



**All interpretations of log data are opinions based on inferences from electrical or other measurements. Weatherford International does not guarantee the accuracy or correctness of any interpretation or recommendation and we shall not be liable or responsible for any loss, cost, damages or expenses incurred or sustained by anyone resulting from any interpretation or recommendation made by any of our employees or agents.**

## RUN SUMMARY

<b>LWD Run Number</b>		<b>1</b>					
Bit Size	in.	8.750					
Bit Type		PDC					
Bit TFA	sq.in.	0.663					
Bit Start Depth	ft	4497					
Bit End Depth	ft	5444					
Top Log Interval	ft	4450					
Bottom Log Interval	ft	5436					
Begin Log Time	hrs	11:40					
Begin Log Date	DD-MMM-YY	10-Sep-12					
End Log Time	hrs	15:47					
End Log Date	DD-MMM-YY	10-Sep-12					
Drill or Wipe		Wipe					
Flow Rate	gal/min	350					
Max AV / CV @ MWD	ft/min	316 / 354					
Min Inc @ Depth	deg @ ft	0.62 @ 5291					
Max Inc @ Depth	deg @ ft	0.97 @ 3186					
<b>MUD DATA</b>							
Depth	ft	5444					
Fluid Type		WBM					
Mud Weight	ppg	9.65					
Plastic Viscosity	cP	14					
Solids / Sand	%	5.10 / 0.20					
NaCl Equiv. Chlorides	ppm	44000					
pH		8					
Oil:Water Ratio	% Vol	0 :100					
Rm @ Temperature	ohm-m @ deg F	0.76 @ 78					
Rmc @ Temperature	ohm-m @ deg F	0.53 @ 81					
Rmf @ Temperature	ohm-m @ deg F	0.65 @ 83					
KCl	% Vol	0					
Client Representative		B.Johnson					
WeatherfordLWD Engineer		R.Cruz					

## EQUIPMENT SUMMARY

<b>LWD Run Number</b>		<b>1</b>				
HEL Serial Number		NW21933PDBBI6.75				
MFR Serial Number		NW21938RBK6.75				
TNP-AZD Serial Number		NW21937NZBB6.75				
Density Source Serial Number		42299B				
Neutron Source Serial Number		8144B				
<b>Sensor to Bit Offsets / Acquisition Rates</b>						
Directional	ft / sec	64.02 / RT				
Gamma Ray	ft / sec	8.36 / 5				
Resistivity	ft / sec	17.93 / 5				
Density	ft / sec	38.62 / 5				
Neutron Porosity	ft / sec	46.59 / 5				
<b>Other Information</b>						
Total BHA Length	ft	116.68				
BHA Assembly Type		Rotary				
Run Circulating Time	hr	9.55				
Run Drilling Time	hr	0.00				

## MUD SUMMARY

Date and Time	Run	Bit Depth	Mud Weight	% K	Rm @ Temp	Rmf @ Temp	Rmc @ Temp	BHCT
10 Sep 12 @ 00:00	01	5444 ft	9.65 ppg	0	0.76 ohm-m @ 78 F	0.53 ohm-m @ 81 F	0.65 ohm-m @ 83 F	109 F

## LWD RUN REMARKS

**Run Number:** 1 :: RECORDED DATA LOG

**WFT Services Provided:**

Recorded and Real Time Logging: Gamma Ray, Deep, Medium and Shallow Resistivity, Bulk Density, Neutron Porosity, Photoelectric effect and Temperature.

Directional Services: On demand Inclination and Azimuth.

**Borehole and Environmental Correction:**

Hole Size: 8.750 in.

Mud Weight: 9.65 ppg

Borehole Temperature: 109° F

Standard Temperature: 78° F

Mud Salinity NaCl Equiv: 44000 ppm

Mud Type: WBM

Matrix Processing: Limestone (2.71 g/cc)

Drilling Fluid Resistivity: 0.76 ohm-m @ 78 F

KCl Concentration: 0%

**Gamma Ray:** Corrected for mud weight, hole size and KCl concentration.

**Resistivities:** Corrected for borehole temperature, hole size, drilling fluid resistivity and dielectric correction.

**Bulk Density:** No corrections.

**Neutron Porosity:** Corrected for mud type, mud salinity, mud weight, hole size, standard temperature and processed using a LIMESTONE matrix.

## LWD LOG COMMENTS

**Comment No. 1-1**

RECORDED DATA LOG

Start of LWD Wipe Run 01

Weatherford International provided 6 3/4 in. Directional, Resistivity, Gamma Ray, Bulk Density, Neutron Porosity, Photoelectric effect and Temperature for Run 01.

Run 01 started formation wiping September 10, 2012 at 11:40 at 4497 MD / 4496 TVD. Weatherford International logged the 8.750 in. borehole.

The WBM at the start of wiping was 9.65 ppg.

**Comment No. 1-2**

End of LWD Wipe Run 01

Run 01 ended wiping formation September 10, 2012 at 15:47 at 5444 MD / 5443 TVD.

The WBM at the start of wiping was 9.65 ppg.

## CURVE SPECIFICATIONS

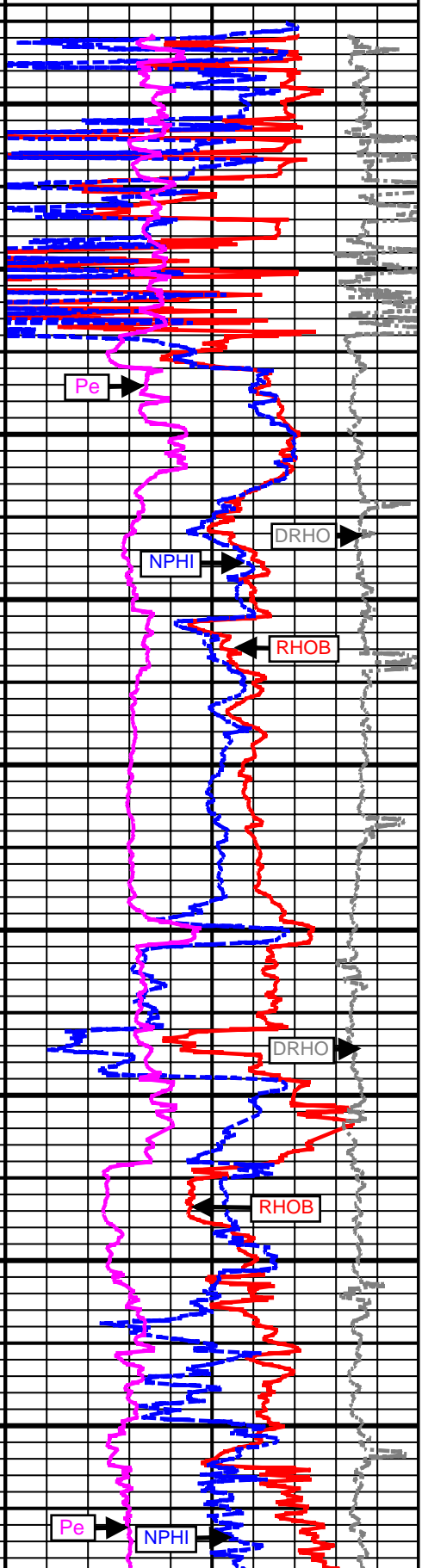
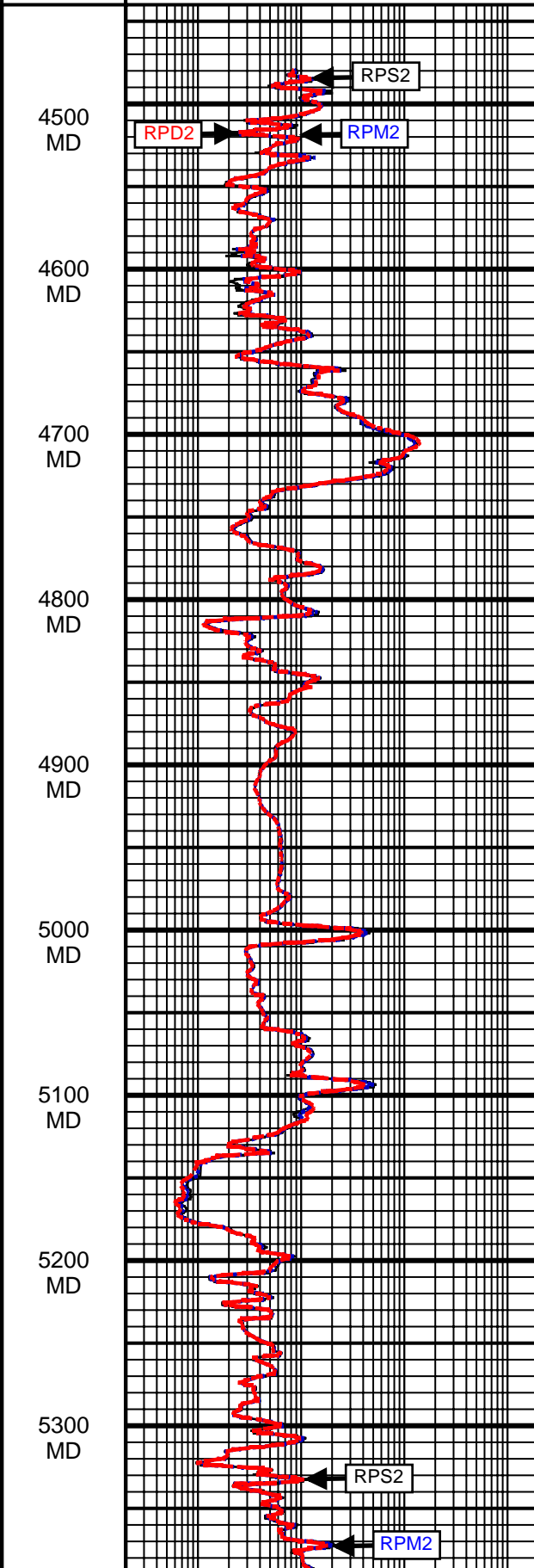
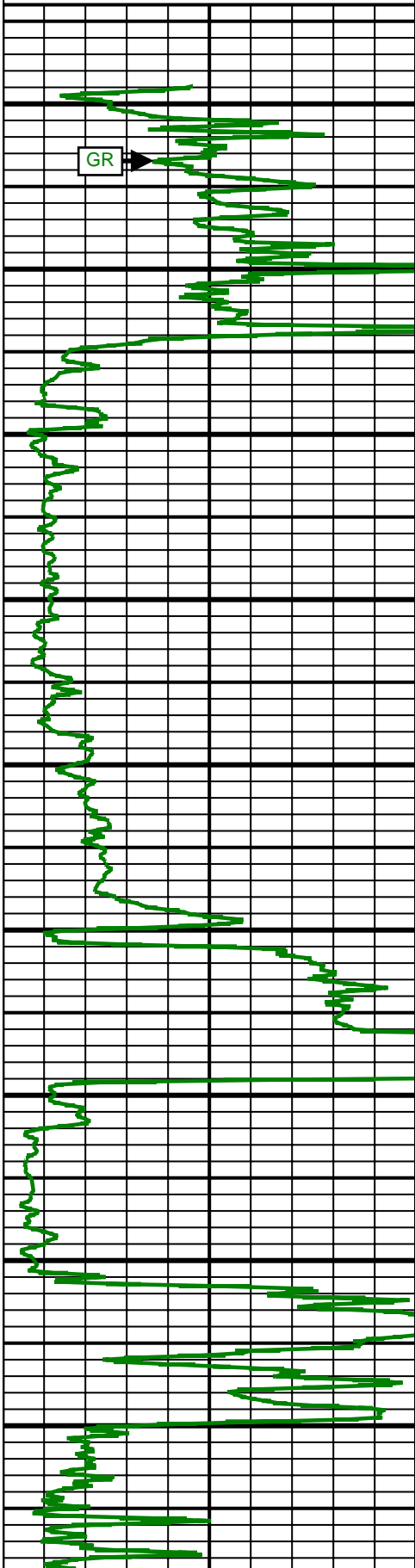
CURVE TYPE	MNEMONIC	UNITS	COMMENTS	CORRECTIONS
Gamma Ray	GR	AAPI	Gamma Ray 3.0 ft window 0.5 ft Exponential Smoothing	See LWD Run Remarks
Deep Phase Resistivity	RPD2	ohm-m	2MHz Deep Phase Resistivity 3.0 ft window 0.5 ft Exponential Smoothing	See LWD Run Remarks
Medium Phase Resistivity	RPM2	ohm-m	2MHz Medium Phase Resistivity 3.0 ft window 0.5 ft Exponential Smoothing	
Shallow Phase Resistivity	RPS2	ohm-m	2MHz Shallow Phase Resistivity 3.0 ft window 0.5 ft Exponential Smoothing	
Bulk Density	RHOB	g/cc	Bulk Density 3.0 ft window 0.5 ft Exponential Smoothing	None
Delta RHO	DRHO	g/cc	Spine and Rib Correction 3.0 ft window 0.5 ft Exponential Smoothing	
Thermal Neutron Porosity	NPHI	PU	Neutron Porosity 3.0 ft window 0.5 ft Exponential Smoothing	See LWD Run Remarks
Photoelectric Effect Factor	PE	B/E	Recorded Near Pe Count Rate 3.0 ft window 0.5 ft Exponential Smoothing	None

**1 Inch - Measured Depth**

GR		
0	(AAPI)	150

0.2	(ohm-m)	2000	RPS2
RPM2			
0.2	(ohm-m)	2000	RPD2
RPM2			
0.2	(ohm-m)	2000	RPS2

RHOB		
1.95	(g/cc)	2.95
NPHI		
45	(PU)	-15
DRHO		
-0.8	(g/cc)	0.2
Pe		
0	(B/E)	10



4500 MD

4600 MD

4700 MD

4800 MD

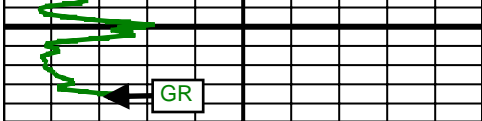
4900 MD

5000 MD

5100 MD

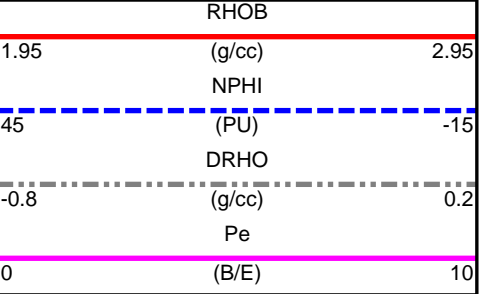
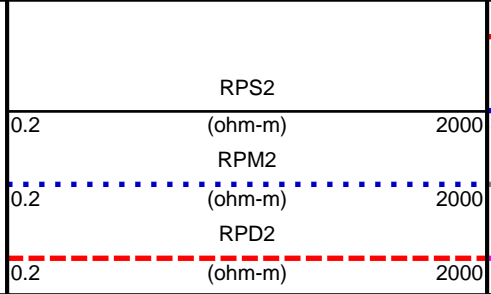
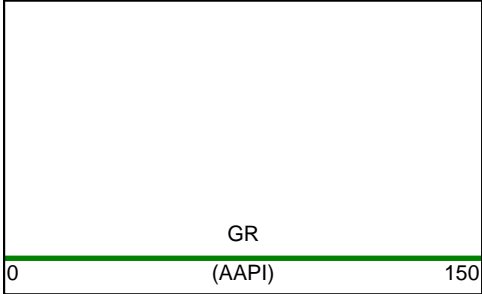
5200 MD

5300 MD



5400  
MD

RPD2

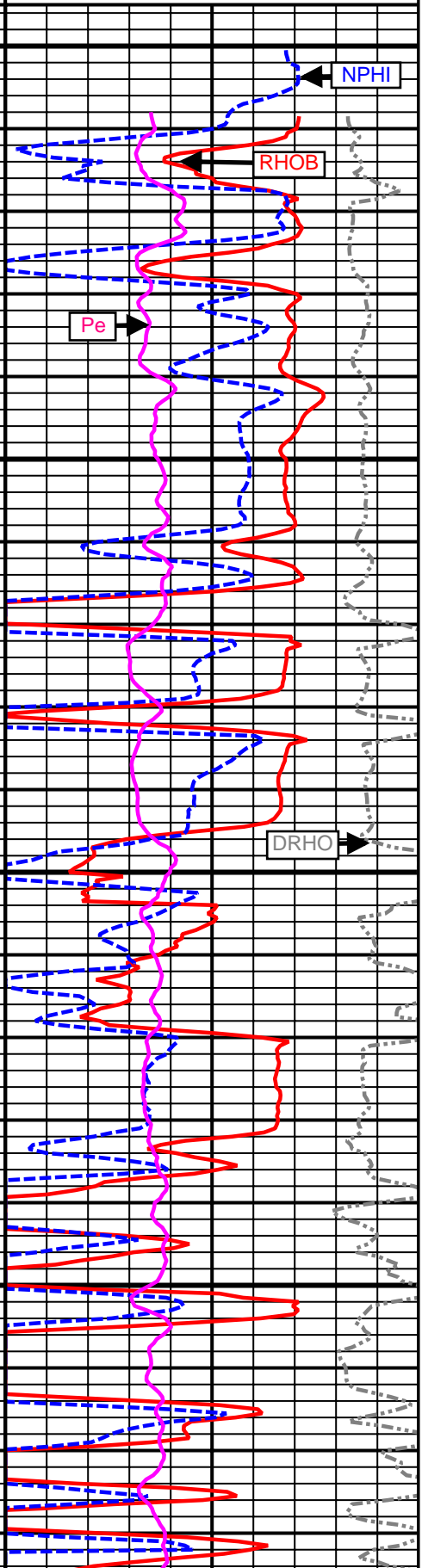
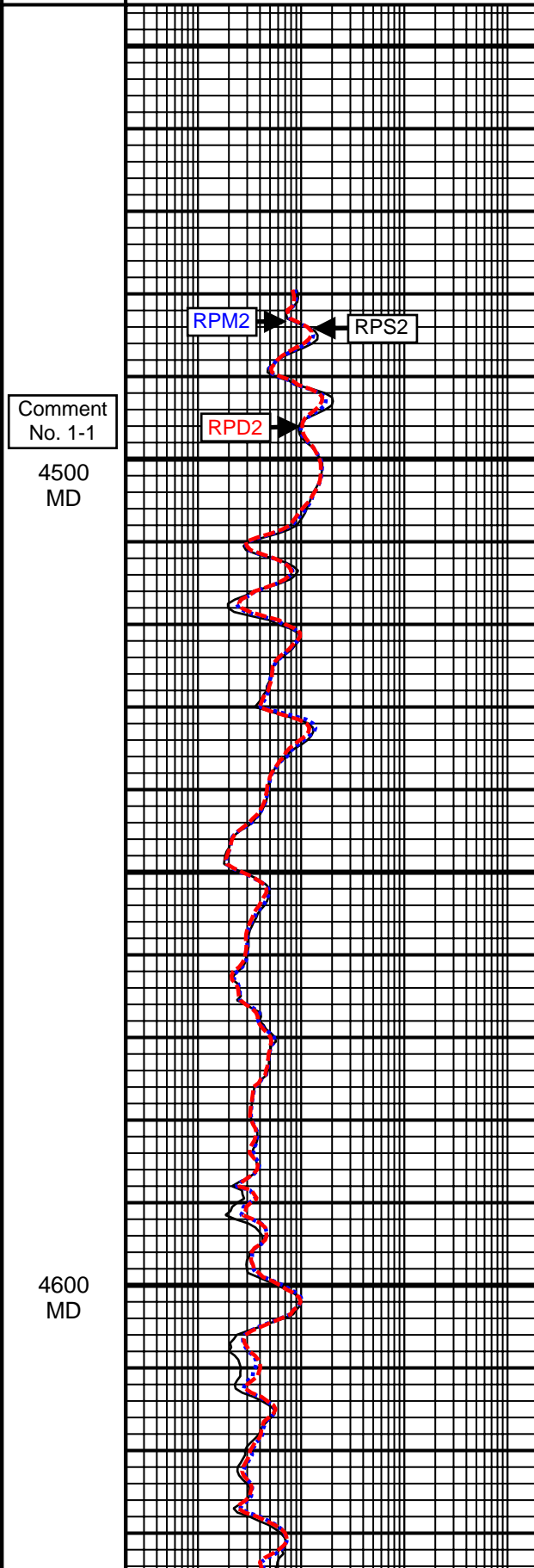
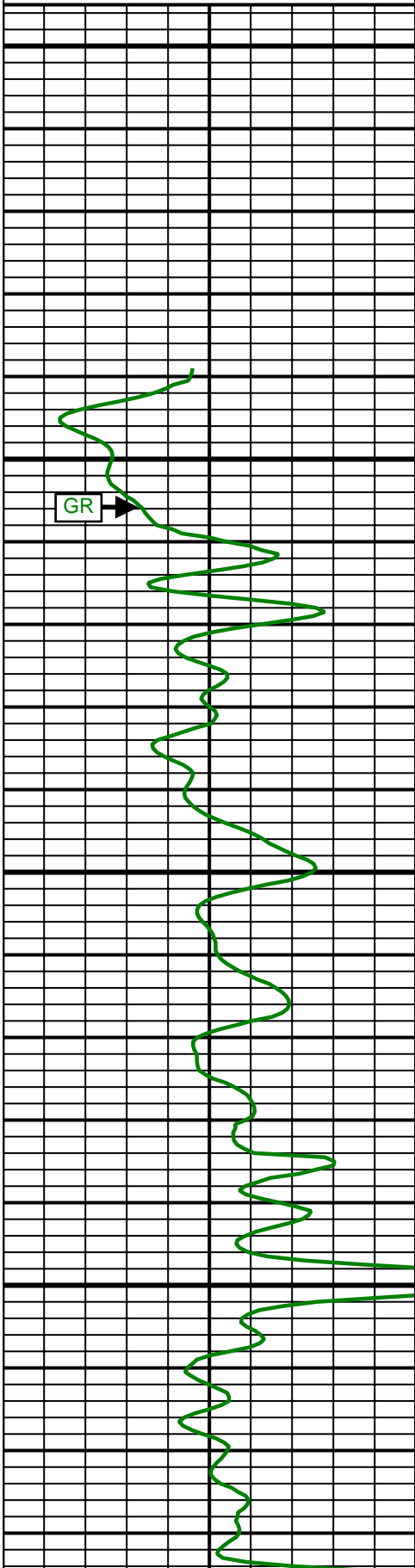


**5 Inch - Measured Depth**

GR		
0	(AAPI)	150

0.2	(ohm-m)	2000
RPM2		
0.2	(ohm-m)	2000
RPD2		
0.2	(ohm-m)	2000

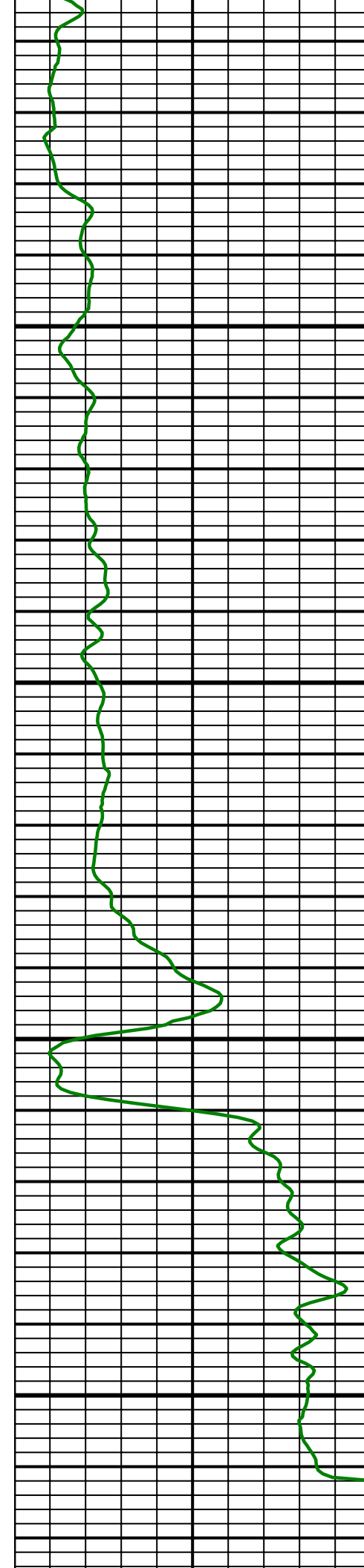
RHOB		
1.95	(g/cc)	2.95
NPHI		
45	(PU)	-15
DRHO		
-0.8	(g/cc)	0.2
PE		
0	(B/E)	10



Comment  
No. 1-1  
4500  
MD

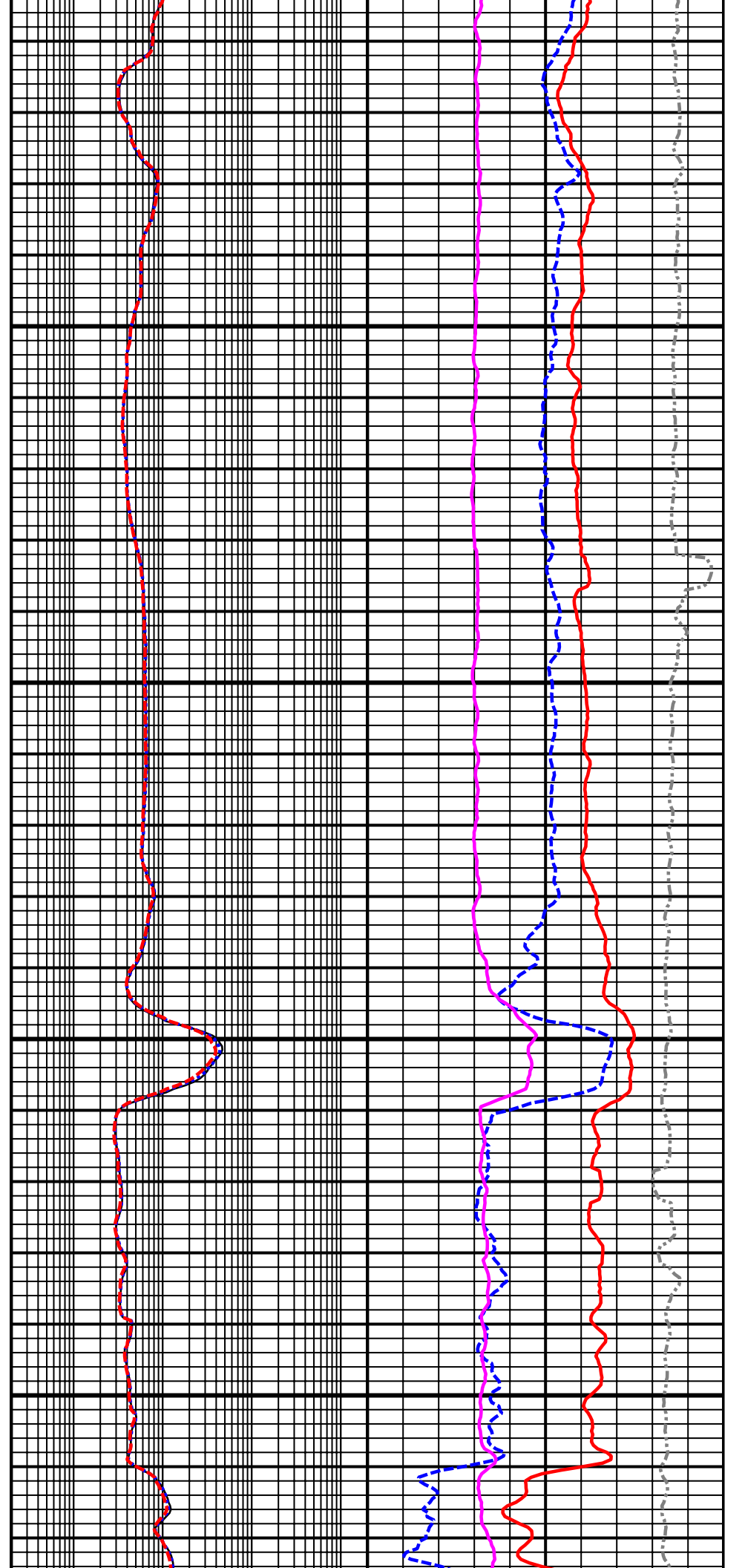
4600  
MD

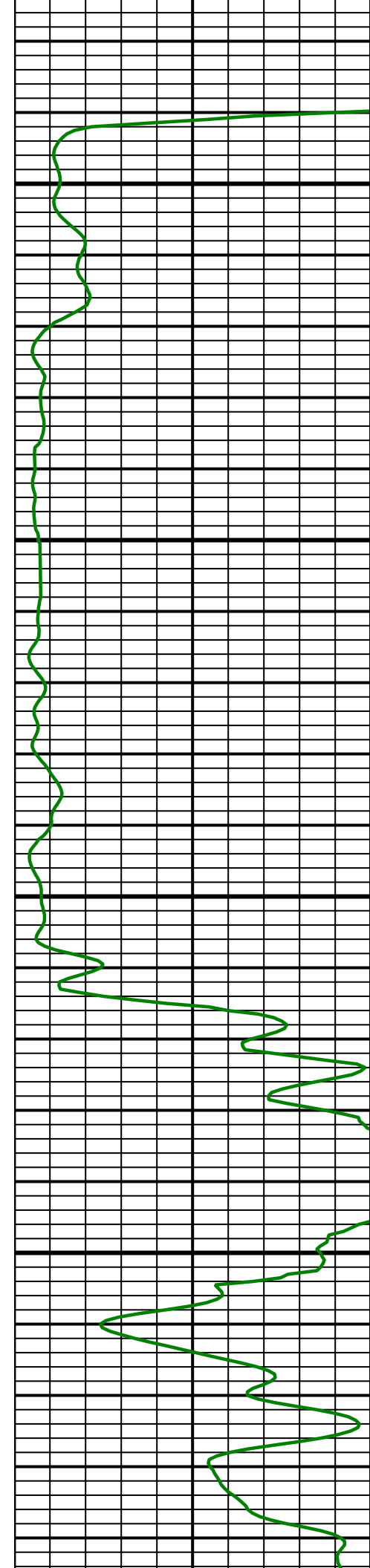




4900  
MD

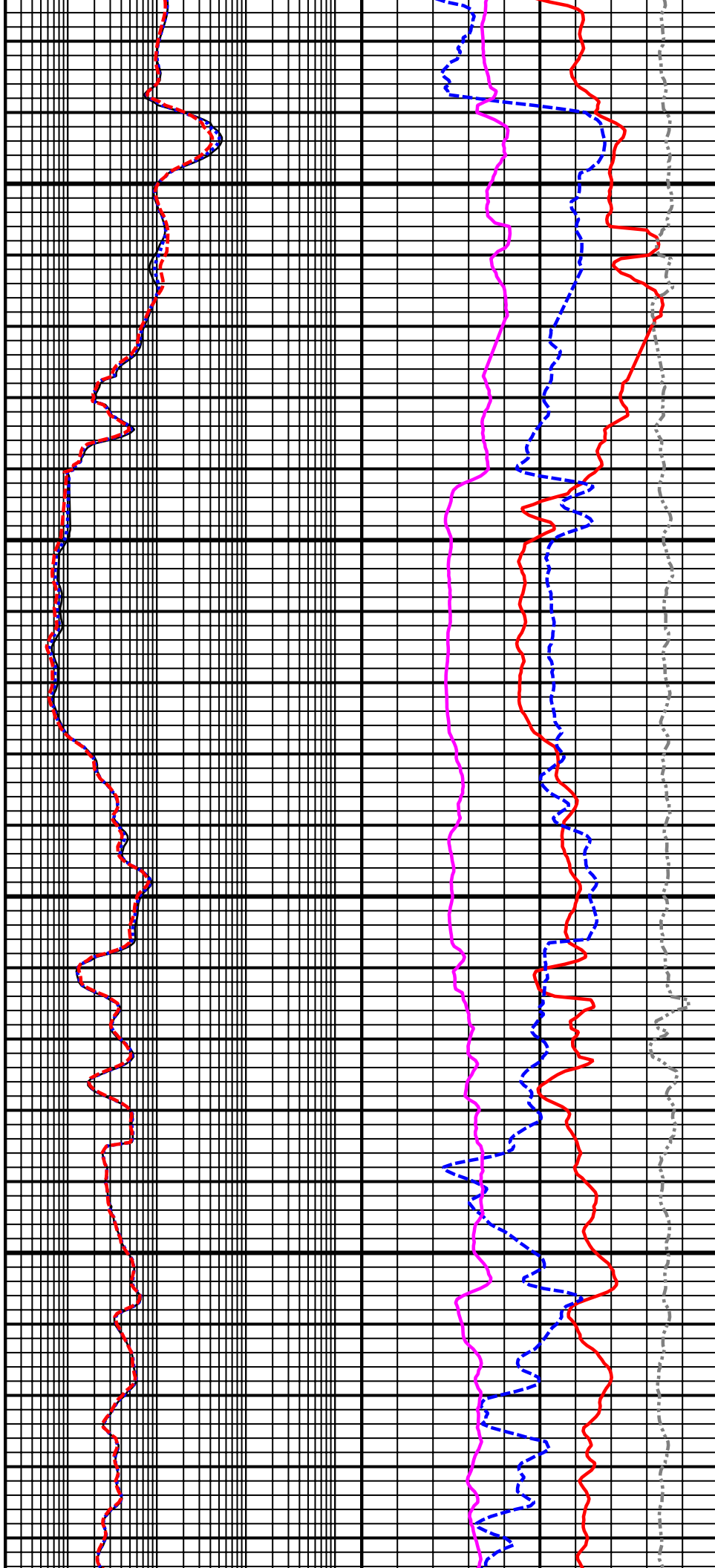
5000  
MD

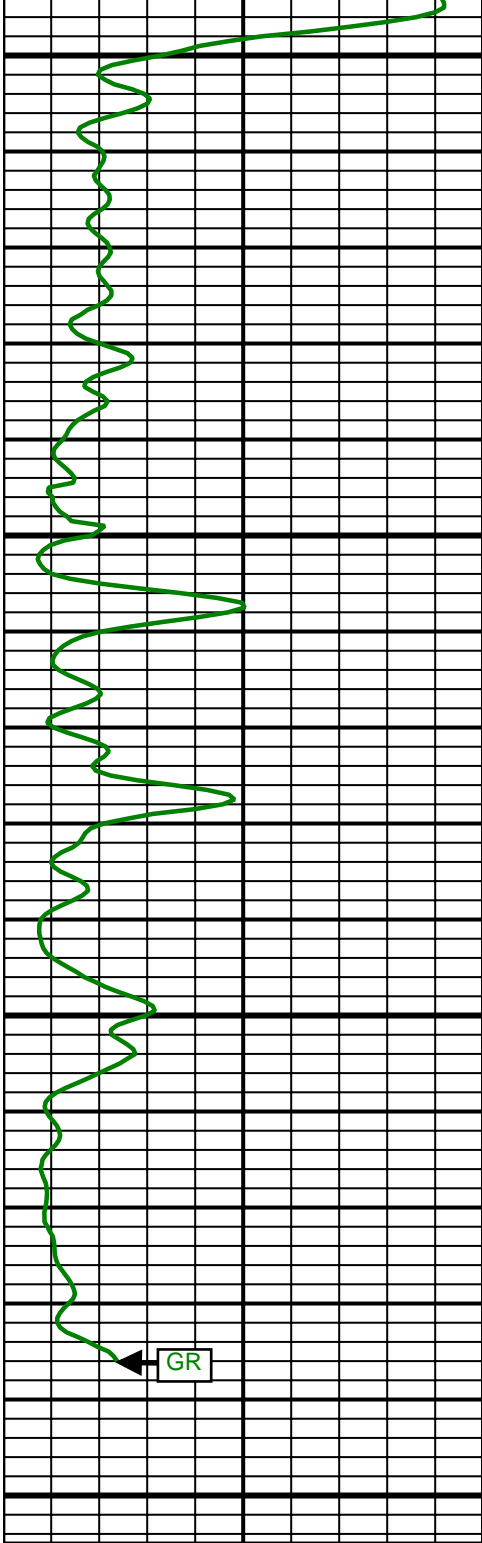




5100  
MD

5200  
MD

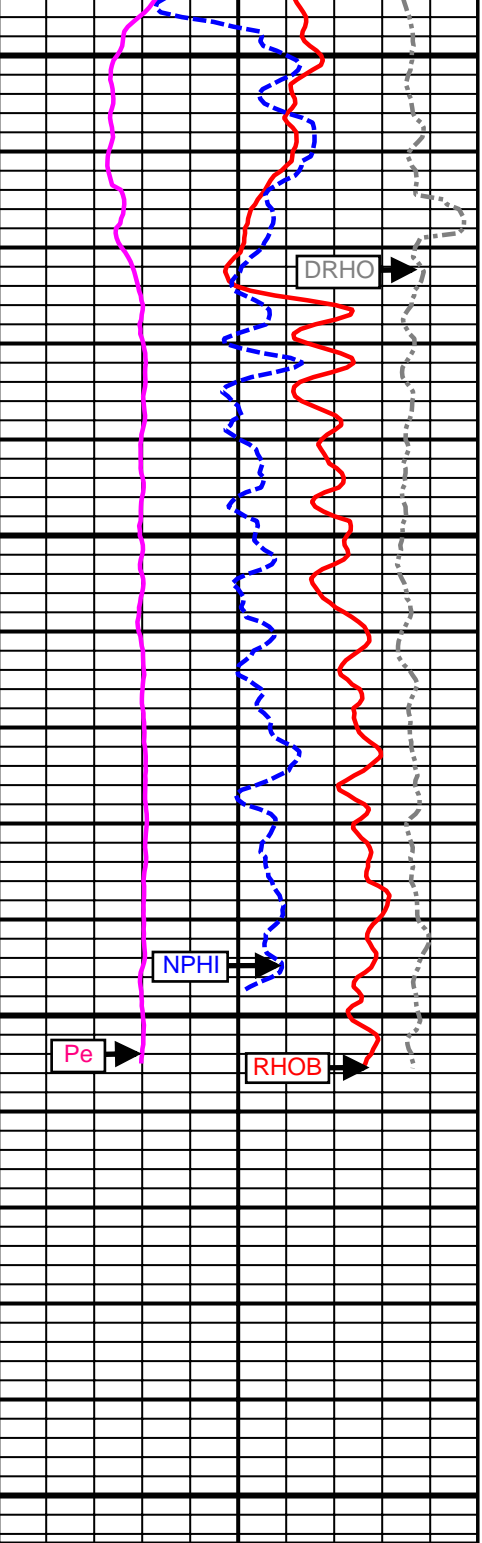
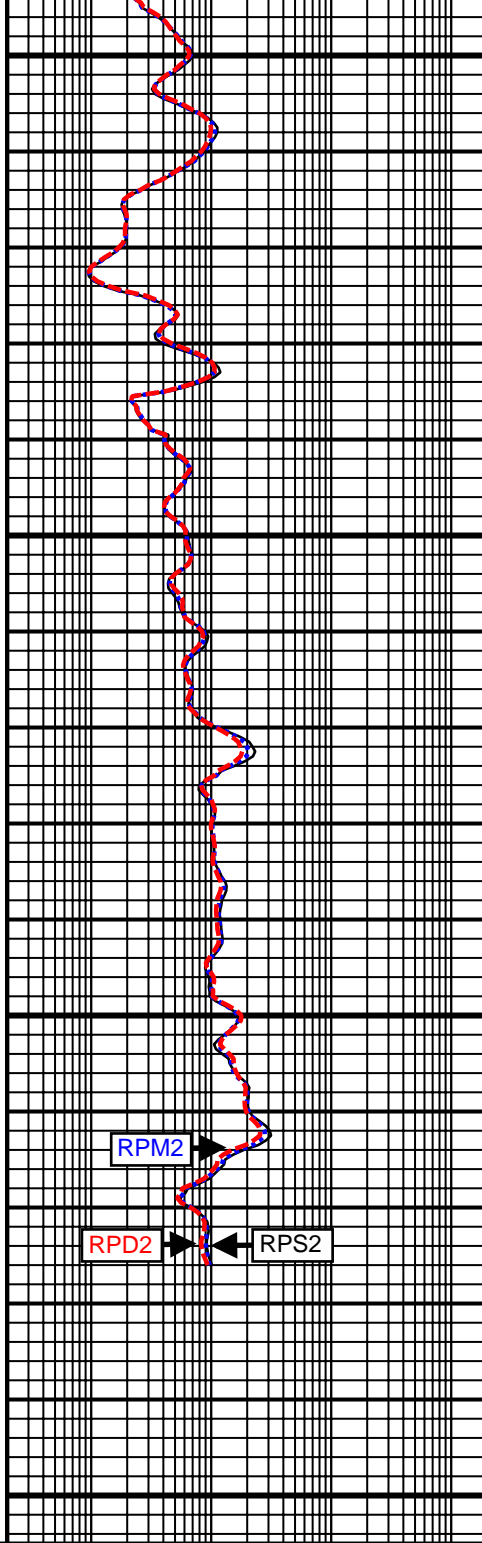




5300 MD

5400 MD

Comment No. 1-2



	RPS2		
0.2	(ohm-m)	2000	45
	RPM2		
0.2	(ohm-m)	2000	-0.8
	RPD2		
0.2	(ohm-m)	2000	0

	RHOB		
1.95	(g/cc)		2.95
	NPHI		
45	(PU)		-15
	DRHO		
-0.8	(g/cc)		0.2
	PE		
0	(B/E)		10

# AZD Density and Pe Calibration

All count rates are corrected for deadtime, without background subtraction.

Tool Serial Number: 4231	Stabilizer blade: 8.25 in.	Aluminum Block: AL03
Insert Serial Number: 33787	Calibration Date: Jun 1, 2012	Magnesium Block: MG03
Source Serial Number: 42299B	Calibration Time: 02:39:21 PM	Run Numbers:

Near Detector	Background	Al with Source	Al + SST with source	Mg with Source	Units
Peak (214-216):	214.820 214   █   216	214.793 214   █   216	214.767 214   █   216	215.563 214   ███   216	Ch
Resolution (5-13.5%):	10.574 5   █   13.5	10.559 5   █   13.5	10.002 5   █   13.5	9.978 5   █   13.5	%
HV:	845.184 600   █   1300	845.715 600   █   1300	848.193 600   █   1300	849.609 600   █   1300	V
Density:	523.343	11946.590	11107.070	18004.990	CPS
Pe:	111.826	3243.061	2694.323	4767.703	CPS
Source:	239.051 150   █   300	265.801	265.918	272.851	CPS




Far Detector	Background	Al with Source	Al + SST with source	Mg with Source	Units
Peak (214-216):	215.347 214   ███   216	215.037 214     216	214.633 214   ███   216	214.333 214   ███   216	Ch
Resolution (5-13.5%):	8.722 5   █   13.5	8.771 5   █   13.5	8.976 5     13.5	9.303 5     13.5	%
HV:	875.806 600   █   1300	874.390 600   █   1300	876.691 600   █   1300	876.337 600   █   1300	V
Density:	171.427	1102.968	844.834	6985.797	CPS
Pe:	34.166	189.464	135.707	1242.165	CPS
Source:	148.715 100     200	149.316	148.663	154.924	CPS

Results	Near Density	Far Density	Near Pe	Far Pe	
Slope:	-0.4702 -0.56   █   -0.43	-2.2022 -2.26   █   -2.16	4.6611 0.1   █   10	10.1690	
Offset:	10.5621	12.5369	-0.9179 -3   █   0.1	-1.3356	

# TNP Neutron Calibration

All count rates are corrected for deadtime.

Tool Serial Number:	4231	Collar Diameter:	7.19 in.	Calibrator Number:	RD9THIN
Insert Serial Number:	33722	Calibration Date:	Jun 1, 2012	Verifier Number:	RD9THICK
Source Serial Number:	6909B (AmBe)	Calibration Time:	03:43:50 PM	Run Numbers:	

	Calibration Pipe	Verification Pipe	Units
Near Count Rate:	631.600	840.540	CPS
Far Count Rate:	39.890	68.780	CPS
Ratio:	15.832	12.220	
Assigned Ratio:	16.440	12.400	
Calibration Factor:	1.038		
	0.95      1.05		
Calibrated Ratio:		12.684	
Deviation:	-3.70	2.30	%
	-5      5	-3      3	

# SURVEY

Survey Calculation Method: **Minimum Curvature**

Magnetic Reference	Target Direction	Total Magnetic Field	Magnetic Dip Angle	Magnetic Declination	Grid Convergence	Total Correction
<b>Grid North</b>	<b>0.00 deg</b>	<b>51816 nT</b>	<b>65.26 deg</b>	<b>4.67 deg</b>	<b>0.24 deg</b>	<b>4.43 deg</b>
<b>Survey Tie-On</b>	Depth	INC	AZ	TVD	NS	EW
	<b>787.00 ft</b>	<b>0.90 deg</b>	<b>2.80 deg</b>	<b>786.45 ft</b>	<b>25.10 ft</b>	<b>2.38 ft</b>

Depth (ft)	Inc (deg)	Azm (deg)	TVD (ft)	Well Head		VSect (ft)	Dogleg (deg/100ft)
				NS (ft)	EW (ft)		
892.00	0.66	342.36	891.44	26.50	2.24	26.50	0.35
985.00	0.66	342.17	984.43	27.52	1.91	27.52	0.00
1080.00	0.77	4.78	1079.43	28.68	1.80	28.68	0.32
1177.00	0.79	12.01	1176.42	29.98	1.99	29.98	0.10
1272.00	0.79	13.42	1271.41	31.26	2.28	31.26	0.02
1370.00	0.75	13.08	1369.40	32.54	2.58	32.54	0.04
1464.00	0.75	39.79	1463.39	33.61	3.11	33.61	0.37
1560.00	0.79	17.83	1559.38	34.73	3.72	34.73	0.31
1656.00	0.82	22.05	1655.37	35.99	4.18	35.99	0.07
1751.00	0.79	21.00	1750.37	37.23	4.67	37.23	0.04
1847.00	0.75	21.41	1846.36	38.44	5.13	38.44	0.04
1943.00	0.71	8.66	1942.35	39.61	5.45	39.61	0.17
2038.00	0.75	22.70	2037.34	40.76	5.78	40.76	0.19
2135.00	0.87	44.42	2134.33	41.88	6.54	41.88	0.34
2230.00	0.93	31.14	2229.32	43.05	7.45	43.05	0.23
2325.00	0.88	30.52	2324.31	44.34	8.22	44.34	0.05
2421.00	0.86	53.11	2420.30	45.41	9.17	45.41	0.36
2516.00	0.86	35.55	2515.29	46.42	10.15	46.42	0.28
2612.00	0.88	36.52	2611.28	47.59	11.01	47.59	0.03
2708.00	0.88	43.04	2707.26	48.72	11.95	48.72	0.10
2804.00	0.82	48.62	2803.25	49.72	12.97	49.72	0.11
2899.00	0.82	49.55	2898.24	50.61	14.00	50.61	0.01
2995.00	0.82	48.91	2994.23	51.51	15.04	51.51	0.01
3091.00	0.88	48.51	3090.22	52.45	16.11	52.45	0.06
3186.00	0.97	45.68	3185.21	53.49	17.23	53.49	0.11
3282.00	0.92	43.82	3281.20	54.61	18.34	54.61	0.06
3377.00	0.93	39.82	3376.19	55.76	19.36	55.76	0.07
3473.00	0.93	38.20	3472.17	56.97	20.35	56.97	0.03
3569.00	0.88	33.90	3568.16	58.19	21.24	58.19	0.09
3633.00	0.72	28.62	3632.15	58.95	21.71	58.95	0.28
3761.00	0.78	30.66	3760.14	60.41	22.53	60.41	0.05
3856.00	0.78	33.32	3855.13	61.50	23.22	61.50	0.04
3952.00	0.78	34.36	3951.13	62.59	23.95	62.59	0.01
4047.00	0.84	36.77	4046.12	63.68	24.73	63.68	0.07
4143.00	0.79	37.57	4142.11	64.77	25.55	64.77	0.05
4238.00	0.79	35.46	4237.10	65.82	26.33	65.82	0.03
4334.00	0.78	35.40	4333.09	66.89	27.10	66.89	0.01
4430.00	0.79	31.93	4429.08	67.99	27.82	67.99	0.05
4526.00	0.84	29.67	4525.07	69.16	28.52	69.16	0.06
4622.00	0.72	21.52	4621.06	70.33	29.09	70.33	0.17
4717.00	0.72	25.66	4716.05	71.43	29.57	71.43	0.05
4813.00	0.86	22.90	4812.04	72.63	30.11	72.63	0.15

4908.00	0.87	14.25	4907.03	73.99	30.57	73.99	0.14
5004.00	0.80	16.61	5003.02	75.34	30.94	75.34	0.08
5100.00	0.79	12.54	5099.01	76.63	31.27	76.63	0.06
5196.00	0.64	359.38	5195.01	77.81	31.41	77.81	0.23
5291.00	0.62	357.20	5290.00	78.85	31.38	78.85	0.03
5377.00	0.71	355.97	5375.99	79.85	31.32	79.85	0.11
Projected to Total Depth:							
5444.00	0.71	355.97	5442.99	80.68	31.26	80.68	0.00

---

\*\*WeatherfordLWD Surveys from 892 ft MD to 5377 ft MD.\*\*

\*\*TD at 5444 ft MD\*\*

The total correction is 4.43 deg relative to Grid North.

---



**Weatherford<sup>®</sup>**

Final Print

COMPANY	<u>Shell</u>
WELL	<u>Harris Farms 3407 8-1</u>
FIELD	<u>Wildcat</u>
RIG	<u>Nabors F01</u>
LOC.	<u>Kansas</u> COUNTY <u>Harper</u>