HALLIBURTON | Sperry Drilling

PCGK: Pressure Case Gamma
PCDC: Pressure Case Directional

Powered by INSITE™

1 : 600 / 1 : 240

Country : USA
Field : Wattenberg
Location : Lat: 40°28' 58.26" North Long: 104°22' 28.67" West
Well : Wells Ranch AE18-63-1HN
Company : Noble Energy
Rig : H&P 315

Company : **Noble Energy**
Rig : **H&P 315**
Well : **Wells Ranch AE18-63-1HN**
Field : **Wattenberg**
Country : **USA**
API Number : **0512335648**

LOCATION
Latitude : **40°28' 58.26" North**
Longitude : **104°22' 28.67" West**
UTM Easting = **3,313,035.59 ft**
UTM Northing = **1,420,729.06 ft**

Other Services
Directional Drilling

Permanent Datum : **Ground Level**
Elevation : **4832.00 ft**
Log Measured From : **Drill Floor** **24.00 ft** Above Permanent Datum
Drilling Measured From : **Drill Floor**

TVD LOG

Elev. KB **N/A**
DF **4856.00 ft**
GL **4832.00 ft**
WD **N/A**

Depth Logged : **643.00 ft** To **6,623.16 ft**
Date Logged : **05-Dec-12** To **06-Dec-12**
Total Depth MD : **7,048.00 ft** TVD : **6,623.16 ft**
Spud Date : **03-Dec-12**

Unit No. : **11610113**
Job No. : **CA-XX-0009957677**
Plot Type : **Final**
Plot Date : **09-Dec-12**

Run No.	Borehole Record (TVD) Size	From	To
2	8.750 in	643.00 ft	4,890.34 ft
3	8.750 in	4,890.34 ft	6,623.16 ft

Run No.	Borehole Record (TVD) Size	From	To

Casing Record (TVD)

Size	Weight	From	To
7.000 in	26.00 lbpf	SURFACE	6,622.86 ft

WELL INFORMATION

MWD Run Number	100	200
Date run completed	05-Dec-12	06-Dec-12
Rig Bit Number	2	3
Bit Size (in)	8.750	8.750
Tool Nominal OD (in)	6.750	6.750
Log Start Depth (TVD, ft)	643.00	4,890.34
Log End Depth (TVD, ft)	4,890.34	6,623.16
Drill or Wipe	Drill	Drill
Drill/Wipe Start Date and Time	04-Dec-12 11:50	05-Dec-12 09:30
Drill/Wipe End Date and Time	05-Dec-12 02:40	06-Dec-12 08:30
Min Inc (deg) @ Depth (TVD, ft)	.22 @ 1,269.88	.20 @ 5,309.32
Max Inc (deg) @ Depth (TVD, ft)	12.84 @ 3,050.73	88.30 @ 6,621.59
Bit TFA(in2) / Bit Type	.75 / PDC	.75 / PDC
Flow Rate (gpm)	590.00	595.00
Max AV (fpm) / CV (fpm) @ MWD	N/A / N/A	N/A / N/A
Fluid Type	Fresh Water Gel	Fresh Water Gel
Density (ppg) / Viscosity (spqt)	8.85 / 29.00	10.35 / 35.00
Filtrate CL (ppm)	1,400.00	1,400.00
pH / Fluid Loss (mptm)	10.60 / 0	9.00 / 8
PV (cP) / YP (lhf2)	4 / 4.00	10 / 10.00
% Solids / % Sand	5.1 / 0.30	10.9 / 0.20
% Oil / Oil:Water Ratio	N/A / N/A	N/A / N/A
Rm @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A
Rmf @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A
Rmc @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A

Max Tool Temp (degF) / Source	139.96 / PCM	172.78 / PCM			
Rm @ Max Tool Temp (degF)	N/A @ N/A	N/A @ N/A			
Lead MWD Engineer	Henry Schmeidler	Henry Schmeidler			
Customer Representative	Dave Nielsen	Dave Nielsen			

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM			
Software Version	5.76	5.76			
Sub Serial Number	11404299	11404299			
Insert Serial Number	11619985	11680751			
Date and Time Initialized	04-Dec-12 01:39	05-Dec-12 05:11			
Date and Time Read	05-Dec-12 08:02	06-Dec-12 13:00			
ECMB SW Version	N/A	N/A			

Directional Sensor Information

Tool Type	PCDC	PCDC			
Distance From Bit (ft)	53.46	51.28			
Software Version	6.21	6.21			
Sub Serial Number	11404299	11404299			
Sonde Serial Number	11297517	11638497			
Sensor ID Number	N/A	N/A			
Toolface Offset (deg)	186.92	332.63			

Gamma Ray Sensor Information

Tool Type	PCG	PCG			
Distance From Bit (ft)	48.66	46.48			
Recorded Sample Period (sec)	10	10			
Software Version	8.15	8.15			
Sub Serial Number	11404299	11404299			
Insert/Sonde Serial Number	11293301	11680975			

REMARKS

1. All depths are calibrated to the driller's pipe tally and are measured from the Rig drill floor.

2. No depth corrections have been made for pipe stretch or compression.

3. All data presented is recorded (memory data) unless otherwise stated.
   - ROPA: Average Rate of Penetration is real time data.
   - PGRC: Smooth Pressure Case Gamma Ray Borehole corrected is recorded data.

4. The following smoothing parameters have been applied to the data:
   - All 2" (1:600) logs - 1 ft. interval, 3 ft. coercion distance.
   - All 5" (1:240) logs - .5 ft. interval, .6 ft. coercion distance.

5. INSITE version 7.3.5

WARRANTY

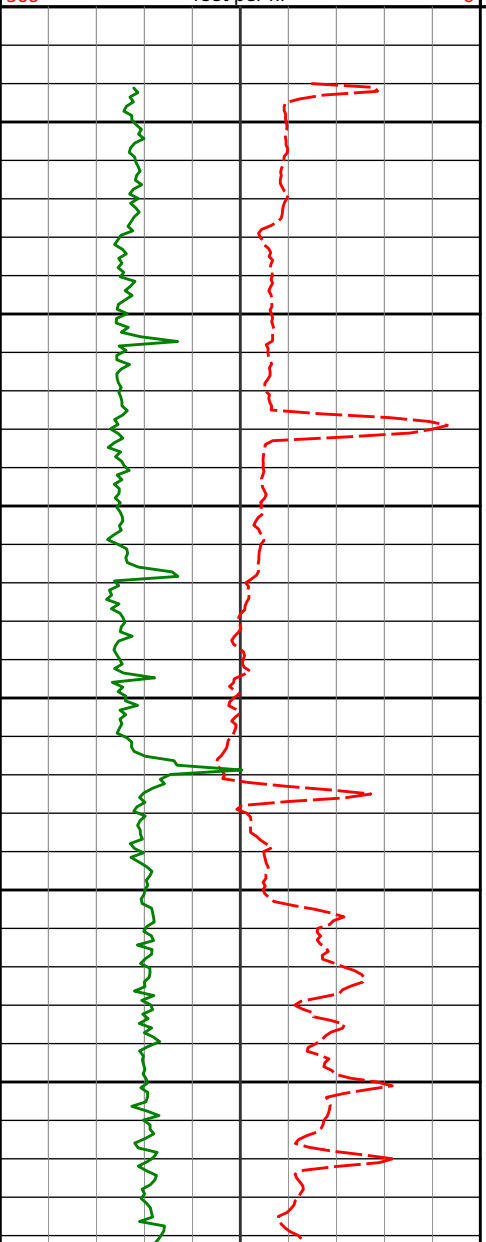
HALLIBURTON
Sperry Drilling Services

TVD Main Log 1:600

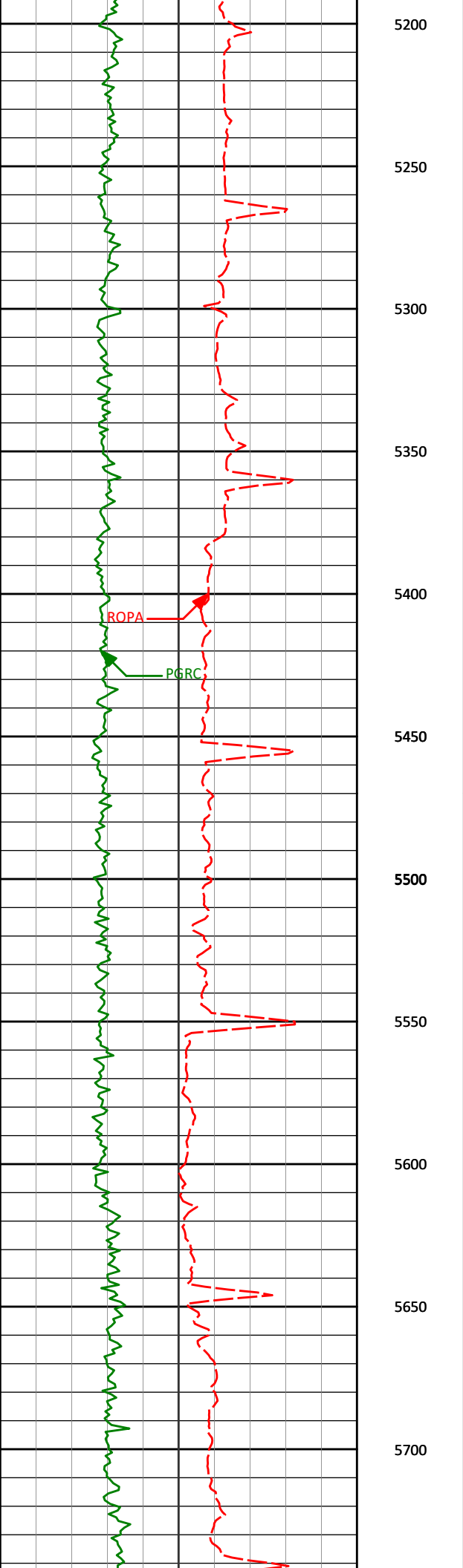
Noble Energy, Inc
Wells Ranch AE18-63-1HN
H&P 315
T6N R62W

PCG Gamma Ray
PGRC
0 api 300

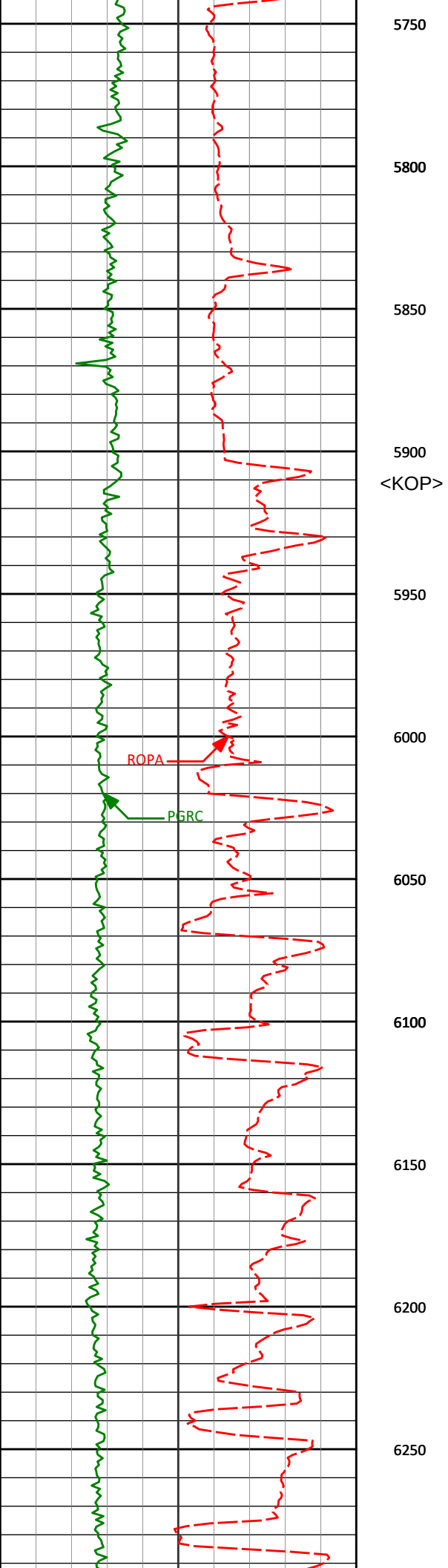
Avg Rate of Penetration
ROPA
500 feet per hr 0



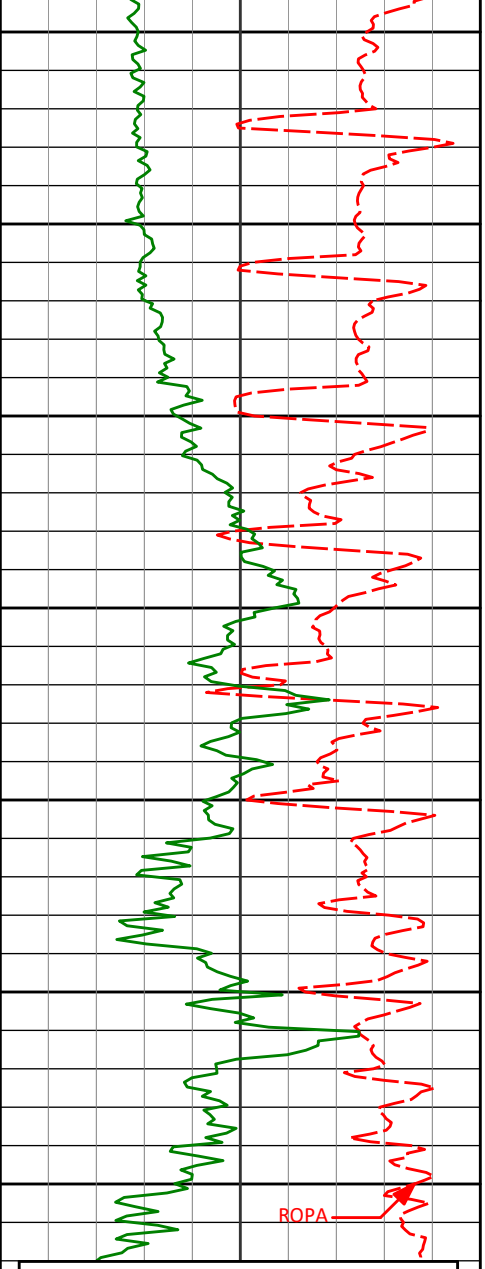
Depth ft	*Depth*	*Inc.*	*Azi.*	*TVD*	*V.S.*
<Run 200>					
4900					
	4961'	1.32°	80.85°	4929.34'	-116.67'
4950					
5000					
	5056'	0.58°	80.34°	5024.32'	-115.13'
5050					
5100					
5150					



5341'	0.20°	229.50°	5309.32'	-114.06'
5625'	0.73°	140.57°	5593.31'	-113.23'



5884'	0.74°	116.10°	5852.29'	-110.61'
6005'	8.90°	81.19°	5972.77'	-100.69'
6053'	12.70°	81.66°	6019.91'	-91.86'
6099'	14.73°	81.98°	6064.59'	-81.13'
6147'	17.55°	85.64°	6110.70'	-67.93'
6194'	21.69°	89.16°	6154.96'	-52.21'
6242'	25.51°	89.65°	6198.94'	-33.02'
6289'	27.20°	88.16°	6241.05'	-12.19'
6337'	29.87°	87.90°	6283.22'	10.68'



Depth ft	Depth	Inc.	Azi.	TVD	V.S.
6300					
	6384'	33.73°	87.24°	6323.16'	35.36'
6350					
	6432'	38.04°	87.22°	6362.04'	63.38'
6400	6479'	41.04°	87.44°	6398.28'	93.19'
	6527'	45.31°	87.18°	6433.27'	125.91'
6450					
	6574'	49.42°	85.77°	6465.10'	160.31'
	6622'	53.32°	84.69°	6495.06'	197.52'
6500					
	6669'	57.54°	85.58°	6521.72'	235.92'
	6717'	61.13°	89.09°	6546.21'	277.05'
6550					
	6764'	65.21°	90.60°	6567.42'	318.94'
	6812'	69.74°	90.23°	6585.80'	363.25'
6600	6859'	73.79°	90.19°	6600.51'	407.85'
	6907'	78.91°	89.01°	6611.83'	454.43'
	6953'	83.86°	88.38°	6618.72'	499.82'
	6995'	88.30°	88.27°	6621.59'	541.61'
6650					

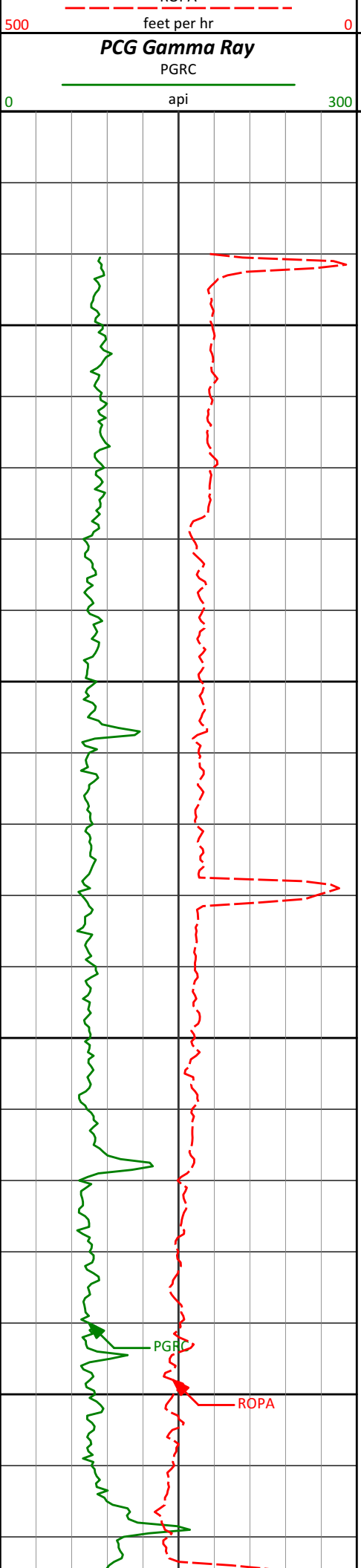
Avg Rate of Penetration
ROPA
500 feet per hr 0

PCG Gamma Ray
PGRC
0 api 300

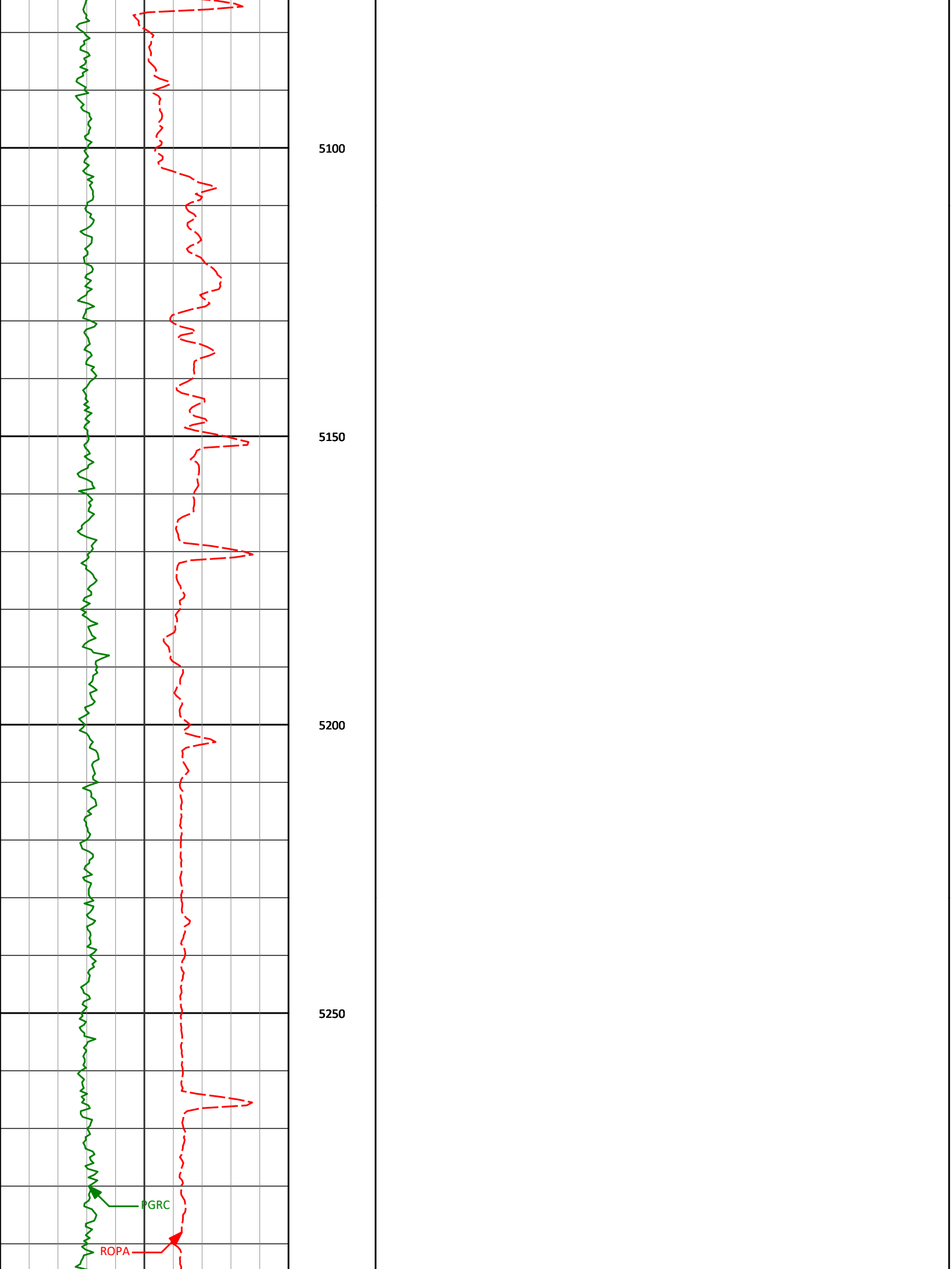
HALLIBURTON
Sperry Drilling Services
TVD Detail Log 1:240

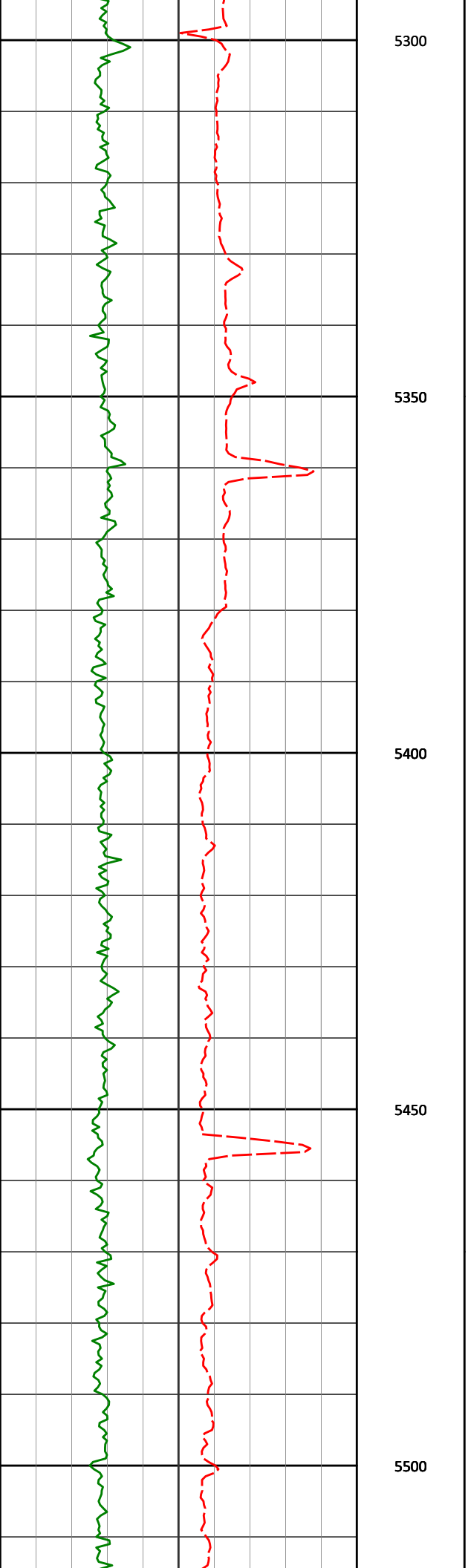
Noble Energy, Inc
Wells Ranch AE18-63-1HN
H&P 315
T6N R62W

Avg Rate of Penetration
ROPA

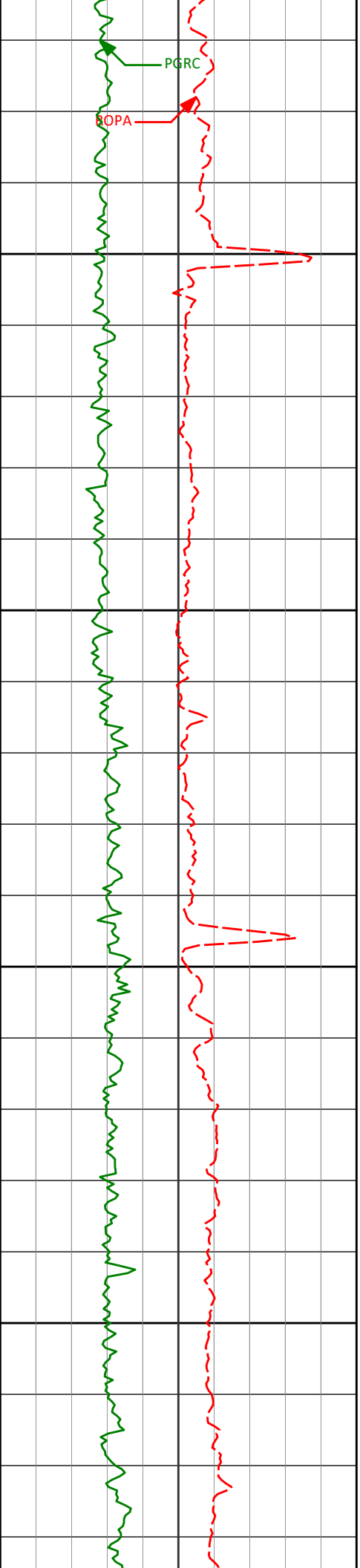


Depth ft	Depth	Inc.	Azi.	TVD	V.S.
<Run 200>					
4900					
	4961'	1.32°	80.85°	4929.34'	-116.67'
4950					
5000					
	5056'	0.58°	80.34°	5024.32'	-115.13'
5050					

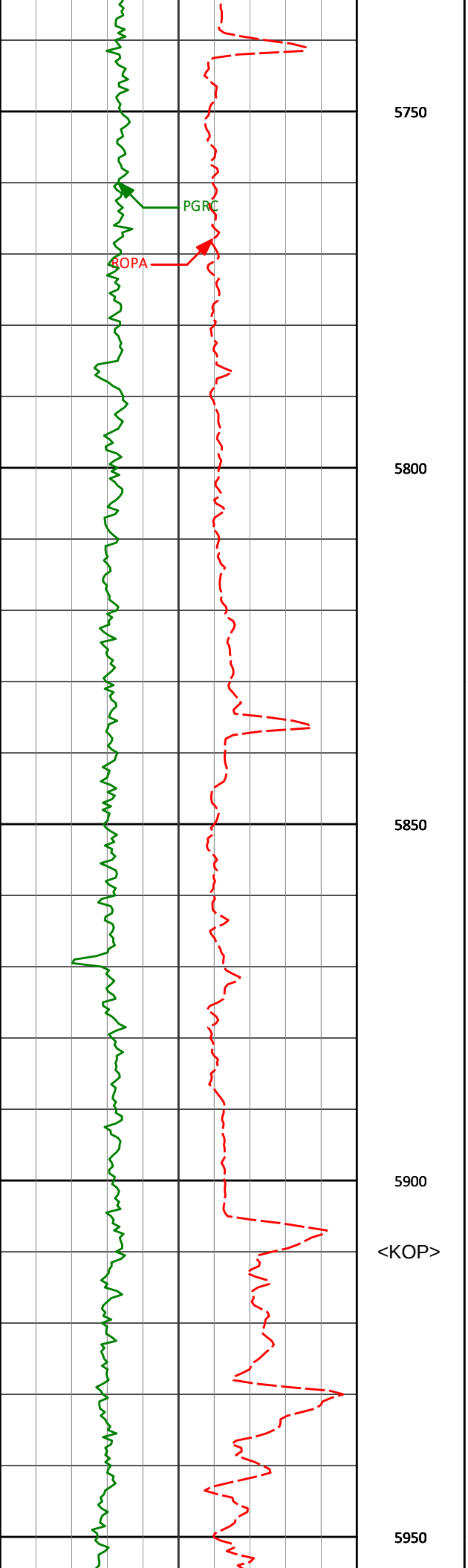

5100
5150
5200
5250
PGRC
ROPA



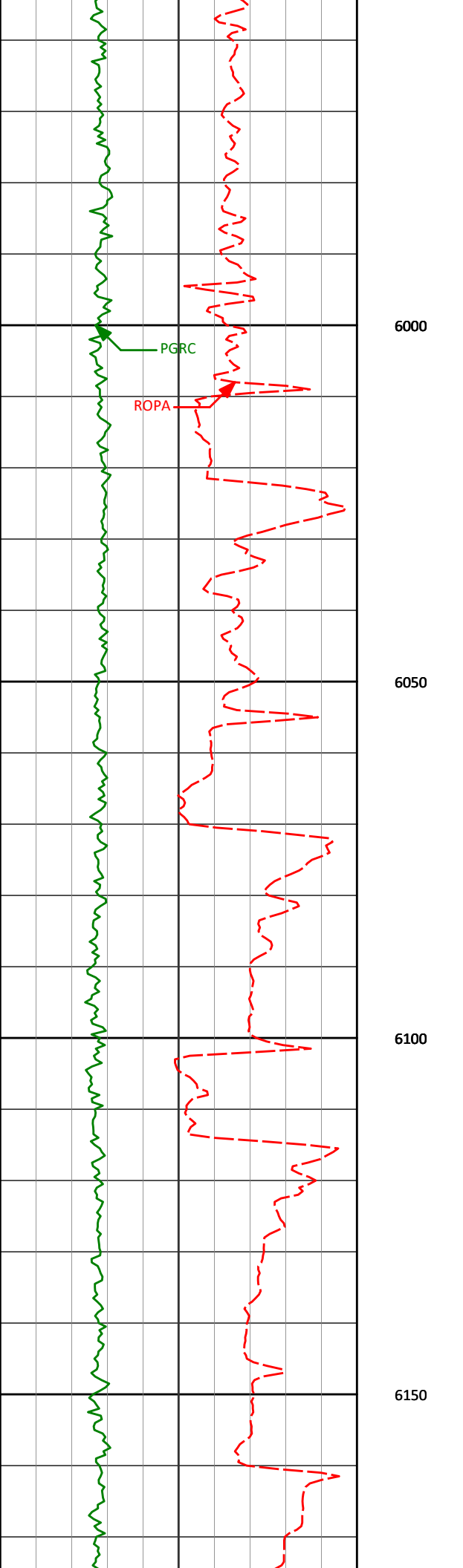
5341'	0.20°	229.50°	5309.32'	-114.06'



5625'	0.73°	140.57°	5593.31'	-113.23'



5884'	0.74°	116.10°	5852.29'	-110.61'



6005'	8.90°	81.19°	5972.77'	-100.69'
6053'	12.70°	81.66°	6019.91'	-91.86'
6099'	14.73°	81.98°	6064.59'	-81.13'
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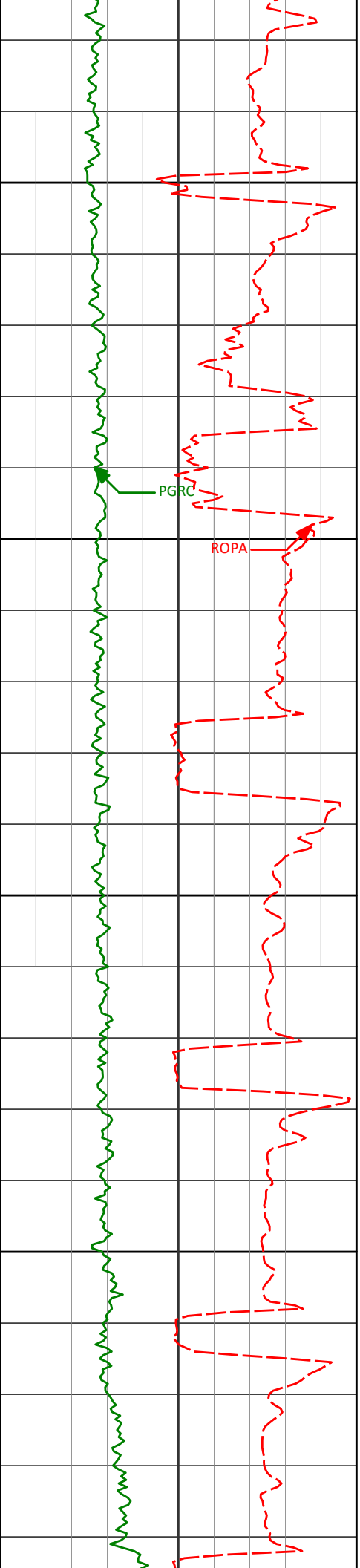
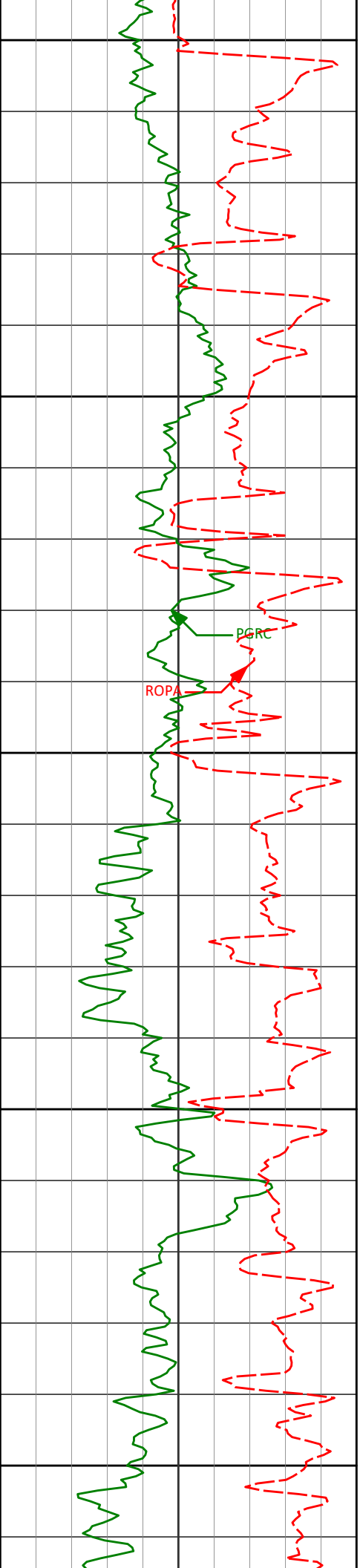
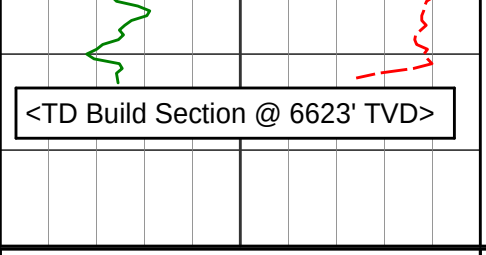


6200	6242'	25.51°	89.65°	6198.94'	-33.02'
6250	6289'	27.20°	88.16°	6241.05'	-12.19'
6300	6337'	29.87°	87.90°	6283.22'	10.68'
6350	6384'	33.73°	87.24°	6323.16'	35.36'
	6432'	38.04°	87.22°	6362.04'	63.38'



6479'	41.04°	87.44°	6398.28'	93.19'
6527'	45.31°	87.18°	6433.27'	125.91'
6574'	49.42°	85.77°	6465.10'	160.31'
6622'	53.32°	84.69°	6495.06'	197.52'
6669'	57.54°	85.58°	6521.72'	235.92'
6717'	61.13°	89.09°	6546.21'	277.05'
6764'	65.21°	90.60°	6567.42'	318.94'
6812'	69.74°	90.23°	6585.80'	363.25'
6859'	73.79°	90.19°	6600.51'	407.85'
6907'	78.91°	89.01°	6611.83'	454.43'



6953'	83.86°	88.38°	6618.72'	499.82'
6995'	88.30°	88.27°	6621.59'	541.61'

PCG Gamma Ray	Depth	Depth	Inc.	Azi.	TVD	V.S.
PGRC	ft					
0 api 300						
Avg Rate of Penetration						
ROPA						
500 feet per hr 0						

HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble Energy
Wells Ranch AE18-63-1HN
Wattenberg
Weld Colorado
USA
CA-XX-0009957677
Survey depth 633 ft created to tie surveys onto bottom of the surface casing shoe.

Last survey is a projection to the bit at TD.

Measured Depth (feet)	Inclination (degrees)	Direction (degrees)	Vertical Depth (feet)	Latitude (feet)	Departure (feet)	Vertical Section (feet)	Dogleg (deg/100ft)
633.00	0.00	0.00	633.00	0.00 N	0.00 E	0.00	TIE-IN
714.00	0.65	342.65	714.00	0.44 N	0.14 W	-0.15	0.80
807.00	0.50	323.63	806.99	1.27 N	0.54 W	-0.58	0.26
900.00	0.97	318.09	899.99	2.18 N	1.30 W	-1.38	0.51
992.00	1.96	290.18	991.96	3.30 N	3.30 W	-3.42	1.29
1084.00	2.00	291.61	1083.90	4.44 N	6.27 W	-6.43	0.07
1177.00	0.56	221.60	1176.88	4.70 N	8.08 W	-8.25	2.03
1270.00	0.22	180.93	1269.88	4.18 N	8.38 W	-8.54	0.45
1362.00	0.80	239.15	1361.87	3.68 N	8.94 W	-9.07	0.77
1457.00	0.53	261.33	1456.87	3.27 N	9.95 W	-10.06	0.39
1552.00	0.62	239.80	1551.86	2.95 N	10.82 W	-10.93	0.24
1646.00	0.59	252.57	1645.86	2.55 N	11.72 W	-11.81	0.15
1741.00	0.72	291.94	1740.85	2.63 N	12.74 W	-12.83	0.48
1836.00	2.84	239.56	1835.80	1.66 N	15.32 W	-15.37	2.59
1931.00	3.37	255.04	1930.67	0.26 S	20.05 W	-20.03	1.04
2026.00	4.85	254.82	2025.42	2.03 S	26.62 W	-26.53	1.55
2121.00	5.69	244.82	2120.02	5.08 S	34.76 W	-34.54	1.31
2215.00	7.26	239.95	2213.42	10.04 S	44.12 W	-43.71	1.77
2310.00	8.71	233.22	2307.49	17.35 S	55.08 W	-54.38	1.81
2405.00	9.39	218.94	2401.32	27.69 S	65.71 W	-64.62	2.46
2500.00	10.01	209.12	2494.97	40.94 S	74.61 W	-73.00	1.86
2594.00	9.94	196.31	2587.56	55.86 S	80.86 W	-78.69	2.36
2689.00	11.14	194.71	2680.96	72.61 S	85.49 W	-82.68	1.30
2784.00	11.34	188.36	2774.14	90.72 S	89.18 W	-85.68	1.32
2878.00	11.97	190.40	2866.20	109.46 S	92.28 W	-88.07	0.80
2973.00	12.57	188.98	2959.03	129.36 S	95.67 W	-90.71	0.70
3067.00	12.84	193.34	3050.73	149.63 S	99.68 W	-93.94	1.06
3162.00	11.97	193.66	3143.51	169.47 S	104.44 W	-97.95	0.92
3257.00	10.80	189.51	3236.64	187.81 S	108.24 W	-101.05	1.50
3352.00	10.87	193.36	3329.95	205.31 S	111.78 W	-103.92	0.77
3447.00	9.35	194.36	3423.47	221.51 S	115.76 W	-107.29	1.61
3541.00	7.63	180.54	3516.45	235.15 S	117.72 W	-108.73	2.83
3636.00	7.60	188.66	3610.61	247.67 S	118.72 W	-109.26	1.13
3731.00	9.20	193.46	3704.59	261.26 S	121.43 W	-111.46	1.83
3826.00	10.02	199.20	3798.26	276.46 S	125.92 W	-115.36	1.33

3921.00	9.96	193.94	3891.82	292.23 S	130.62 W	-119.46	0.96
4016.00	8.97	186.58	3985.53	307.56 S	133.44 W	-121.70	1.64
4111.00	5.83	185.54	4079.73	319.72 S	134.76 W	-122.56	3.30
4206.00	2.62	188.37	4174.46	326.68 S	135.54 W	-123.08	3.39
4300.00	0.54	97.83	4268.42	328.87 S	135.42 W	-122.87	2.85
4585.00	1.46	168.33	4553.38	332.61 S	133.36 W	-120.67	0.48
4869.00	0.81	54.16	4837.35	334.98 S	131.00 W	-118.22	0.68
4961.00	1.32	80.85	4929.34	334.44 S	129.43 W	-116.67	0.76
5056.00	0.58	80.34	5024.32	334.18 S	127.87 W	-115.13	0.77
5341.00	0.20	229.50	5309.32	334.26 S	126.81 W	-114.06	0.27
5625.00	0.73	140.57	5593.31	335.96 S	126.04 W	-113.23	0.26
5884.00	0.74	116.10	5852.29	337.96 S	123.50 W	-110.61	0.12
6005.00	8.90	81.19	5972.77	336.87 S	113.53 W	-100.69	6.86
6053.00	12.70	81.66	6019.91	335.54 S	104.64 W	-91.86	7.92
6099.00	14.73	81.98	6064.59	333.99 S	93.85 W	-81.13	4.42
6147.00	17.55	85.64	6110.70	332.59 S	80.58 W	-67.93	6.25
6194.00	21.69	89.16	6154.96	331.92 S	64.83 W	-52.21	9.16
6242.00	25.51	89.65	6198.94	331.73 S	45.61 W	-33.02	7.97
6289.00	27.20	88.16	6241.05	331.32 S	24.75 W	-12.19	3.86
6337.00	29.87	87.90	6283.22	330.53 S	1.84 W	10.68	5.56
6384.00	33.73	87.24	6323.16	329.47 S	22.90 E	35.36	8.25
6432.00	38.04	87.22	6362.04	328.11 S	50.99 E	63.38	8.99
6479.00	41.04	87.44	6398.28	326.72 S	80.88 E	93.19	6.39
6527.00	45.31	87.18	6433.27	325.17 S	113.68 E	125.91	8.91
6574.00	49.42	85.77	6465.10	323.03 S	148.18 E	160.31	9.02
6622.00	53.32	84.69	6495.06	319.90 S	185.54 E	197.52	8.31
6669.00	57.54	85.58	6521.72	316.63 S	224.09 E	235.92	9.10
6717.00	61.13	89.09	6546.21	314.73 S	265.32 E	277.05	9.78
6764.00	65.21	90.60	6567.42	314.63 S	307.25 E	318.94	9.14
6812.00	69.74	90.23	6585.80	314.95 S	351.58 E	363.25	9.46
6859.00	73.79	90.19	6600.51	315.11 S	396.21 E	407.85	8.62
6907.00	78.91	89.01	6611.83	314.78 S	442.83 E	454.43	10.93
6953.00	83.86	88.38	6618.72	313.74 S	488.29 E	499.82	10.85
6995.00	88.30	88.27	6621.59	312.52 S	530.16 E	541.61	10.57
7048.00	88.30	88.27	6623.16	310.92 S	583.11 E	594.47	0.00

CALCULATION BASED ON MINIMUM CURVATURE METHOD

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

VERTICAL SECTION RELATIVE TO WELL HEAD
VERTICAL SECTION IS COMPUTED ALONG A CLOSURE OF 118.07 DEGREES (GRID)
A TOTAL CORRECTION OF 7.79 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED

HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 7048.00 FEET
IS 660.83 FEET ALONG 118.07 DEGREES (GRID)

Date Printed:09 December 2012