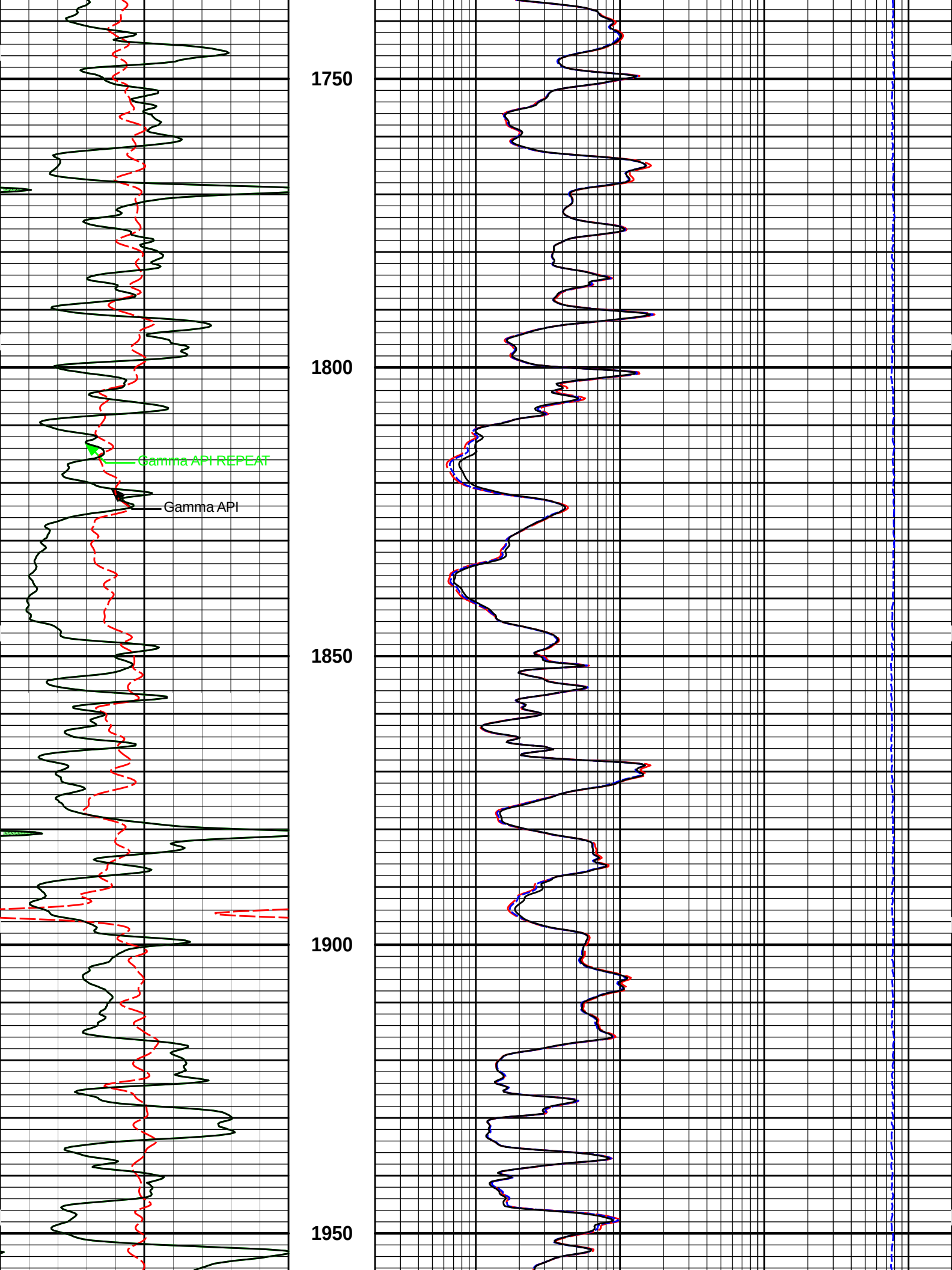

ohmm
0.2
60in Resistivity 2ft Res
2000
ohmm
0.2
20in Resistivity 2ft Res
2000
ohm-metre
SP
-] 20 mV [+
Tension Pull
10
0
15K
Tension
0
pounds
0
Gamma API
150
api
1 : 240
ft
700
750
800
850

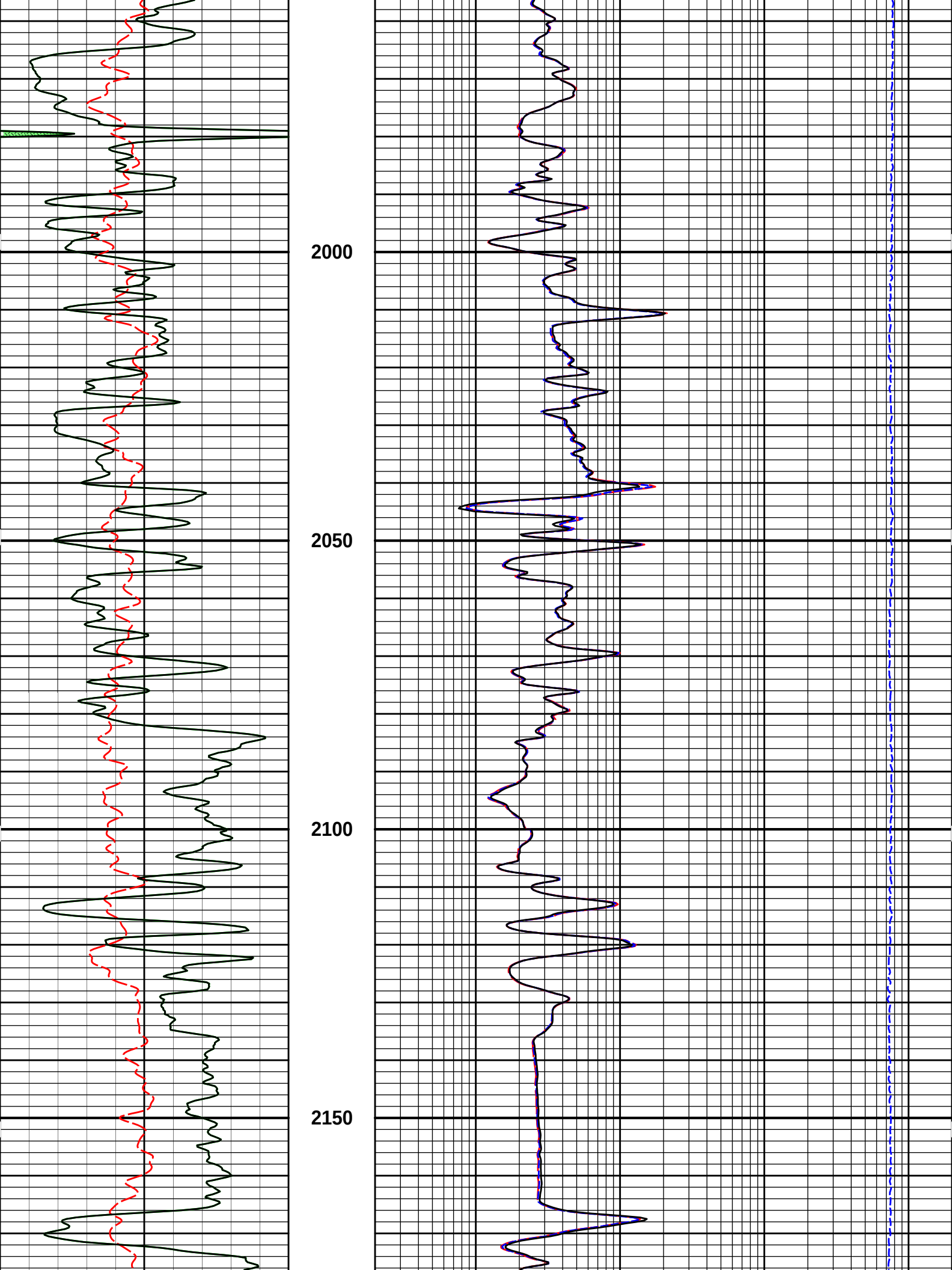

900
950
1000
1050

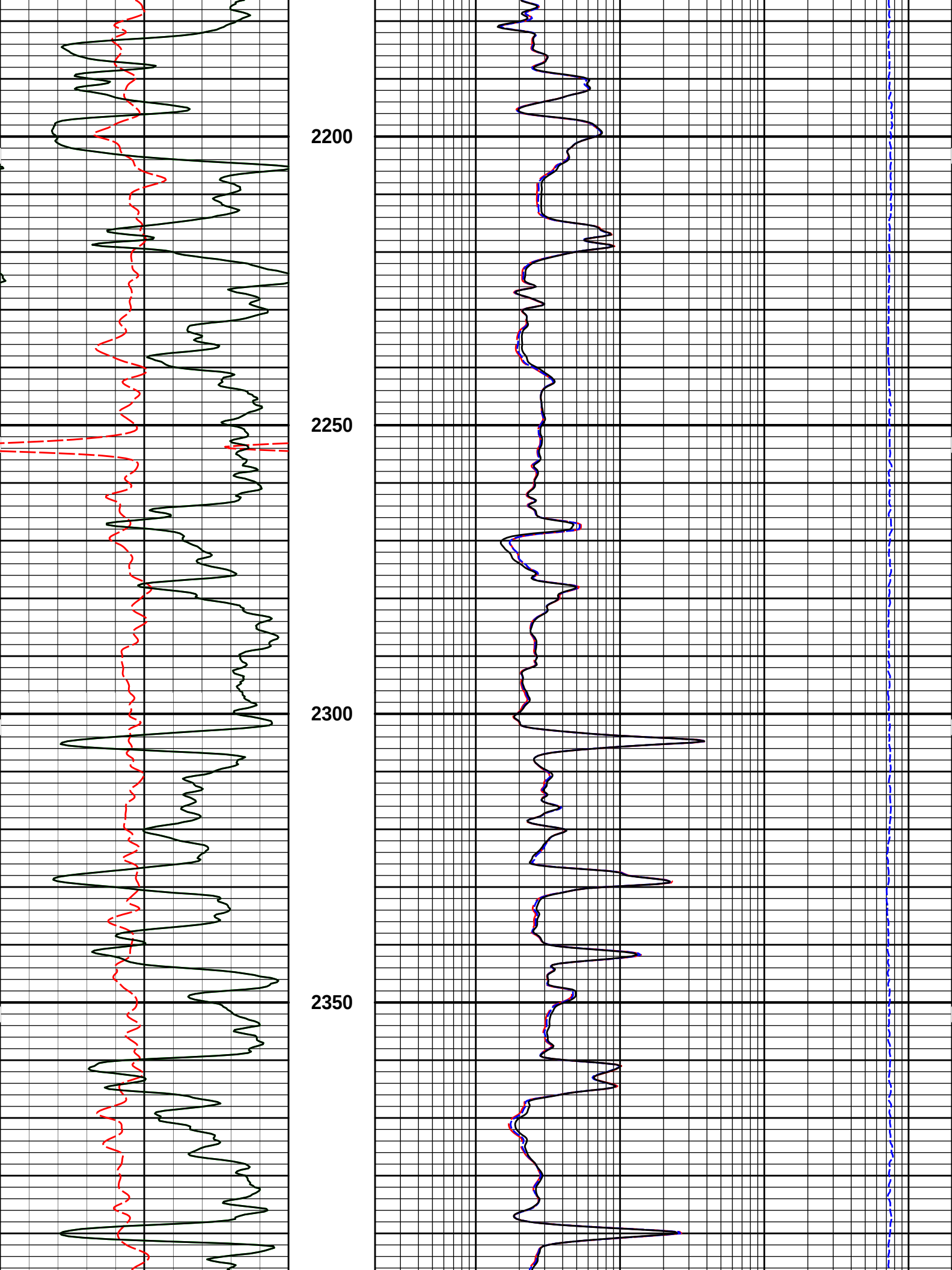

1100
1150
1200
1250
Gamma API REPEAT
Gamma API

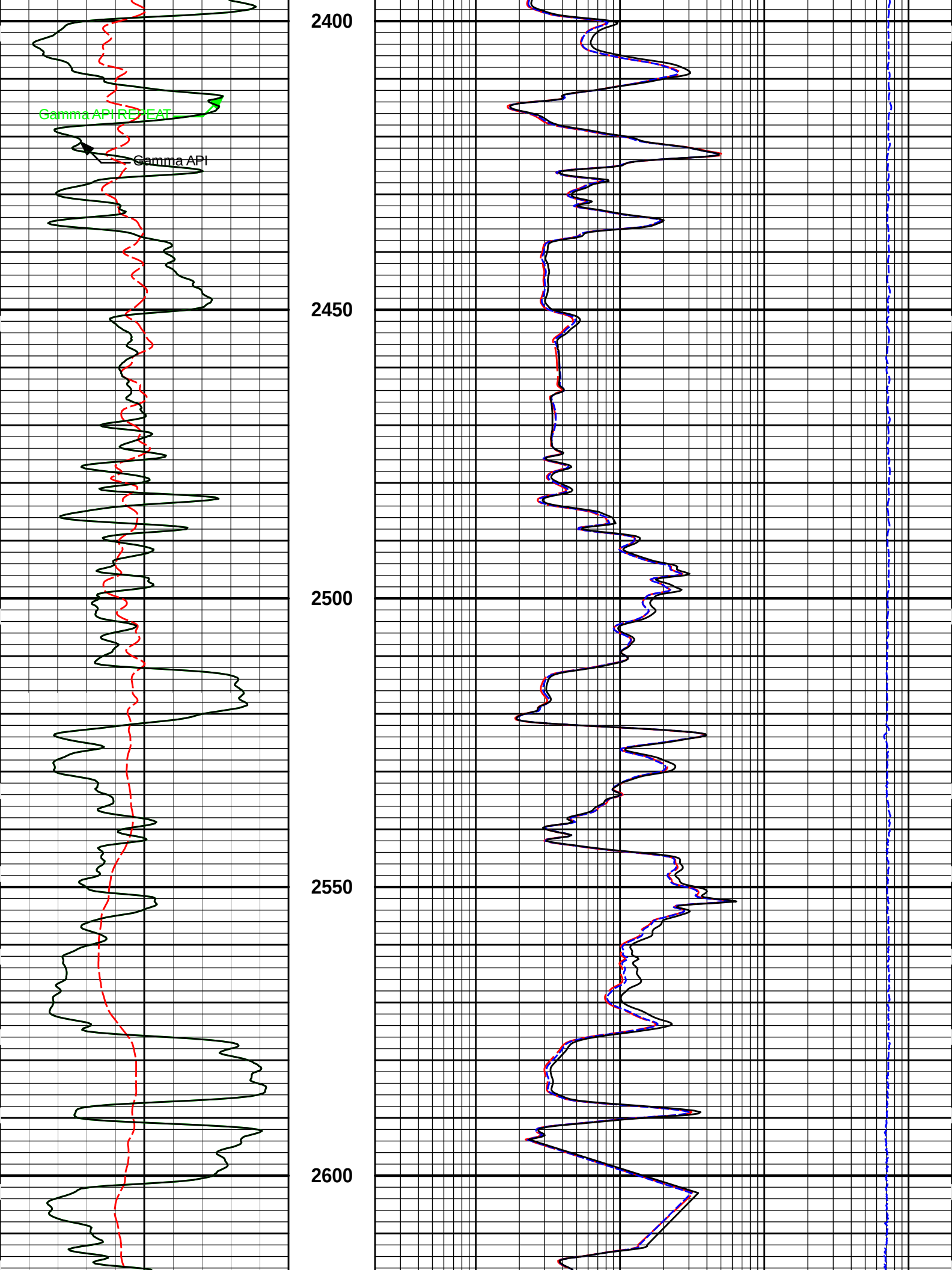

1300
1350
1400
1450
1500

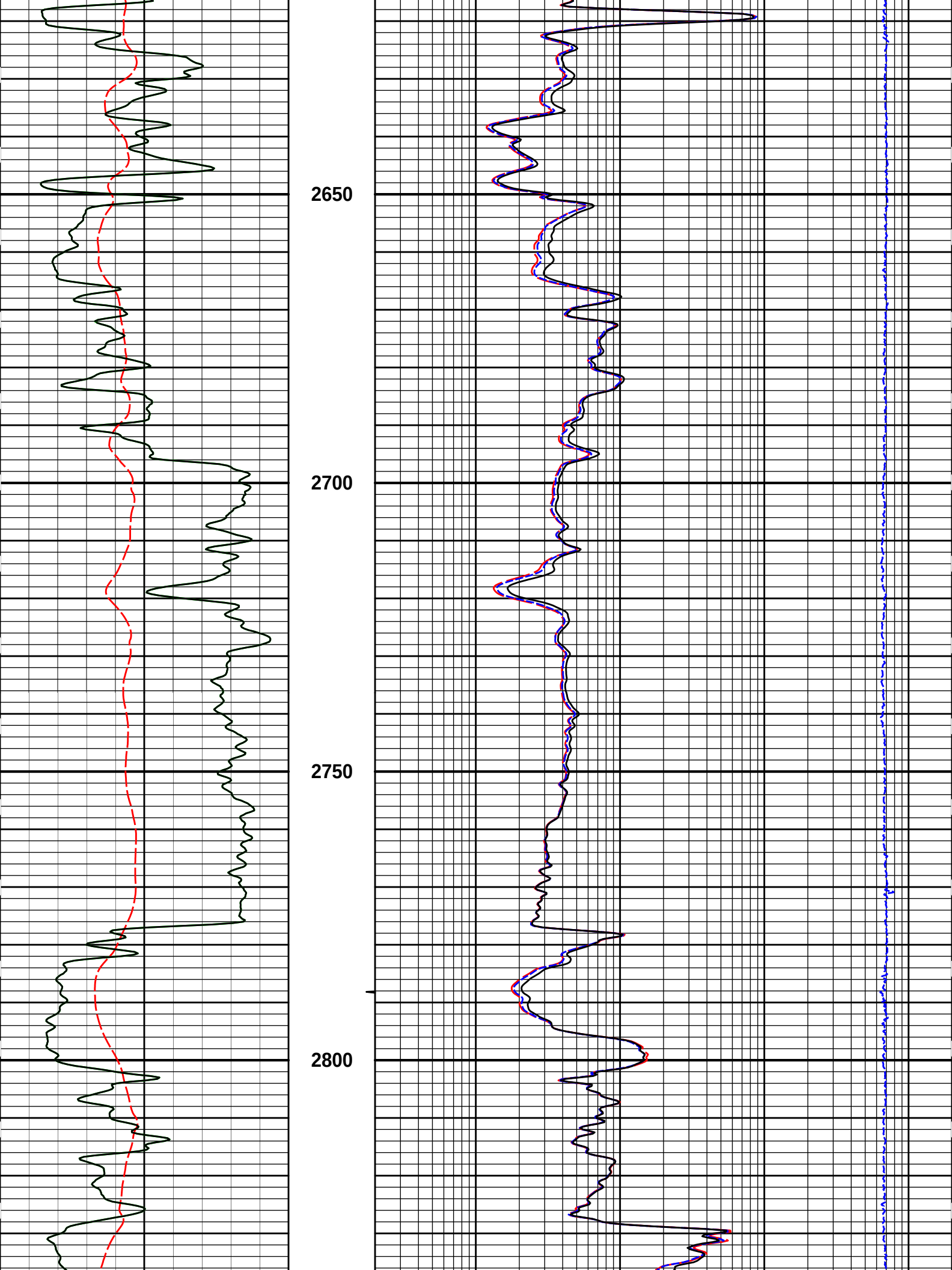

1550
1600
1650
1700

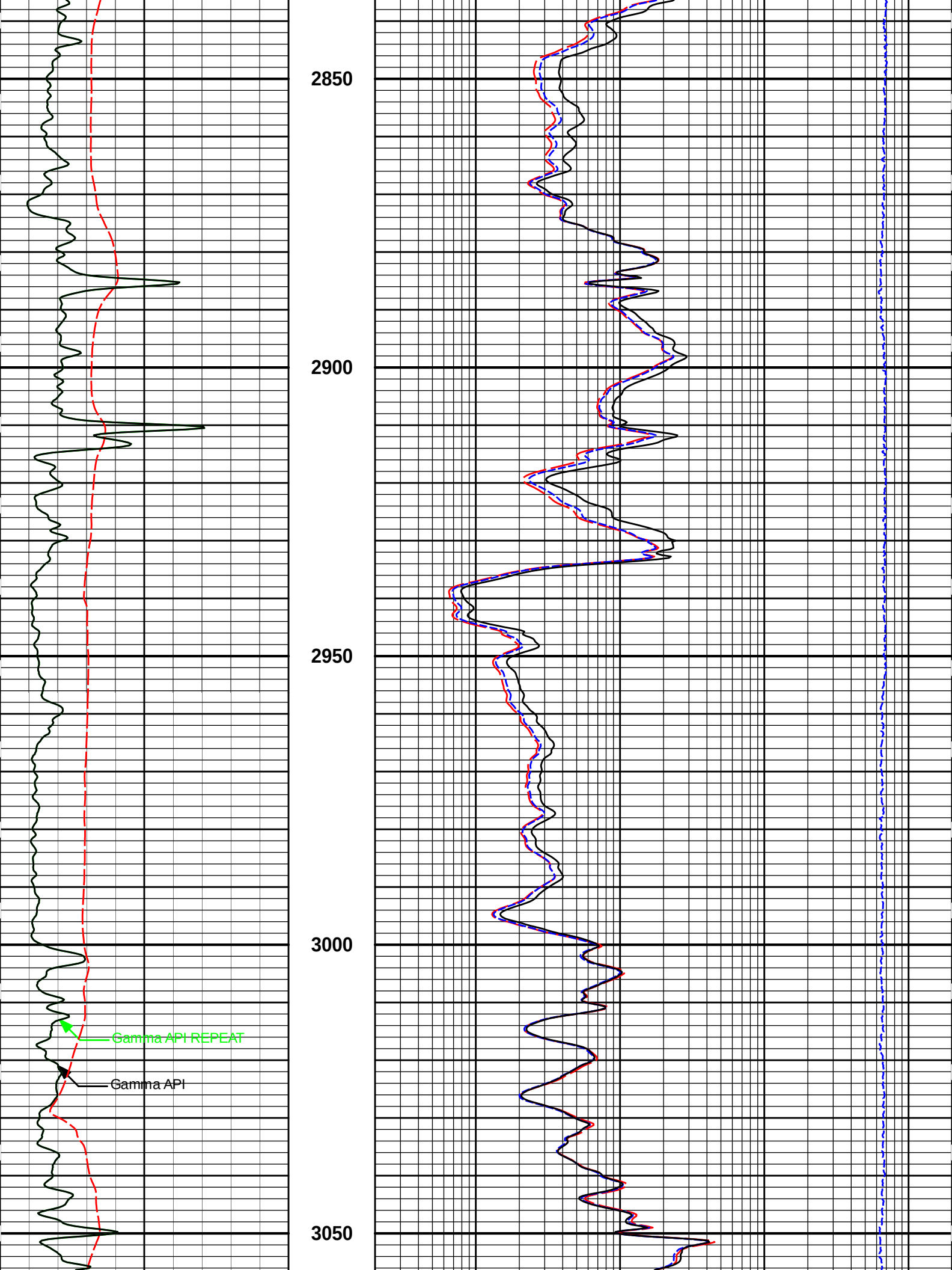

1750
1800
1850
1900
1950
Gamma API REPEAT
Gamma API

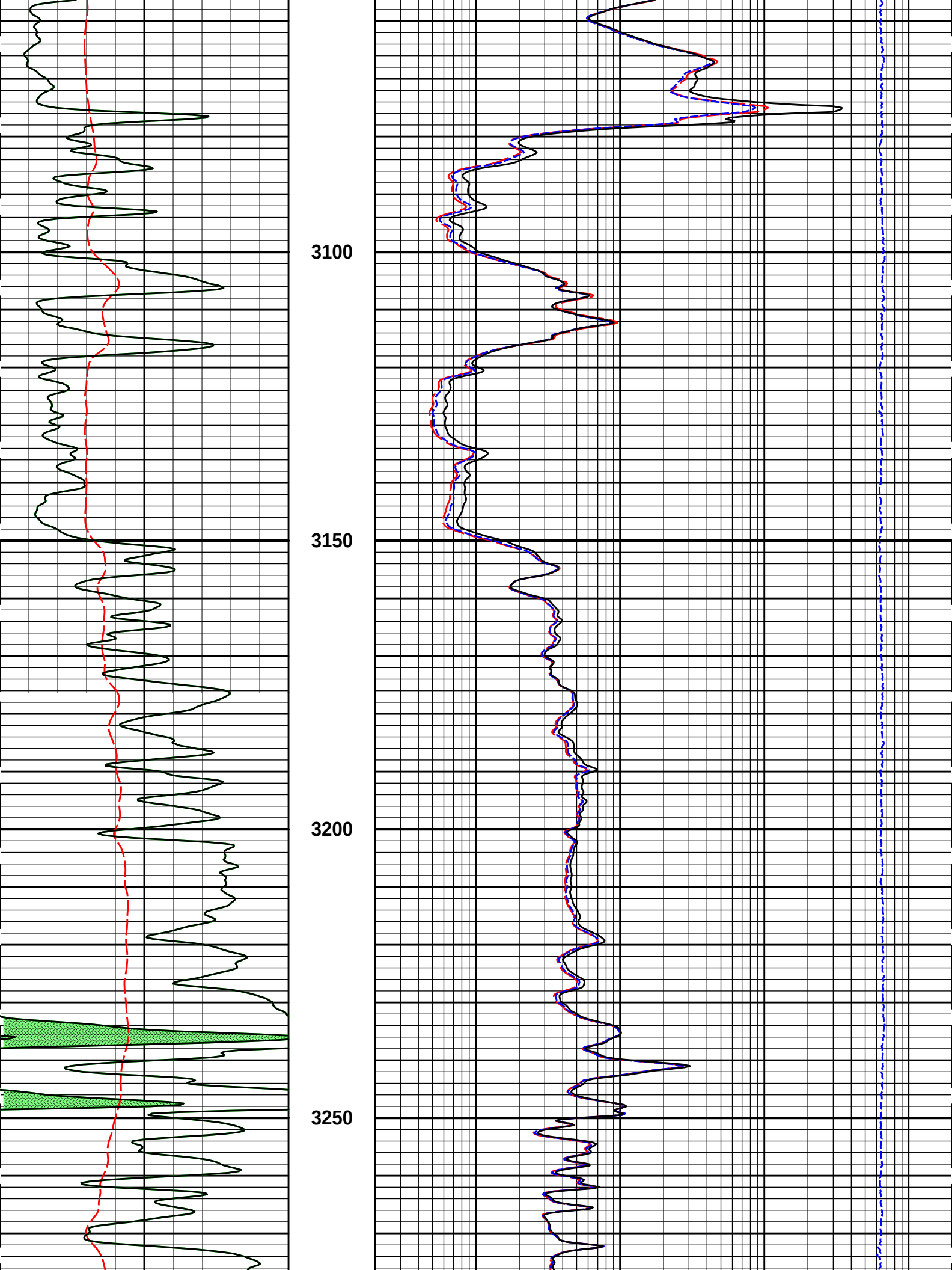

2000
2050
2100
2150

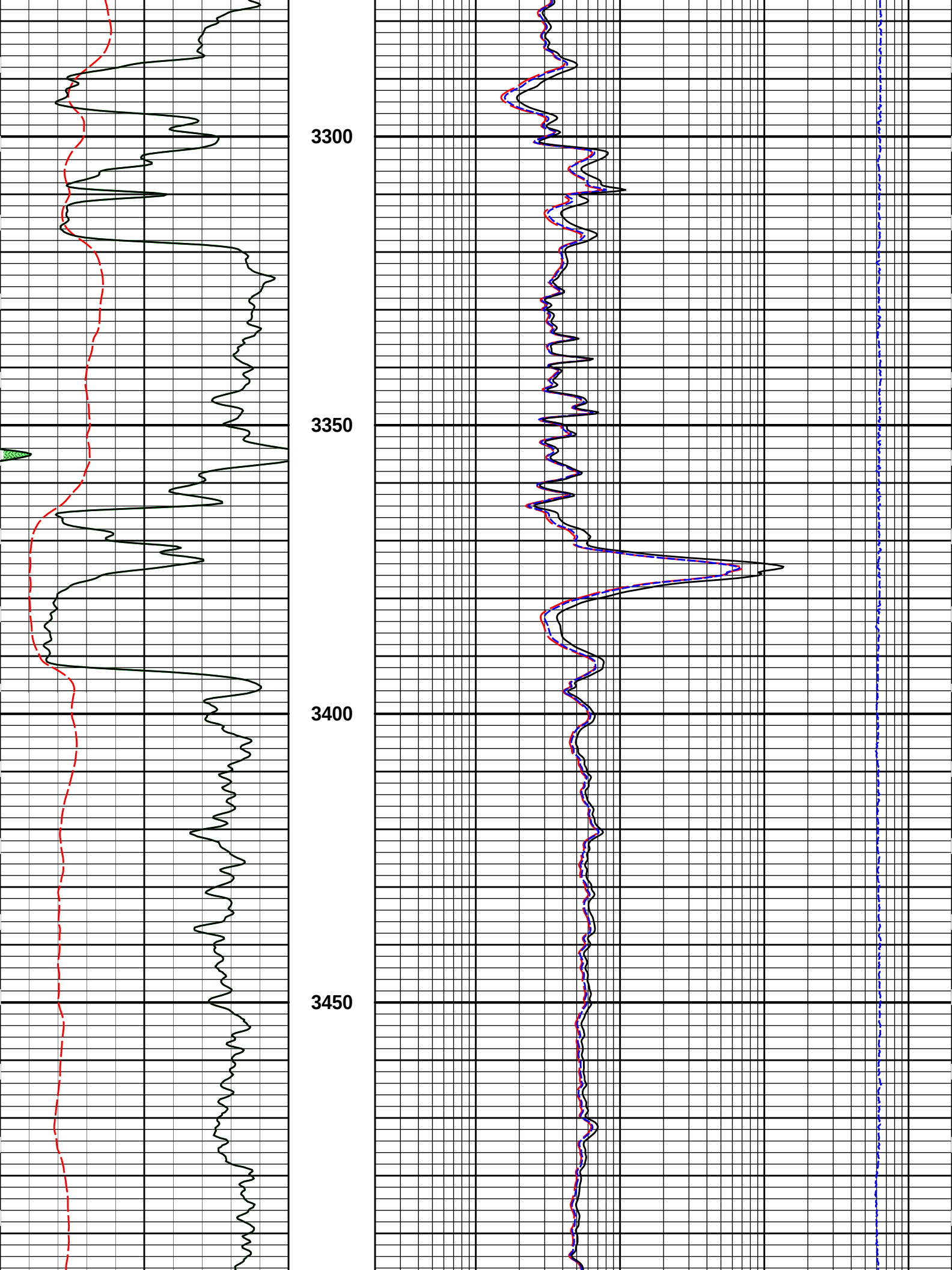

2200
2250
2300
2350

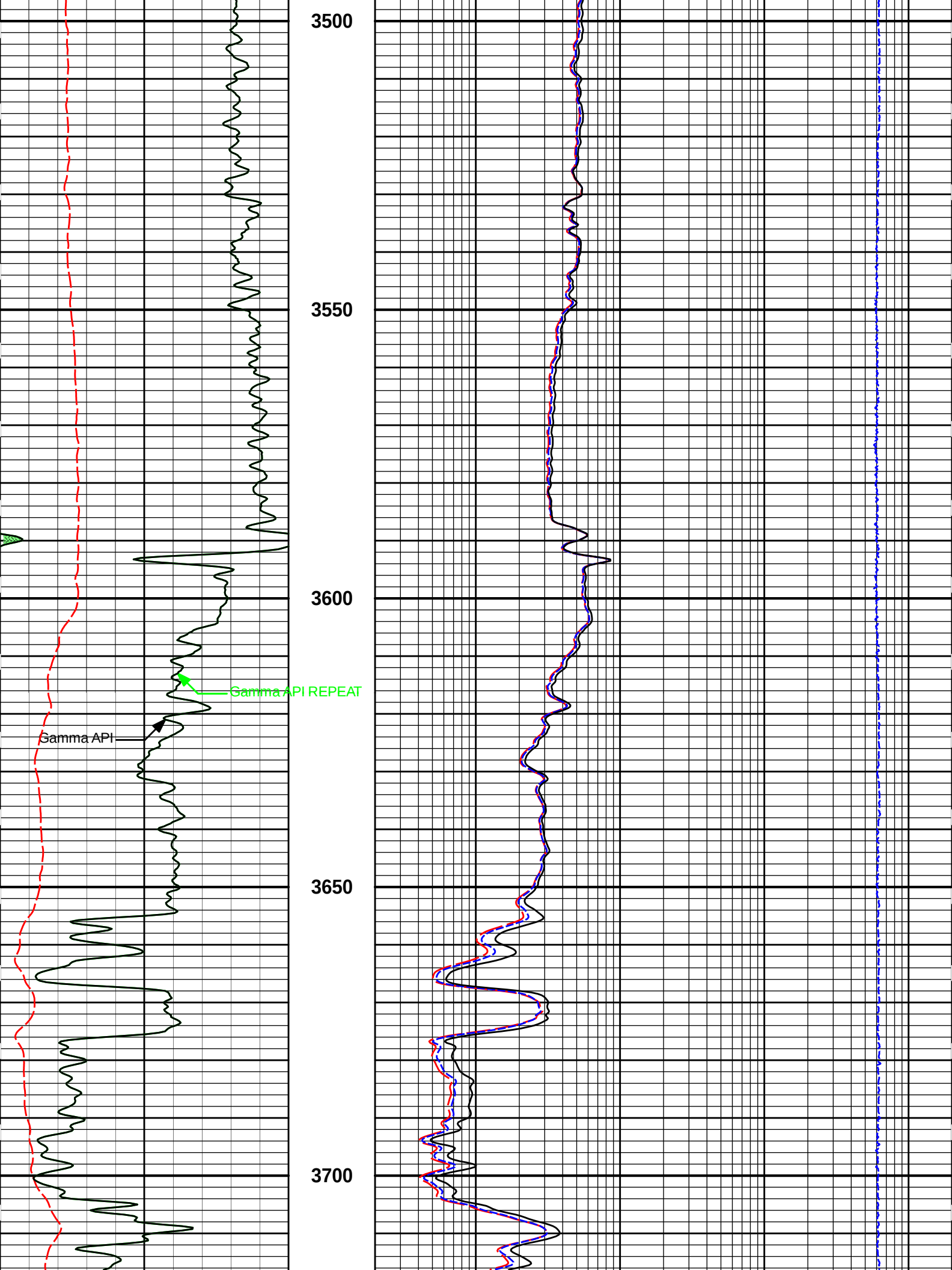

Gamma API REPEAT
Gamma API
2400
2450
2500
2550
2600

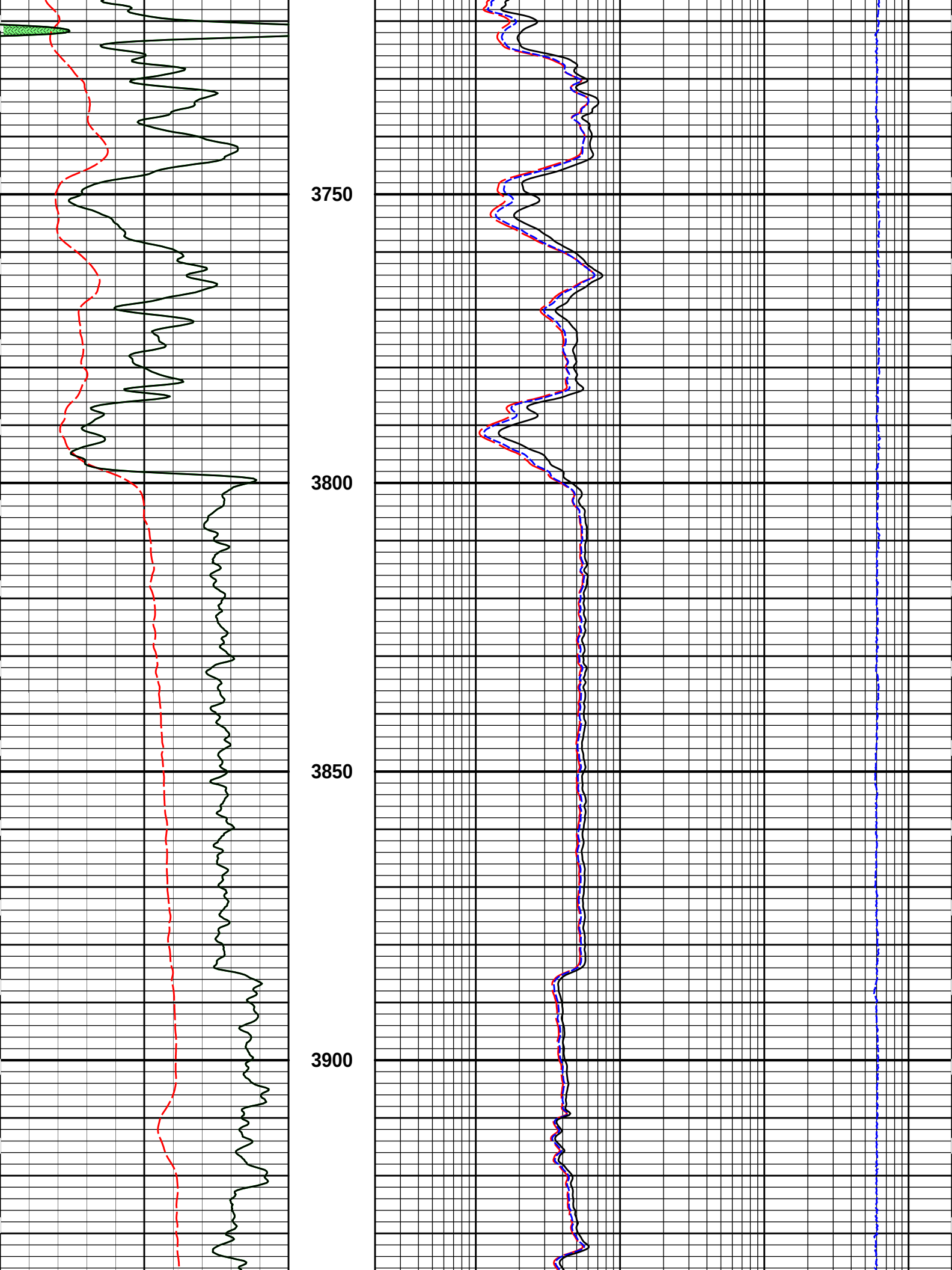

2650
2700
2750
2800

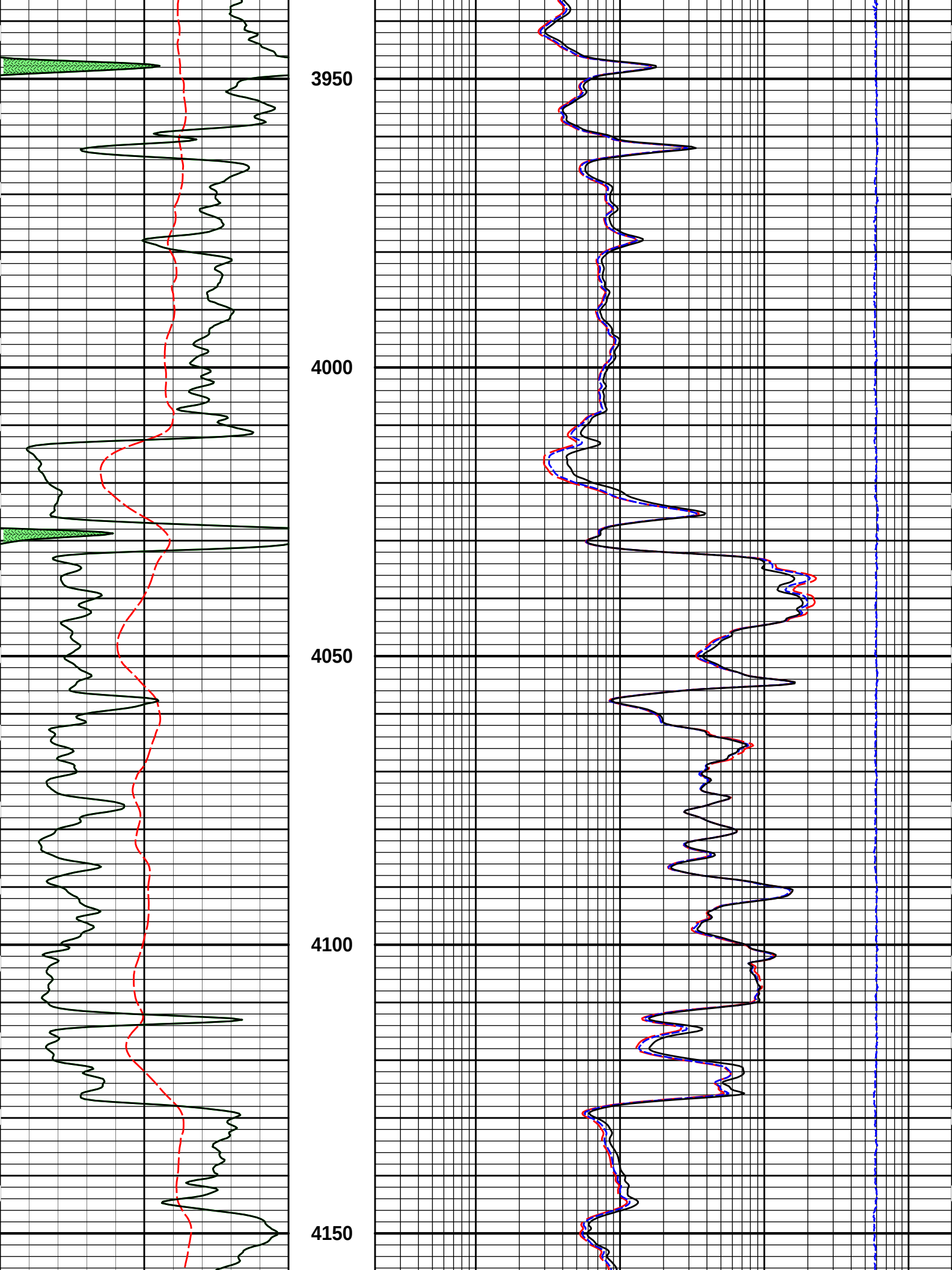

2850
2900
2950
3000
3050
Gamma API REPEAT
Gamma API

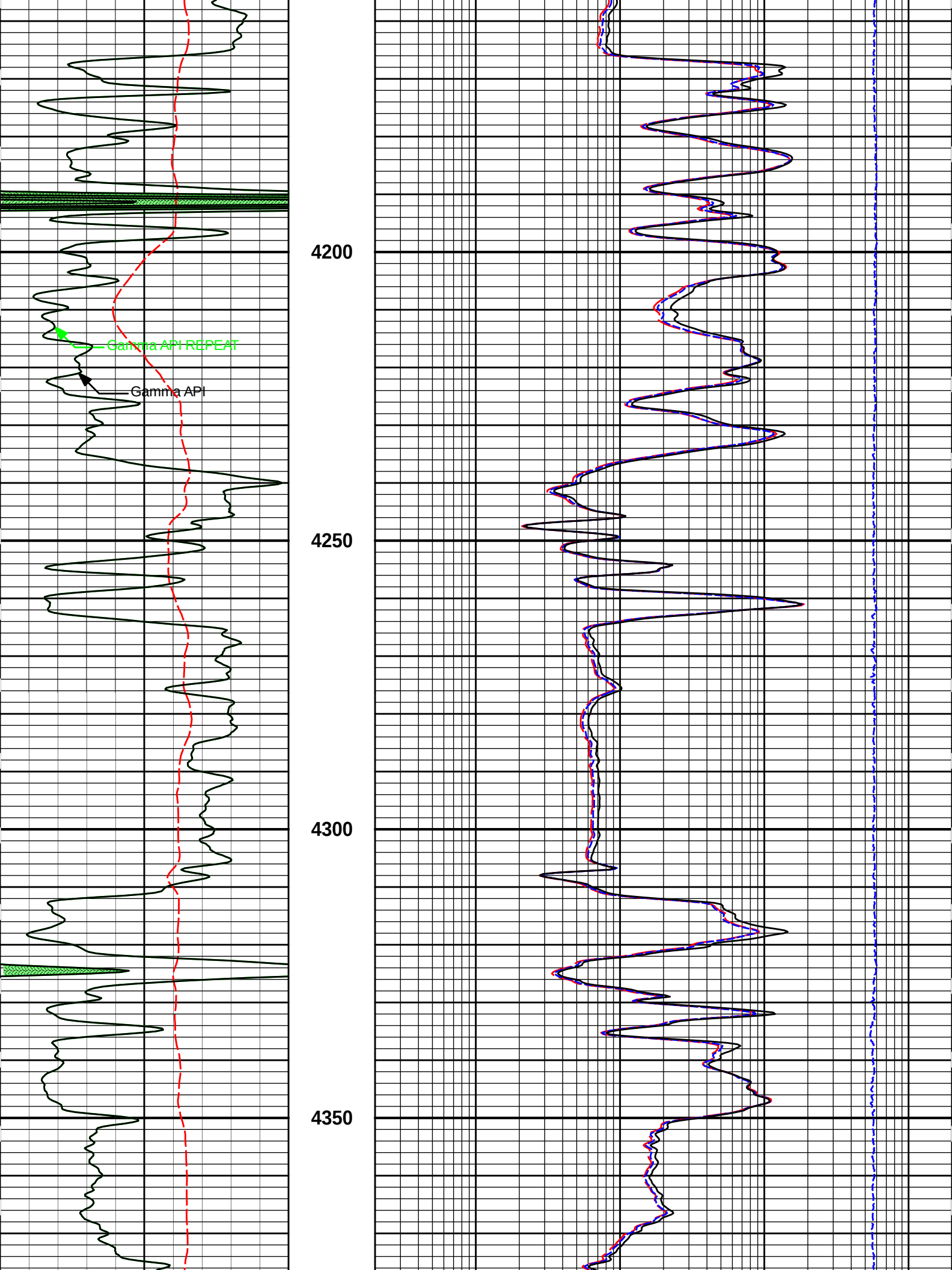

3100
3150
3200
3250

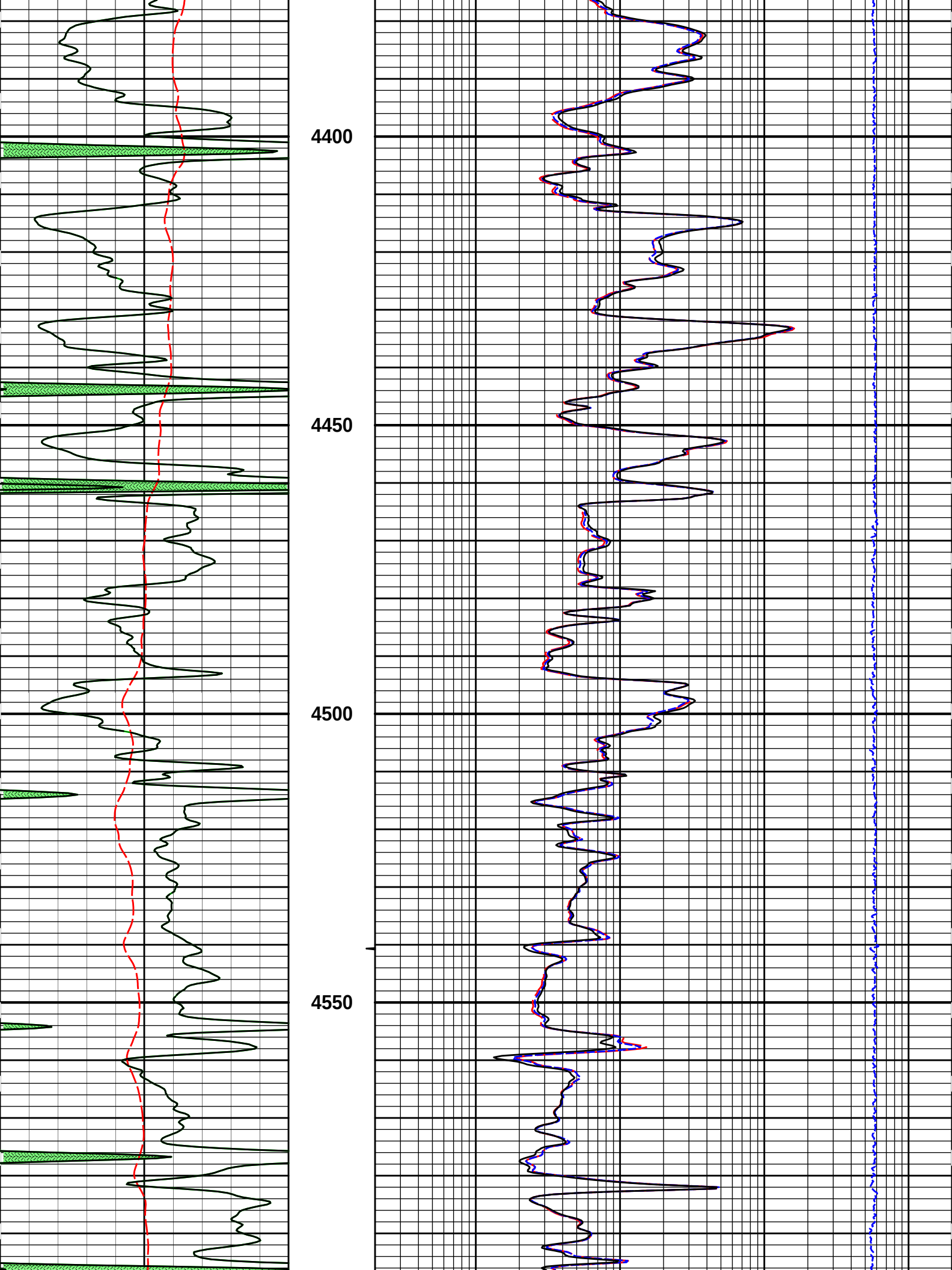

3300
3350
3400
3450

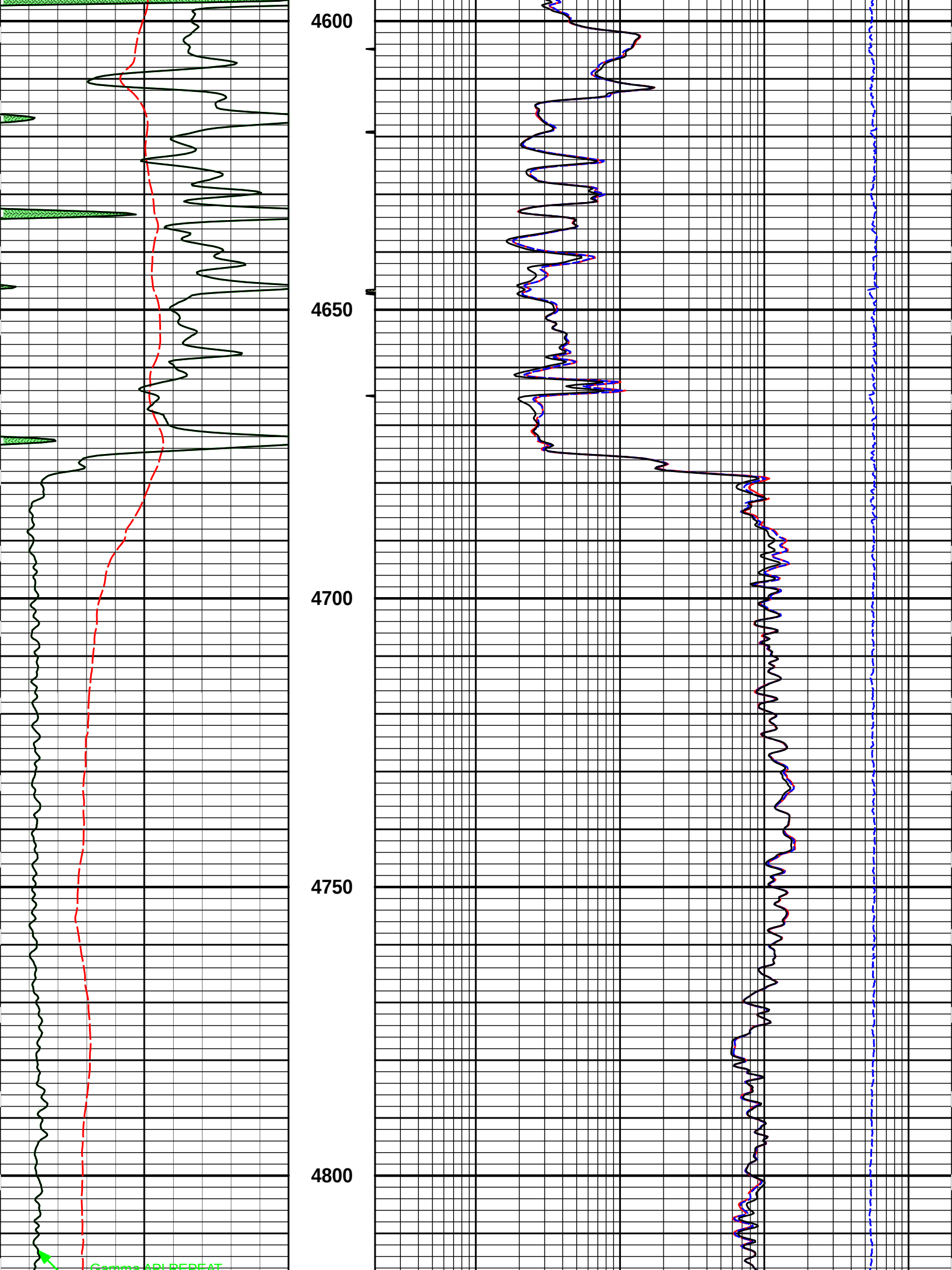

3500
3550
3600
3650
3700
Gamma API REPEAT
Gamma API

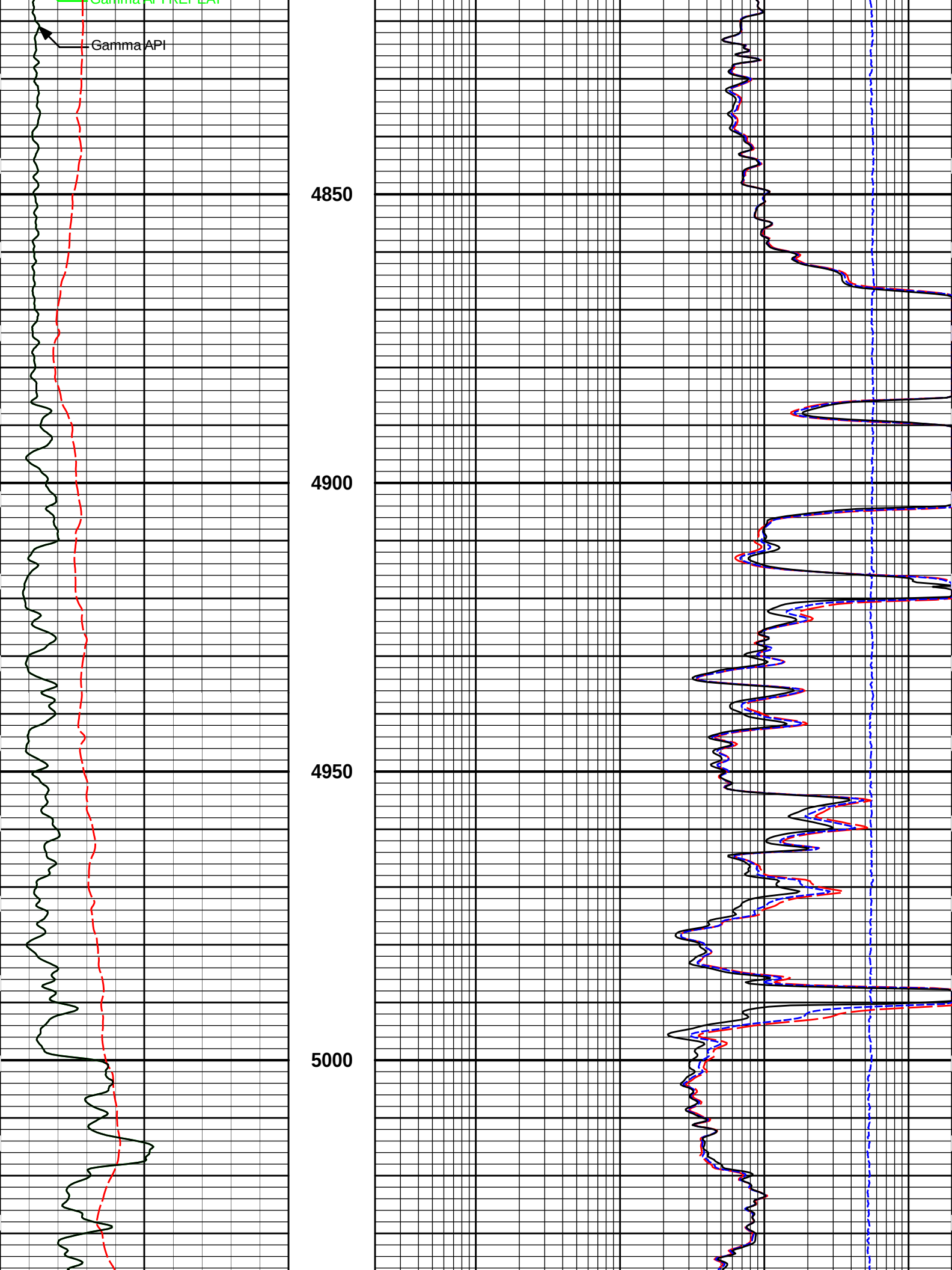

3750
3800
3850
3900

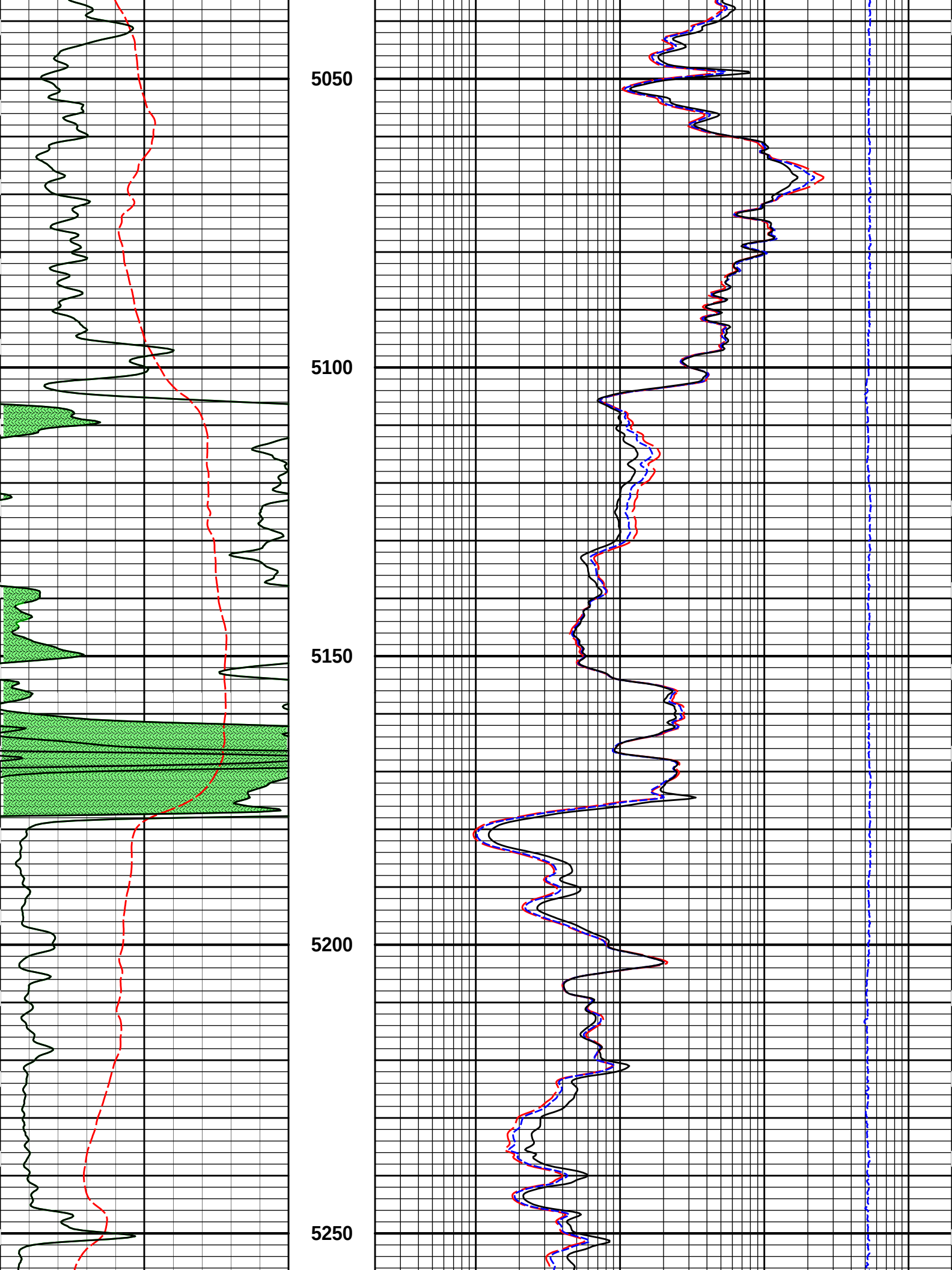

3950
4000
4050
4100
4150

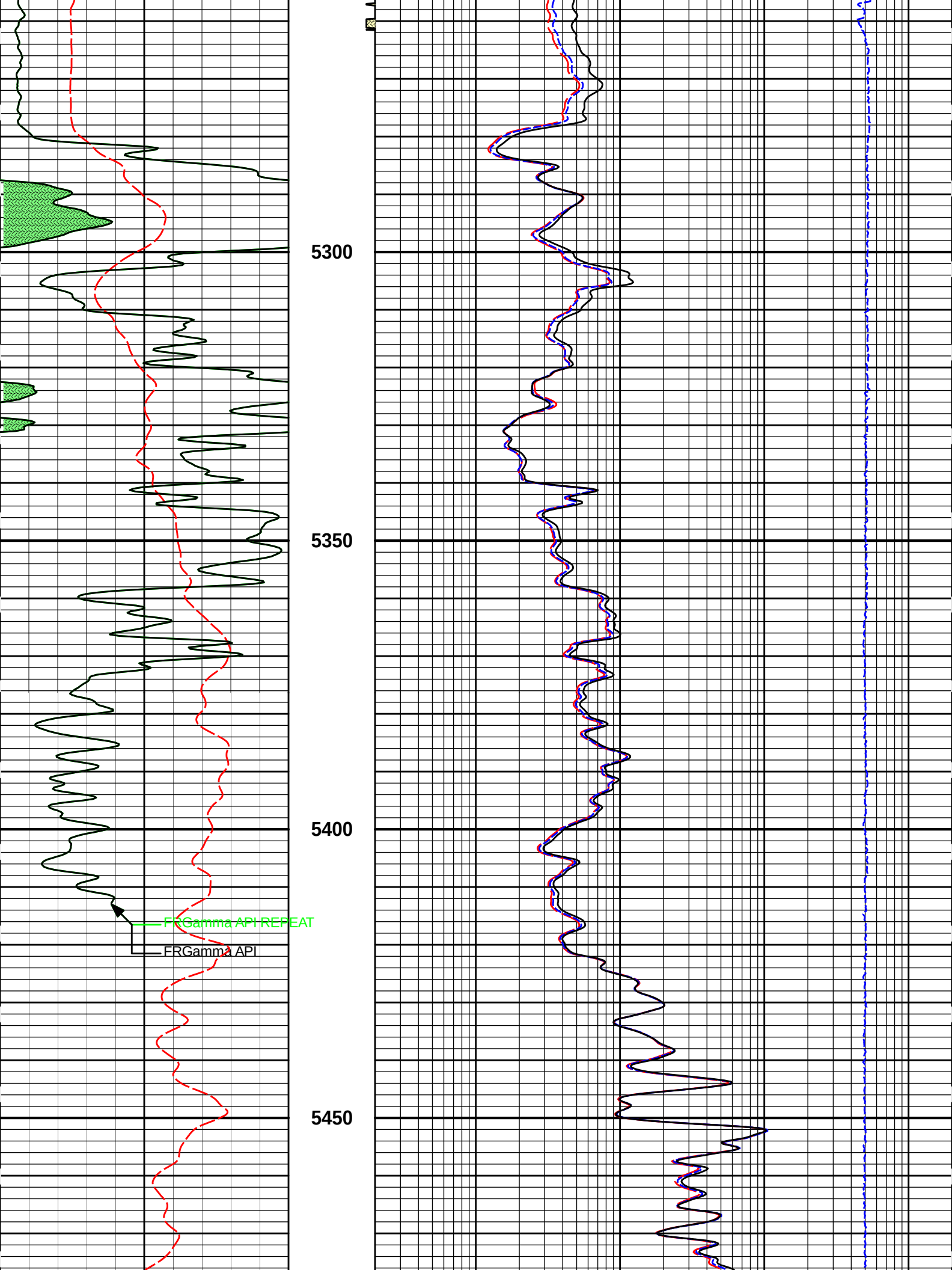

4200
4250
4300
4350
Gamma API REPEAT
Gamma API

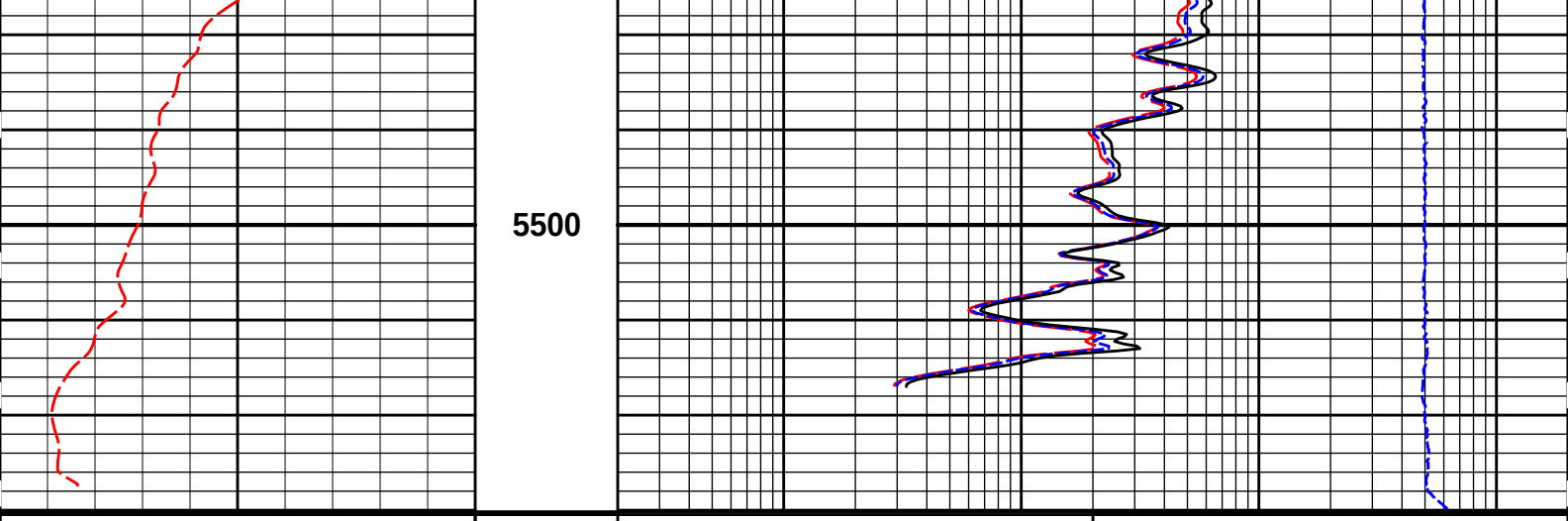

4400
4450
4500
4550


4600
4650
4700
4750
4800
Gamma API REPEAT


Gamma API
4850
4900
4950
5000


5050
5100
5150
5200
5250


5300
5350
5400
5450
FRGamma API REPEAT
FRGamma API




0 Gamma API 150
api
SP
-] 20 mV [+

1 : 240
ft

Tension Pull
10 0

15K Tension 0
pounds

0.2 20in Resistivity 2ft Res 2000
ohm-metre

0.2 60in Resistivity 2ft Res 2000
ohmm

0.2 90in Resistivity 2ft Res 2000
ohmm

HALLIBURTON

Plot Time: 08-Dec-14 12:28:44
Plot Range: 670 ft to 5530.17 ft
Data: SKYLER_RAE_SWD_\Well Based*\
Plot File: \\-LOCAL-\SKYLER_RAE_SWD_\0001 RED_TRIPLE_CSNG_WSTT_XRMI\ACRT\1_ACRT_5_mainx

# 5 INCH MAIN LOG

HALLIBURTON

Plot Time: 08-Dec-14 12:28:44
Plot Range: 4200 ft to 4500 ft
Data: SKYLER_RAE_SWD_\Well Based\DAQ-0001-004\
Plot File: \\-LOCAL-\SKYLER_RAE_SWD_\0001 RED_TRIPLE_CSNG_WSTT_XRMI\ACRT\1_ACRT_5_rptx

# REPEAT SECTION

0.2 90in Resistivity 2ft Res 2000
ohmm

0.2 60in Resistivity 2ft Res 2000
ohmm

0.2 20in Resistivity 2ft Res 2000
ohm-metre

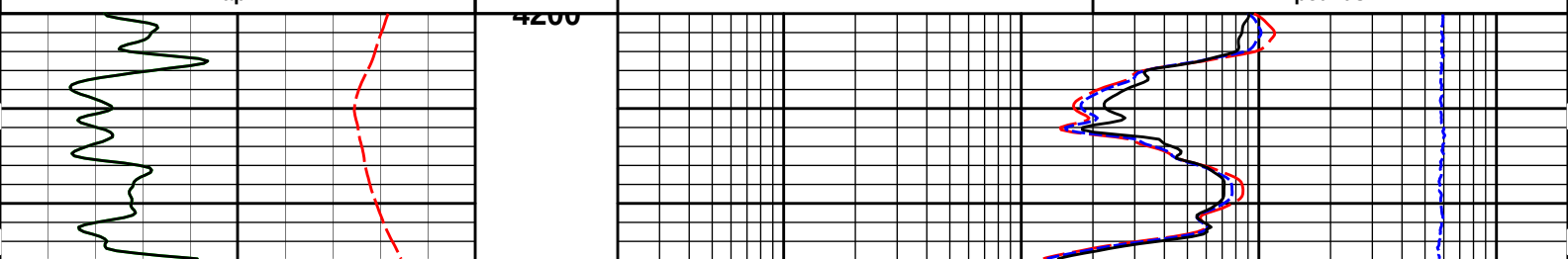
SP
-] 20mV [+

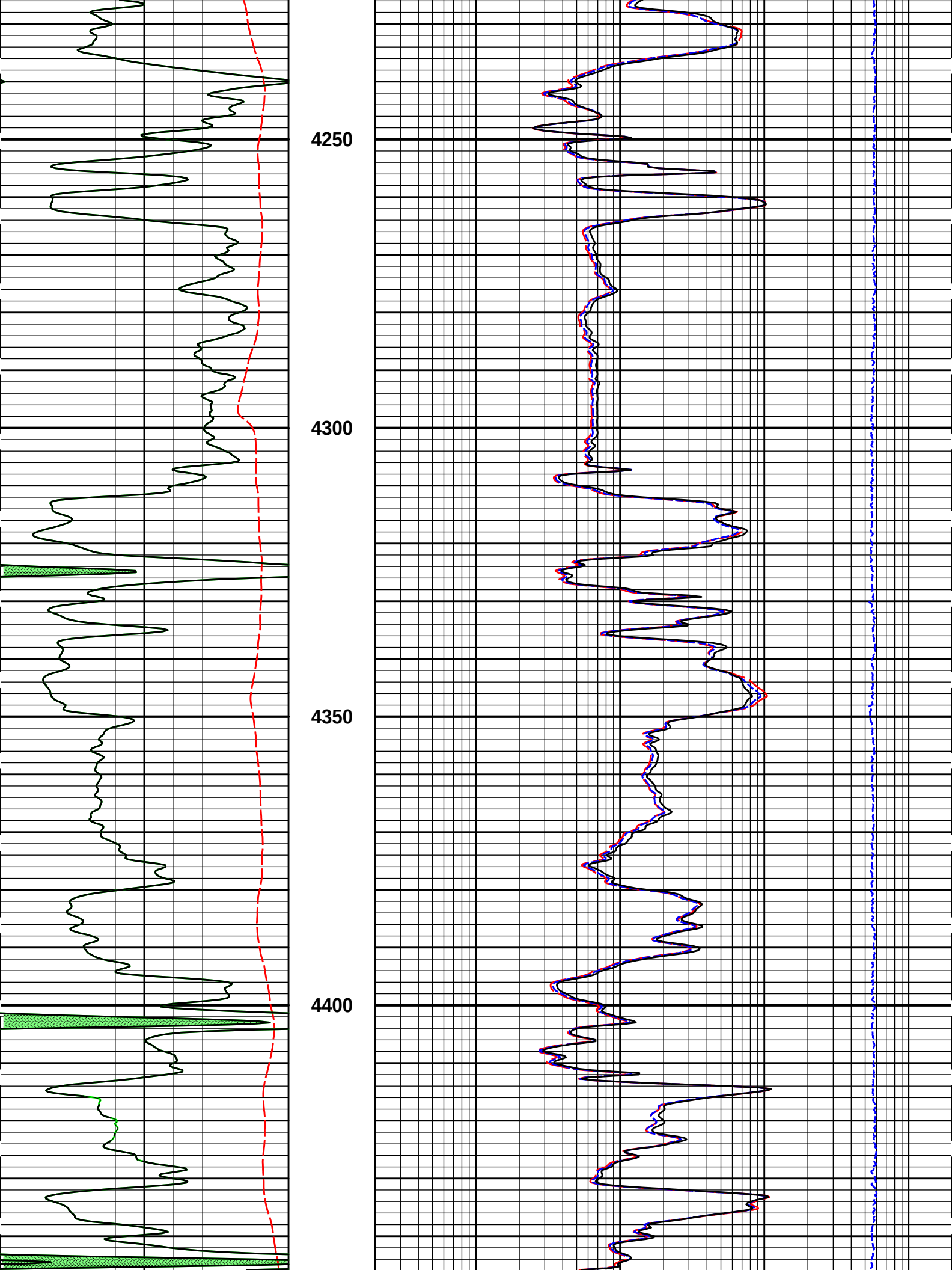
Tension Pull
10 0

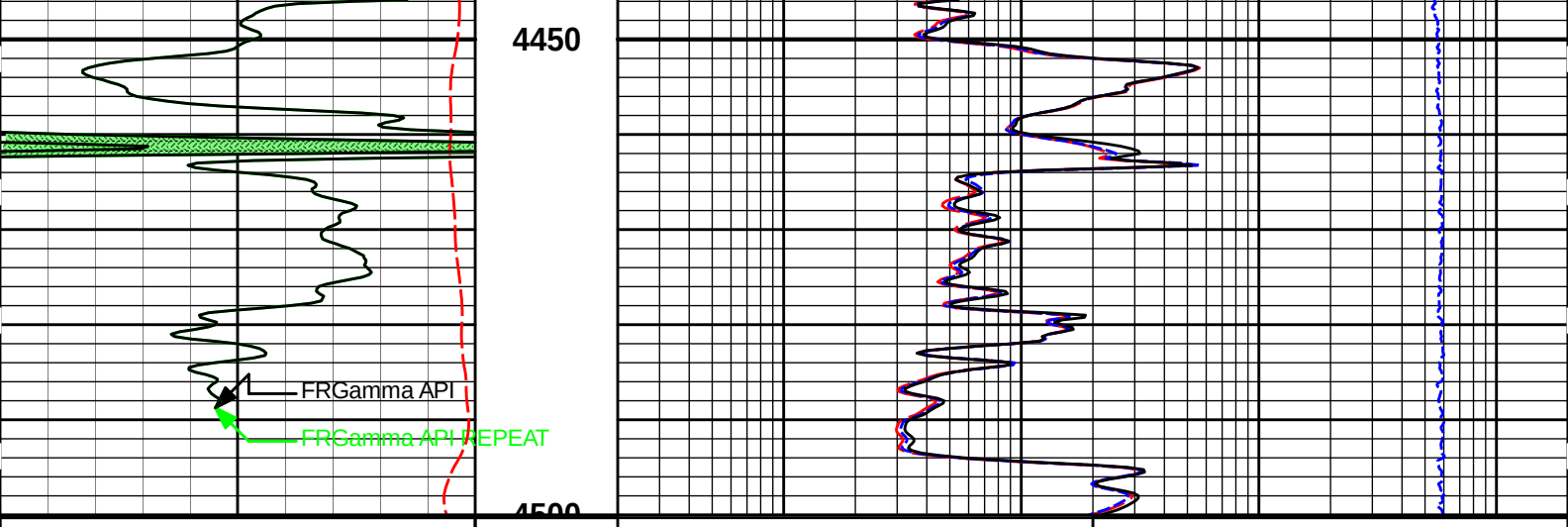
0 Gamma API 150
api

1 : 240
ft

15K Tension 0
pounds




4250
4300
4350
4400




| | | |
|---|---|---|
| 0 Gamma API 150 | 1 : 240 | 15K Tension 0 |
| api | ft | pounds |
| SP | Tension Pull | 0.2 20in Resistivity 2ft Res 2000 |
| -] 20mV [+ | 10 0 | ohm-metre |
| | | 0.2 60in Resistivity 2ft Res 2000 |
| | | ohmm |
| | | 0.2 90in Resistivity 2ft Res 2000 |
| | | ohmm |

**HALLIBURTON**

Plot Time: 08-Dec-14 12:28:46
Plot Range: 4200 ft to 4500 ft
Data: SKYLER_RAE_SWD_\Well Based\DAQ-0001-004\
Plot File: \\-LOCAL-\SKYLER_RAE_SWD_\0001 RED_TRIPLE_CSNG_WSTT_XRMI\ACRT\1_ACRT_5_rptx

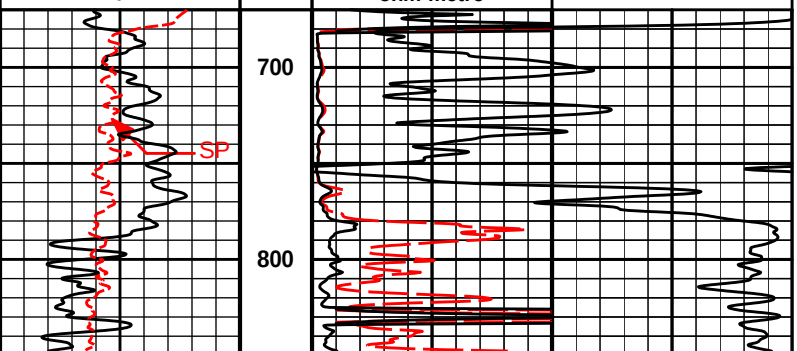
# REPEAT SECTION

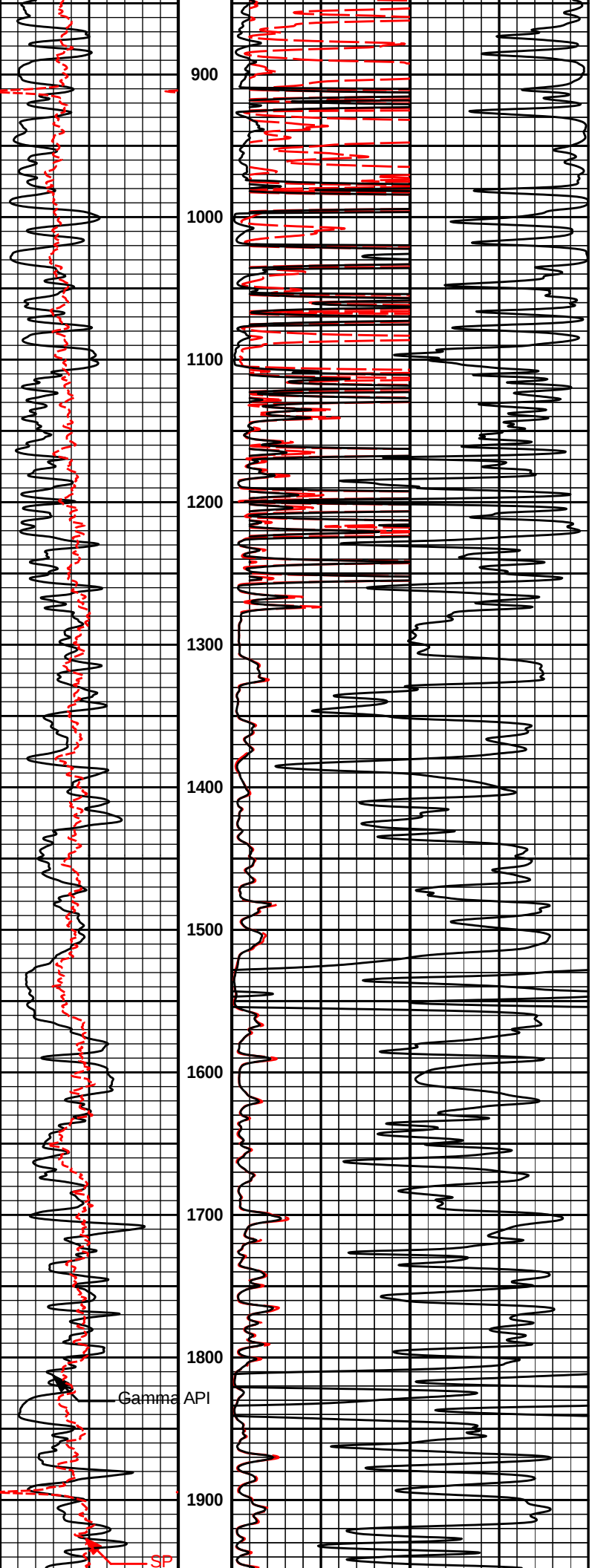
**HALLIBURTON**

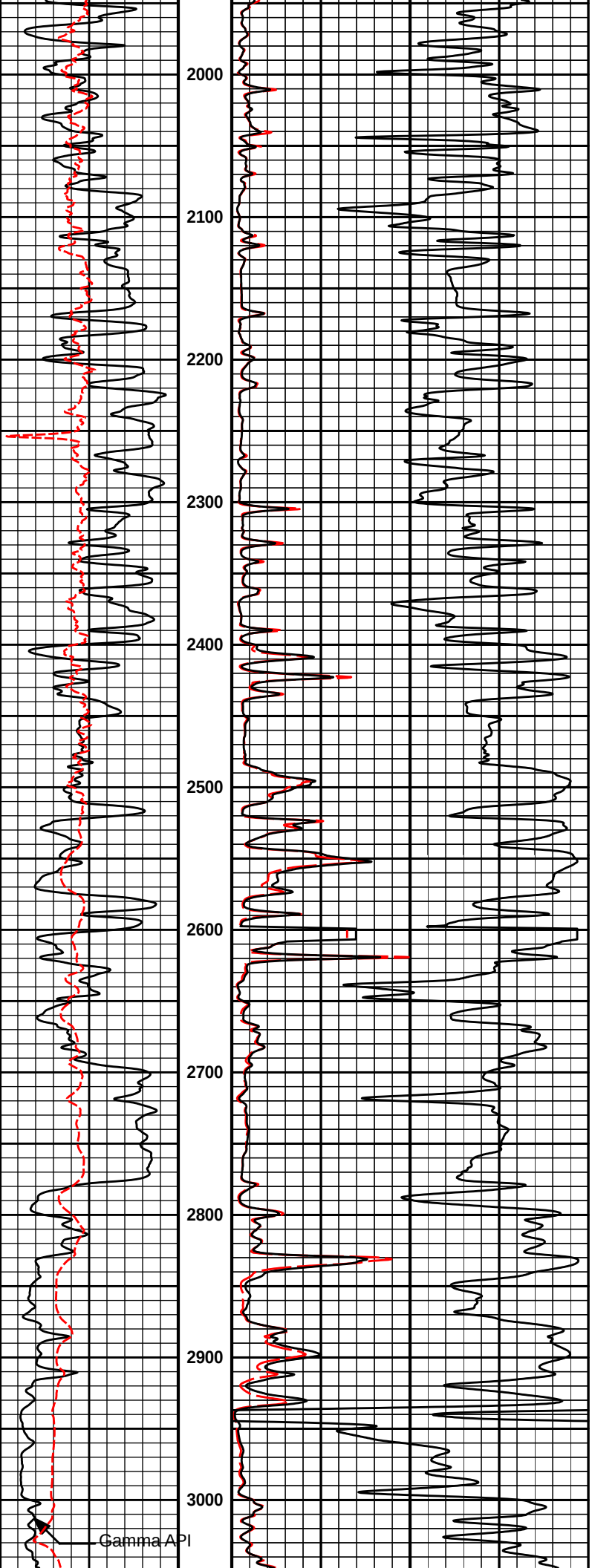
Plot Time: 08-Dec-14 12:28:46
Plot Range: 670 ft to 5527.25 ft
SKYLER_RAE_SWD_\...\...
Plot File: \\...\...\1_ACRT_1inx

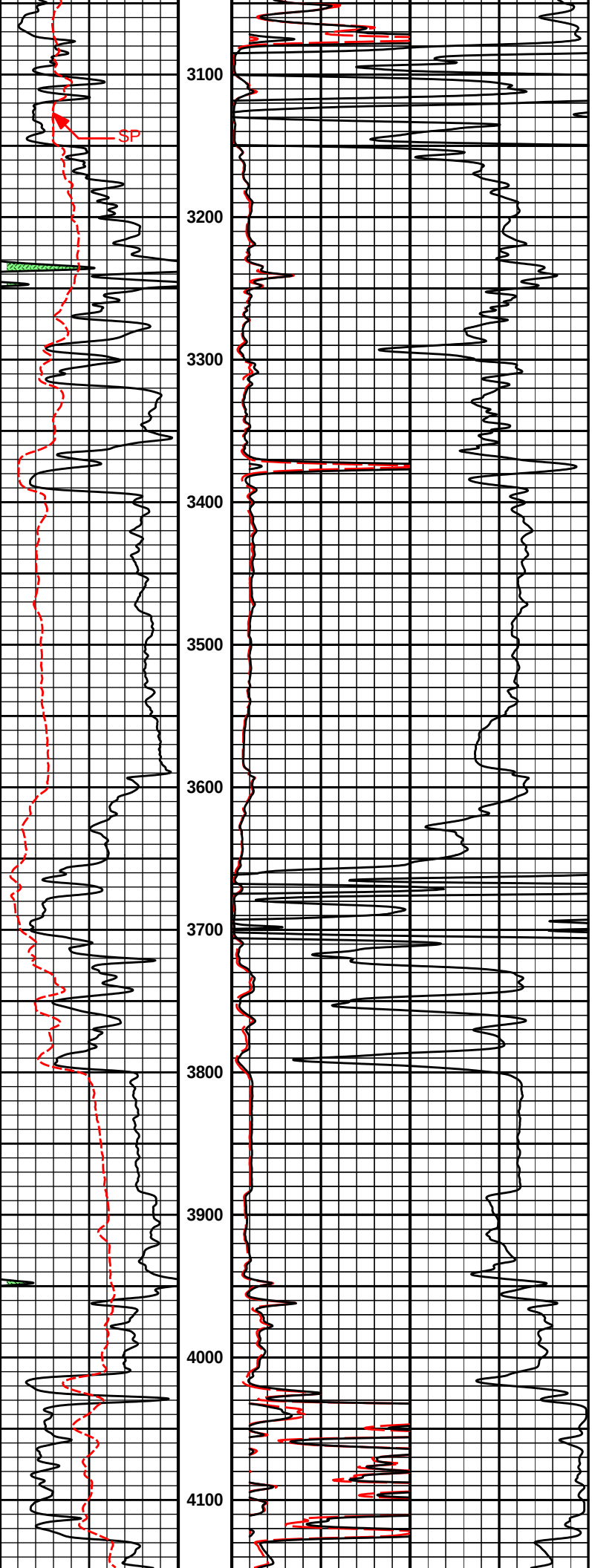
# 1 INCH MAIN LOG

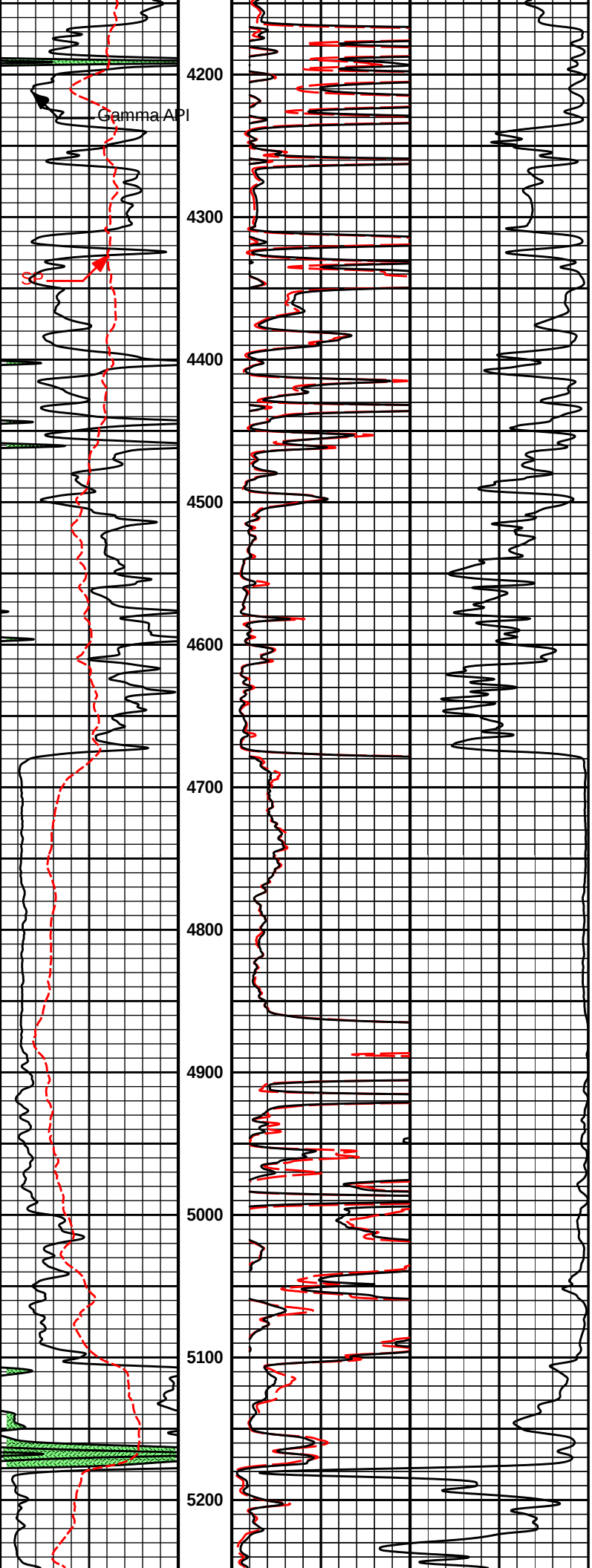
| | | |
|---|---|---|
| | | 1K 90in Conductivity 2ft Res 0 |
| | | mmho per metre |
| SP | | 90in Resistivity 2ft Res |
| -] 20mV [+ | | 0 50 |
| | | ohm-metre |
| 0 Gamma API 150 | 1 : 1200 | 20in Resistivity 2ft Res |
| api | ft | 0 50 |
| | | ohm-metre |

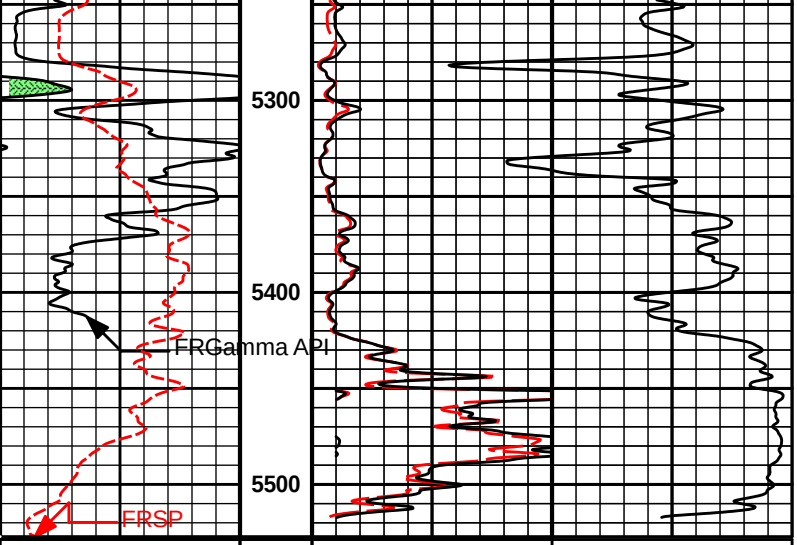



900
1000
1100
1200
1300
1400
1500
1600
1700
1800
Gamma API
1900
SP


2000
2100
2200
2300
2400
2500
2600
2700
2800
2900
3000
Gamma API


SP
3100
3200
3300
3400
3500
3600
3700
3800
3900
4000
4100


Gamma API
4200
4300
4400
4500
4600
4700
4800
4900
5000
5100
5200




0 Gamma API 150
api
SP
-] 20mV [+

1 : 1200
ft

20in Resistivity 2ft Res
0 50
ohm-metre
90in Resistivity 2ft Res
0 50
ohm-metre

1K 90in Conductivity 2ft Res 0
mmho per metre

HALLIBURTON

Plot Time: 08-Dec-14 12:28:49
Plot Range: 670 ft to 5527.25 ft
SKYLER_RAE_SWD_\...\...
Plot File: \\...\...\1_ACRT_1inx

# 1 INCH MAIN LOG

HALLIBURTON

## PARAMETERS REPORT

| Depth (ft) | Tool Name | Mnemonic | Description | Value | Units |
|---|---|---|---|---|---|
| TOP | | | | | |
| | SHARED | BS | Bit Size | 8.750 | in |
| | SHARED | UBS | Use Bit Size instead of Caliper for all applications. | No | |
| | SHARED | MDBS | Mud Base | Water | |
| | SHARED | MDWT | Borehole Fluid Weight | 9.100 | ppg |
| | SHARED | WAGT | Weighting Agent | Natural | |
| | SHARED | BSAL | Borehole salinity | 0.00 | ppm |
| | SHARED | FSAL | Formation Salinity NaCl | 0.00 | ppm |
| | SHARED | KPCT | Percent K in Mud by Weight? | 0.00 | % |
| | SHARED | RMUD | Mud Resistivity | 0.430 | ohmm |
| | SHARED | TRM | Temperature of Mud | 69.0 | degF |
| | SHARED | CSD | Logging Interval is Cased? | No | |
| | SHARED | ICOD | AHV Casing OD | 7.000 | in |
| | SHARED | ST | Surface Temperature | 75.0 | degF |
| | SHARED | TD | Total Well Depth | 5555.00 | ft |
| | SHARED | BHT | Bottom Hole Temperature | 125.0 | degF |
| | SHARED | SVTM | Navigation and Survey Master Tool | XRMI-I Instrument | |
| | SHARED | AZTM | High Res Z Accelerometer Master Tool | XRMI-I Instrument | |
| | SHARED | TEMM | Temperature Master Tool | NONE | |
| | Rwa / | | | | |

| | | | | |
|---|---|---|---|---|
| CrossPlot | XPOK | Process Crossplot? | Yes | |
| Rwa / CrossPlot | FCHO | Select Source of F | Automatic | |
| Rwa / CrossPlot | AFAC | Archie A factor | 0.6200 | |
| Rwa / CrossPlot | MFAC | Archie M factor | 2.1500 | |
| Rwa / CrossPlot | RMFR | Rmf Reference | 0.10 | ohmm |
| Rwa / CrossPlot | TMFR | Rmf Ref Temp | 75.00 | degF |
| Rwa / CrossPlot | RWA | Resistivity of Formation Water | 0.05 | ohmm |
| Rwa / CrossPlot | ADP | Use Air Porosity to calculate CrossplotPhi | No | |
| Rwa / CrossPlot | BHSM | Borehole Size Source Tool | XRMI-I Mandrel | |
| GTET | GROK | Process Gamma Ray? | Yes | |
| GTET | GRSO | Gamma Tool Standoff | 0.000 | in |
| GTET | GEOK | Process Gamma Ray EVR? | No | |
| GTET | TPOS | Tool Position for Gamma Ray Tools. | Eccentered | |
| GTET | BHSM | Borehole Size Source Tool | XRMI-I Mandrel | |
| CSNG | CGOK | Process CSNG Data? | Yes | |
| CSNG | CENT | Is Tool Centralized? | No | |
| CSNG | GBOK | Gamma Enviromental Corrections? | Yes | |
| CSNG | BARF | Barite Correction Factor | 1.00 | |
| CSNG | ORDG | Use Fixed Gain | No | |
| CSNG | ORDO | Use Fixed Offset | No | |
| CSNG | ORDR | Use Fixed Resolution Degradation Factor | No | |
| CSNG | BHSM | Borehole Size Source Tool | XRMI-I Mandrel | |
| DSNT | DNOK | Process DSN? | Yes | |
| DSNT | DEOK | Process DSN EVR? | No | |
| DSNT | NLIT | Neutron Lithology | Limestone | |
| DSNT | DNSO | DSN Standoff - 0.25 in (6.35 mm) Recommended | 0.250 | in |
| DSNT | DNTP | Temperature Correction Type | None | |
| DSNT | DPRS | DSN Pressure Correction Type | None | |
| DSNT | SHCO | View More Correction Options | No | |
| DSNT | UTVD | Use TVD for Gradient Corrections? | No | |
| DSNT | LHWT | Logging Horizontal Water Tank? | No | |
| DSNT | BHSM | Borehole Size Source Tool | XRMI-I Mandrel | |
| SDLT | CLOK | Process Caliper Outputs? | Yes | |
| SDLT Pad | DNOK | Process Density? | Yes | |
| SDLT Pad | DNOK | Process Density EVR? | No | |
| SDLT Pad | CB | Logging Calibration Blocks? | No | |
| SDLT Pad | SPVT | SDLT Pad Temperature Valid? | Yes | |
| SDLT Pad | DTWN | Disable temperature warning | No | |
| SDLT Pad | DMA | Formation Density Matrix | 2.710 | g/cc |
| SDLT Pad | DFL | Formation Density Fluid | 1.000 | g/cc |
| SDLT Pad | BHSM | Borehole Size Source Tool | SDLT | |
| Microlog Pad | MLOK | Process MicroLog Outputs? | Yes | |
| WAVE Receivers | WSOK | Process WSTT? | Yes | |
| WAVE Receivers | AFIL | Adaptive Filtering? | No | |
| WAVE Receivers | PINT | Process 1 Sample and Skip | 0 | |
| WAVE Receivers | PROM | Process Mode: M=1,MX=2,MY=3,MXY=4 | 4 | |
| WAVE Receivers | DTSH | Delta -T Shale | 100.00 | uspf |
| WAVE Receivers | DTMT | Delta -T Matrix Type | User define | |

| | | | | | |
|---|---|---|---|---|---|
| | WAVE Receivers | DTMA | Delta -T Matrix | 47.60 | uspf |
| | WAVE Receivers | DTFL | Delta -T Fluid | 189.00 | uspf |
| | WAVE Receivers | RHOM | Matrix Density | 2.7100 | g/cc |
| | WAVE Receivers | RHOF | Fluid Density | 1.0000 | g/cc |
| | WAVE Receivers | SMTH | Semblance Threshold | 0.25 | |
| | WAVE Receivers | VPVS | VPVS Ratio for Porosity | 1.40 | |
| | WAVE Receivers | APEQ | Acoustic Porosity Equation | Wylie | |
| | WAVE Receivers | NAVS | Navigation Source Tool | XRMI-I Instrument | |
| | XRMI-I Instrument | WRTI | Survey Writing Interval | 30 | ft |
| | XRMI-I Instrument | SOPT | Smoothing Option | None | |
| | XRMI-I Mandrel | DIMG | Process XRMI? | Yes | |
| | XRMI-I Mandrel | ALMT | Image Alignment Method | AZIM | |
| | XRMI-I Mandrel | AGN | Use Button Auto Gain? | Yes | |
| | XRMI-I Mandrel | BCLR | Button Auto Gain Color | 127 | |
| | XRMI-I Mandrel | BFIL | Button Auto Gain Filter | 0.020 | |
| | XRMI-I Mandrel | BGAN | Button Gain Value | 0.001 | |
| | XRMI-I Mandrel | BOFF | Button Offset | 0 | |
| | XRMI-I Mandrel | DIPE | Process Dipmeter Calculations? | Yes | |
| | XRMI-I Mandrel | BHCS | Process Borehole Corrections? | Yes | |
| | XRMI-I Mandrel | BHSM | Borehole Size Source Tool | XRMI-I Mandrel | |
| | XRMI-I Mandrel | CLOK | Process Caliper Outputs? | Yes | |
| | XRMI-I Mandrel | CMAX | Caliper Maximum Limit | 100.0 | in |
| | XRMI-I Mandrel | CMIN | Caliper Mimimum Limit | 3.5 | in |
| | XRMI-I Mandrel | NAVS | Navigation Source Tool | XRMI-I Instrument | |
| | XRMI-I Mandrel | BHVC | Radius type for borehole volume calcuations | Elliptical | |
| | ACRt Sonde | RTOK | Process ACRt? | Yes | |
| | ACRt Sonde | MNSO | Minimum Tool Standoff | 1.50 | in |
| | ACRt Sonde | TCS1 | Temperature Correction Source | FP Lwr & FP Upr | |
| | ACRt Sonde | TPOS | Tool Position | Free Hanging | |
| | ACRt Sonde | RMOP | Rmud Source | Mud Cell | |
| | ACRt Sonde | RMIN | Minimum Resistivity for MAP | 0.20 | ohmm |
| | ACRt Sonde | RMIN | Maximum Resistivity for MAP | 200.00 | ohmm |
| | ACRt Sonde | THQY | Threshold Quality | 0.50 | |
| | ACRt Sonde | MRFX | Fixed mud resistivity | 2000 | ohmm |
| | ACRt Sonde | BHSM | Borehole Size Source Tool | XRMI-I Mandrel | |
| BOTTOM | | | | | |

**Data: SKYLER_RAE_SWD_\0001 RED_TRIPLE_CSNG_WSTT_XRMI\007 04-Dec-14 03:30 Up @5530.3f** **Date: 04-Dec-14 04:11:30**

HALLIBURTON

# CALIBRATION REPORT

## NATURAL GAMMA RAY TOOL SHOP CALIBRATION

**Tool Name:** GTET - 11021139 **Reference Calibration Date:** 01-Jan-70 00:00:00

**Engineer:** CHRIS MARLOWE **Calibration Date:** 02-Dec-14 22:57:07

| | | | |
|---|---|---|---|
| **Software Version:** | **WL INSITE R4.2.0 (Build 2)** | **Calibration Version:** | **1** |

Calibrator Source S/N: 181

Calibrator API Reference:234.00 api

Equivalent Calibrator API Reference:238.1 api

| Measurement | Measured | Calibrated | Units |
|---|---|---|---|
| Background | 33.7 | 33.7 | api |
| Background + Calibrator | 271.8 | 271.8 | api |
| Calibrator | 238.1 | 238.1 | api |

## NATURAL GAMMA RAY TOOL FIELD CALIBRATION

| | | | |
|---|---|---|---|
| **Tool Name:** | **GTET - 11021139** | **Reference Calibration Date:** | **02-Dec-14 22:57:07** |
| **Engineer:** | **CHRIS MARLOWE** | **Calibration Date:** | **02-Dec-14 23:00:45** |
| **Software Version:** | **WL INSITE R4.2.0 (Build 2)** | **Calibration Version:** | **1** |

Calibrator Source S/N: 181

Calibrator API Reference:234.00 api

Equivalent Calibrator API Reference:238.1 api

| Field Verification | Shop | Field | Units |
|---|---|---|---|
| Background | 33.7 | 33.1 | api |
| Background + Calibrator | 271.8 | 268.9 | api |
| Calibrator | 238.1 | 235.8 | api |

| Shop | Field | Difference | Tolerance |
|---|---|---|---|
| 238.1 | 235.8 | 2.3 | +/- 9.00 |

## ARRAY COMPENSATED TRUE RESISTIVITY SHOP CALIBRATION

| | | | |
|---|---|---|---|
| **Tool Name:** | **ACRt Sonde - 11335202** | **Reference Calibration Date:** | **25-Jun-14 16:39:28** |
| **Engineer:** | **JOHN BOEVERS** | **Calibration Date:** | **10-Nov-14 16:47:07** |
| **Software Version:** | **WL INSITE R4.2.0 (Build 2)** | **Calibration Version:** | **1** |
| **Host Tool Name:** | **ACRt Instrument - 11302822** | | |

### TYPICAL GAIN RANGE

| Subarray | R12KHz | | | R36KHz | | | R72KHz | | |
|---|---|---|---|---|---|---|---|---|---|
| | Lower | (mmho/m) | Upper | Lower | (mmho/m) | Upper | Lower | (mmho/m) | Upper |
| A1 (80") | 0.95 | 1.0513 | 1.05 | 0.95 | 1.0308 | 1.05 | 0.95 | 1.0231 | 1.05 |
| A2 (50") | 0.95 | 1.0472 | 1.05 | 0.95 | 1.0286 | 1.05 | 0.95 | 1.0231 | 1.05 |
| A3 (29") | 0.95 | 1.0527 | 1.05 | 0.95 | 1.0334 | 1.05 | 0.95 | 1.0266 | 1.05 |
| A4 (17") | 0.95 | 1.0428 | 1.05 | 0.95 | 1.0183 | 1.05 | 0.95 | 1.0125 | 1.05 |
| A5 (10") | N/A | N/A | N/A | 0.95 | 1.0100 | 1.05 | 0.95 | 1.0041 | 1.05 |
| A6 (6") | N/A | N/A | N/A | 0.95 | 1.0198 | 1.05 | 0.95 | 1.0134 | 1.05 |

### SONDE OFFSET

| Subarray | R12KHz | R36KHz | R72KHz |
|---|---|---|---|
| | (mmho/m) | (mmho/m) | (mmho/m) |
| A1 (80") | 3.526 | -2.776 | -6.236 |
| A2 (50") | 0.018 | -4.338 | -4.358 |
| A3 (29") | -11.828 | -4.381 | -3.137 |
| A4 (17") | -100.046 | -31.094 | -25.736 |
| A5 (10") | N/A | -106.582 | -51.220 |
| A6 (6") | N/A | 339.348 | 170.119 |

### TRANSMITTER CURRENT GAIN

| Signal | Lower | R | Upper |
|---|---|---|---|

### R-MUD VERIFICATION

| Signal | Lower | Measured | Upper |
|---|---|---|---|

| | | | |
|---|---|---|---|
| 12K | 0.6 | 0.90 | 1.3 |
| 36K | 1.0 | 1.83 | 2.0 |
| 72K | 1.0 | 1.12 | 2.0 |

| | (ohm-m) | (ohm-m) | (ohm-m) |
|---|---|---|---|
| Mud Cell | 0.95 | 1.00 | 1.05 |

| PASS/FAIL SUMMARY | |
|---|---|
| GAIN RANGE CHK | FAIL |
| SONDE OFFSET CHK | PASS |

TOOL OUT OF TOLERANCE

## CALIBRATION SUMMARY

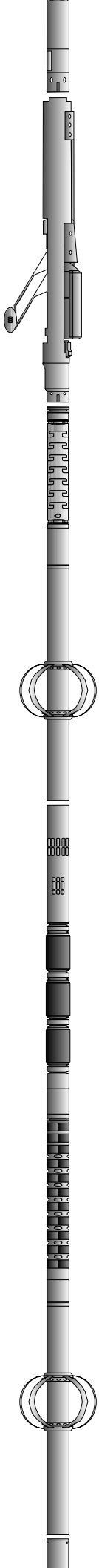
| Sensor | Shop | Field | Post | Difference | Tolerance | Units |
|---|---|---|---|---|---|---|
| **GTET-11021139** | | | | | | |
| Gamma Ray Calibrator | 238.1 | 235.8 | ---------- | 2.3 | +/- 9.00 | api |
| **ACRt Sonde-11335202** | | | | | | |
| Mud Cell | 1.00 | ---------- | ---------- | 0.00 | ---------- | ohm-m |

**Data: SKYLER_RAE_SWD_\0001 RED_TRIPLE_CSNG_WSTT_XRMI\007 04-Dec-14 03:30 Up @5530.3f** **Date: 04-Dec-14 04:26:44**

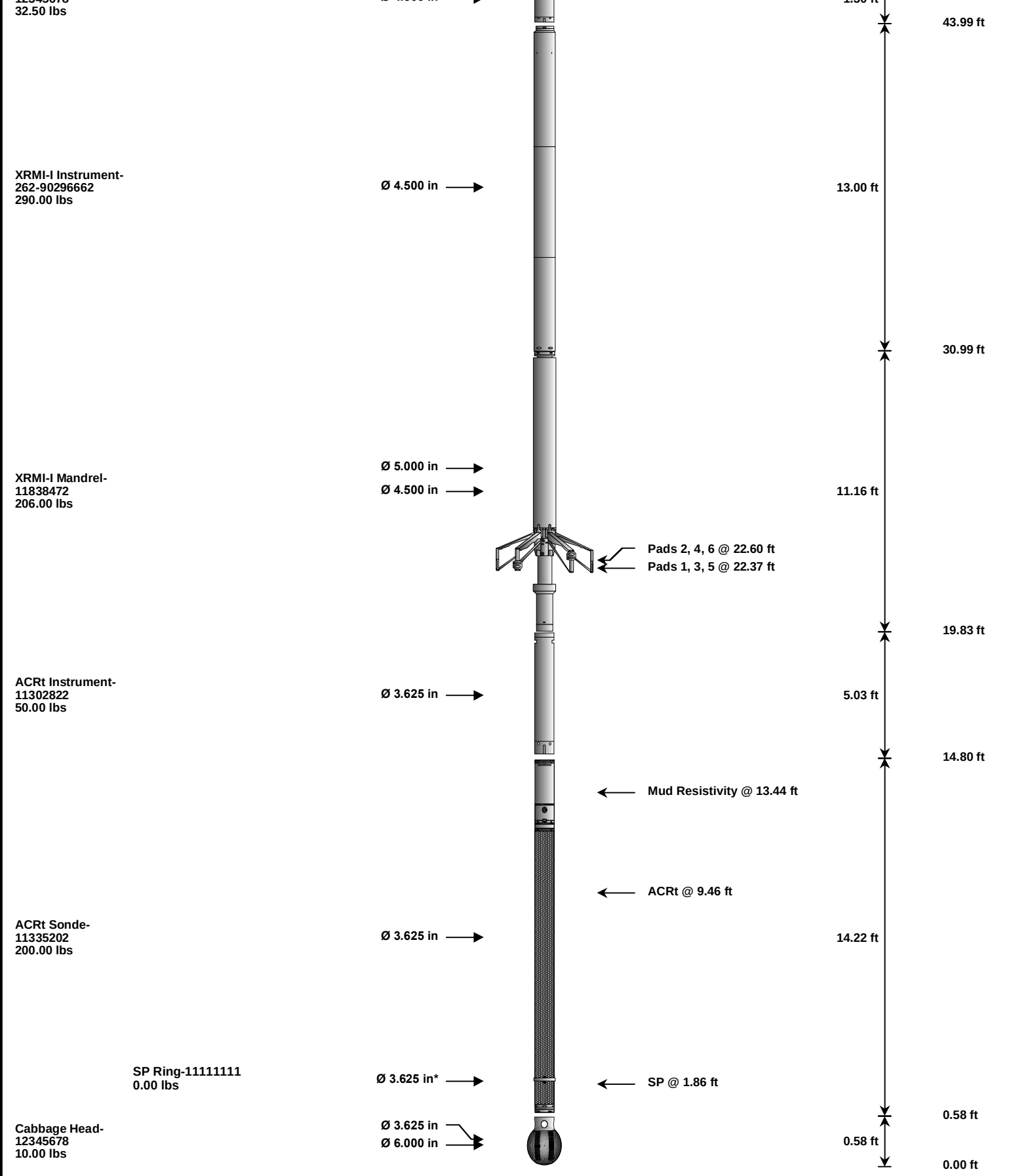
HALLIBURTON

## TOOL STRING DIAGRAM REPORT

| Description | Overbody Description | O.D. | Diagram | Sensors @ Delays | Length | Accumulated Length |
|---|---|---|---|---|---|---|
| | | | | | | 126.26 ft |
| CH_HOS-RED<br>37.50 lbs | | Ø 2.750 in | | ← Temperature @ 125.23 ft | 3.03 ft | |
| | | | | | | 123.23 ft |
| XOHD-12345678<br>20.00 lbs | | Ø 2.750 in<br>Ø 3.625 in | | | 0.95 ft | |
| | | | | | | 122.28 ft |
| GTET-11021139<br>165.00 lbs | | Ø 3.625 in | | ← GammaRay @ 116.22 ft | 8.52 ft | |
| | | | | | | 113.76 ft |
| CSNG-10836164<br>114.00 lbs | UnivWearRing3.6-10836164<br>5.00 lbs | Ø 4.200 in*<br>Ø 3.625 in | | ← CSNG @ 108.13 ft | 8.17 ft | |
| | | | | | | 105.59 ft |
| DSNT-11020487<br>174.00 lbs | DSN Decentralizer-11020487<br>6.60 lbs | Ø 5.000 in*<br>Ø 3.625 in | | | 9.69 ft | |



DSN Far @ 98.66 ft
DSN Near @ 97.91 ft
95.91 ft
SDLT-10960494
360.00 lbs
Ø 4.500 in
SDLT Pad-10844774
65.00 lbs
Microlog Pad-10960494
8.00 lbs
Ø 4.750 in*
Ø 4.750 in*
10.81 ft
Microlog @ 88.09 ft
SDL Caliper @ 87.91 ft
SDL @ 87.90 ft
85.09 ft
Flex Joint-12345678
140.00 lbs
Ø 3.625 in
5.67 ft
79.42 ft
WAVE Upper Electronics-00000000
151.50 lbs
Centralizer 25-12345678
8.00 lbs
Ø 3.625 in
Ø 4.000 in*
8.33 ft
71.09 ft
WAVE Trans-Isolator - Std-00000001
277.00 lbs
Ø 3.625 in
10.88 ft
60.21 ft
WAVE Receivers-10650265
135.00 lbs
Ø 3.625 in
Wavesonic Delay @ 56.79 ft
6.67 ft
53.54 ft
WAVE Lower Electronics-00000000
146.50 lbs
Centralizer 25-11111111
8.00 lbs
Ø 4.000 in*
Ø 3.625 in
8.25 ft
45.29 ft
XRMI Isolator-12345678
Ø 4.500 in
1.30 ft




| Mnemonic | Tool Name | Serial Number | Weight (lbs) | Length (ft) | | Accumulated Length (ft) | Max.Log. Speed (fpm) |
|---|---|---|---|---|---|---|---|
| CH_HOS | Hostile Cable Head with Load Cell | RED | 37.50 | 3.03 | | 123.23 | 300.00 |
| XOHD | Hostile to Dits Cross Over | 12345678 | 20.00 | 0.95 | | 122.28 | 300.00 |
| GTET | Gamma Telemetry Tool | 11021139 | 165.00 | 8.52 | | 113.76 | 60.00 |
| CSNG | Compensated Spectral Natural Gamma | 10836164 | 114.00 | 8.17 | | 105.59 | 15.00 |
| UWR3P6 | Universal Wear Ring 3 5-8 inch | 10836164 | 5.00 | 0.35 | * | 109.67 | 300.00 |
| DSNT | Dual Spaced Neutron | 11020487 | 174.00 | 9.69 | | 95.91 | 60.00 |
| DCNT | DSN Decentralizer | 11020487 | 6.60 | 5.13 | * | 99.24 | 300.00 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| SDLT | Spectral Density Tool | 10960494 | 360.00 | 10.81 | | 85.09 | 60.00 |
| SDLP | Density Insite Pad | 10844774 | 65.00 | 2.55 | * | 87.30 | 60.00 |
| MICP | Microlog Pad | 10960494 | 8.00 | 1.00 | * | 87.59 | 60.00 |
| FLEX | Flex Joint | 12345678 | 140.00 | 5.67 | | 79.42 | 300.00 |
| WSTT | WAVE Transmitter Electronics - Insite | 00000000 | 151.50 | 8.33 | | 71.09 | 100.00 |
| OBCEN | Centralizer - 25 in. Overbody | 12345678 | 8.00 | 2.08 | * | 74.00 | 300.00 |
| WTIS | WAVE Standard Transmitter - Standard Isolator | 00000001 | 277.00 | 10.88 | | 60.21 | 100.00 |
| WSTT | WAVE Receiver Section - Offset Dipole | 10650265 | 135.00 | 6.67 | | 53.54 | 30.00 |
| WSTT | WAVE Lower Electronics - Insite | 00000000 | 146.50 | 8.25 | | 45.29 | 100.00 |
| OBCEN | Centralizer - 25 in. Overbody | 11111111 | 8.00 | 2.08 | * | 49.00 | 300.00 |
| | Isolator for the XRMI tool | 12345678 | 32.50 | 1.30 | | 43.99 | 300.00 |
| XRMI | XRMI Navigation - Insite | 262-90296662 | 290.00 | 13.00 | | 30.99 | 30.00 |
| XRMI-I | XRMI Imager - Insite | 11838472 | 206.00 | 11.16 | | 19.83 | 30.00 |
| ACRt | Array Compensated True Resistivity Instrument Section | 11302822 | 50.00 | 5.03 | | 14.80 | 120.00 |
| ACRt | Array Compensated True Resistivity Sonde Section | 11335202 | 200.00 | 14.22 | | 0.58 | 120.00 |
| SP | SP Ring | 11111111 | 0.00 | 0.25 | * | 1.86 | 300.00 |
| CBHD | Cabbage Head | 12345678 | 10.00 | 0.58 | | 0.00 | 300.00 |
| **Total** | | | **2,609.60** | **126.26** | | | |

* Not included in Total Length and Length Accumulation.

**Data: SKYLER_RAE_SWD_\0001 RED_TRIPLE_CSNG_WSTT_XRMI\007 04-Dec-14 03:30 Up @5530.3f** **Date: 04-Dec-14 04:11:58**

| | |
|---|---|
| COMPANY | **SANDRIDGE ENERGY INC** |
| WELL | **SKYLER RAE SWD 3505 1-3** |
| FIELD | **WILLTEX NORTH** |
| COUNTY | **HARPER** STATE **KS** |

HALLIBURTON

**ARRAY COMPENSATED TRUE RESISTIVTY LOG**