

PCGK : Pressure Case Gamma
PCDC: Pressure Case Directional

1 : 600 / 1 : 240

Country		: USA				
Field		: Wattenberg				
Location		: Lat: 40° 31' 24.89" North Long: 104° 23' 16.08" West				
Well		: Crow Creek State AC36-77-1HN				
Company		: Noble Energy				
Rig		: H&P 315				
LOCATION		Latitude : 40° 31' 24.89" North Longitude : 104° 23' 16.08" West UTM Easting = 3,309,186.442 ft UTM Northing = 1,435,520.049 ft		Other Services Directional Drilling		
Permanent Datum		: Ground Level		Elev. KB N/A		
Log Measured From		: Drill Floor		24.00 ft Above Permanent Datum DF 4813.00 ft GL 4789.00 ft WD N/A		
Drilling Measured From		: Drill Floor		TVD LOG		
Depth Logged		: 645.97 ft To 6,689.93 ft		Unit No. : 11610113		
Date Logged		: 07-Oct-13 To 10-Oct-13		Job No. :CA-XX-0900775411		
Total Depth MD		: 7,042.00 ft TVD: 6,689.93 ft		Plot Type : Final		
Spud Date		: 06-Oct-13		Plot Date : 11-Oct-13		
Run No.	Borehole Record (TVD)			Run No.	Borehole Record (TVD)	
	Size	From	To		Size	From
2	8,750 in	645.97 ft	6,019.13 ft			
3	8,750 in	6,019.13 ft	6,357.40 ft			
4	8,750 in	6,357.40 ft	6,689.93 ft			

Max Tool Temp (degF) / Source	151.47 / PCM	151.47 / PCM	165.58 / PCM		
Rm @ Max Tool Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A		
Lead MWD Engineer	Henry Schmeidler	Henry Schmeidler	Henry Schmeidler		
Customer Representative	Martin Suarez	Martin Suarez	Steve Record		

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM	PCM		
Software Version	5.84	5.84	5.84		
Sub Serial Number	11404299	11404299	11404299		
Insert Serial Number	11680895	11680895	12001055		
Date and Time Initialized	06-Oct-13 22:56	01-Jan-70 00:00	09-Oct-13 05:50		
Date and Time Read	09-Oct-13 11:12	09-Oct-13 11:00	10-Oct-13 12:39		
ECMB SW Version	N/A	N/A	N/A		

Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC		
Distance From Bit (ft)	55.44	52.04	51.86		
Software Version	6.21	6.21	6.21		
Sub Serial Number	11404299	11404299	11404299		
Sonde Serial Number	11638477	11638477	12177609		
Sensor ID Number	N/A	N/A	N/A		
Toolface Offset (deg)	54.83	323.25	249.93		

Gamma Ray Sensor Information

Tool Type	PCG	PCG	PCG		
Distance From Bit (ft)	50.44	47.04	46.86		
Recorded Sample Period (sec)	10	10	10		
Software Version	8.15	8.15	8.15		
Sub Serial Number	11404299	11404299	11404299		
Insert/Sonde Serial Number	11292594	11292594	11293274		

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 8.0.0

WARRANTY

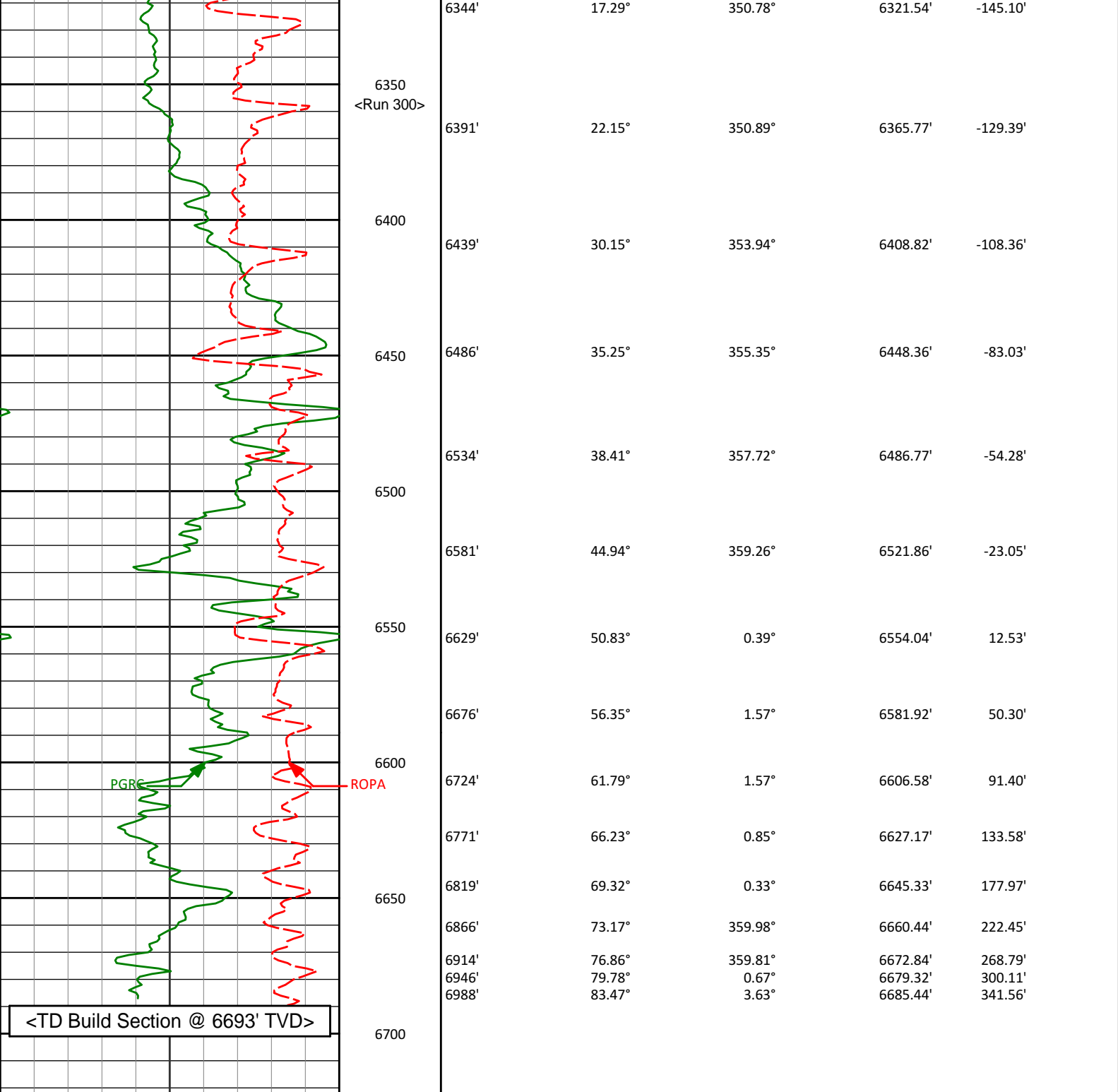
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Sperry Drilling Services
TVD Detail Log 1:600

Noble Energy, Inc
Crow Creek State AC36-77-1HN
H&P 315
T7N R63W

PCG Gamma Ray PGRC 0 api 300						
Avg Rate of Penetration ROP Avg 500 feet per hr 0		Depth ft	Depth	Inc.	Azi.	TVD V.S.
		6000	6024'	0.78°	41.23°	6007.14' -195.95'
		<Run 200>				
		6050				
		<KOP>				
		6100				
		6154'	6154'	7.60°	341.22°	6136.73' -187.08'
		6150				
		6201'	6201'	10.53°	342.20°	6183.14' -179.98'
		6200				
		6249'	6249'	14.43°	342.53°	6230.00' -170.01'
		6250				
		6296'	6296'	15.12°	348.45°	6275.44' -158.34'
		6300				

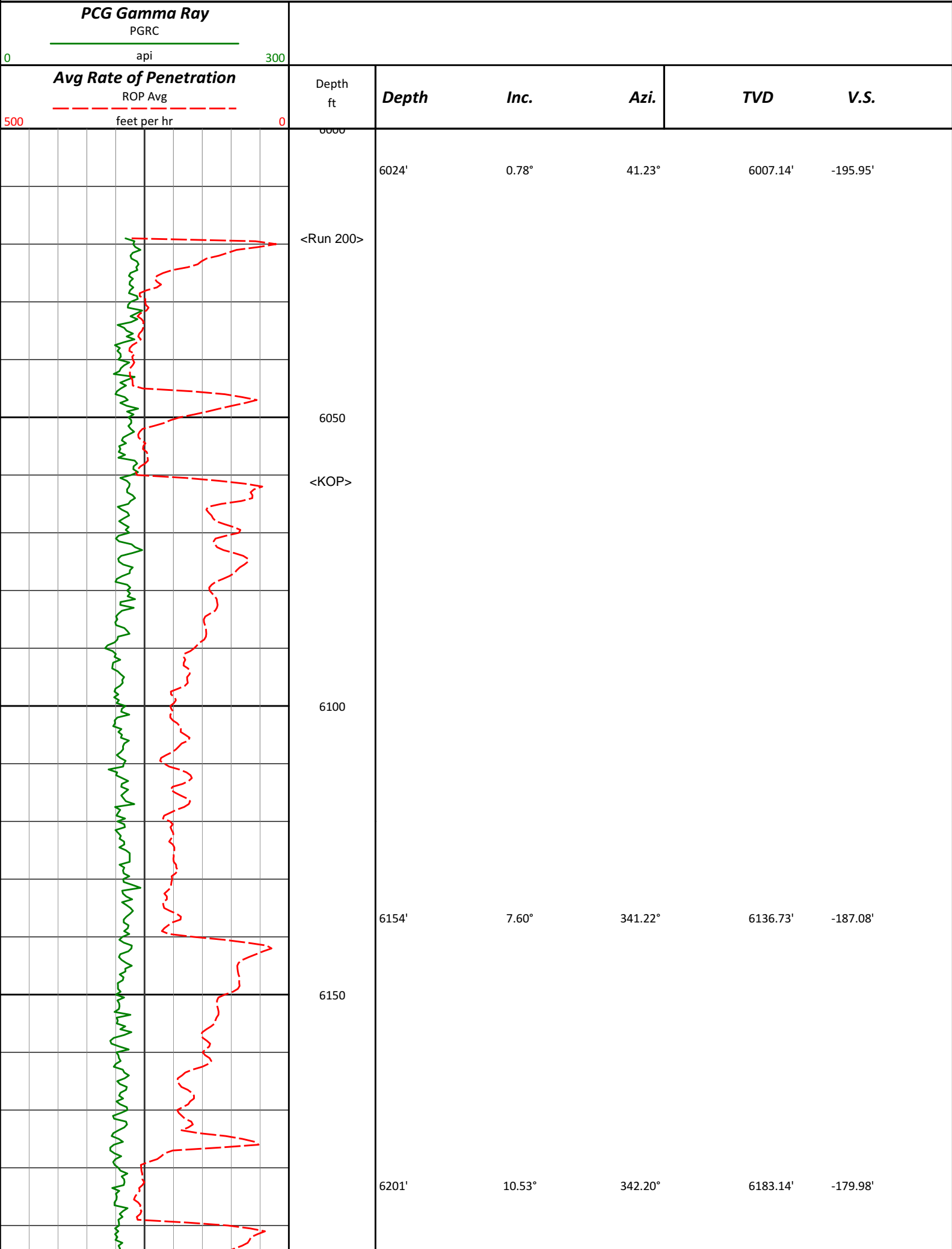


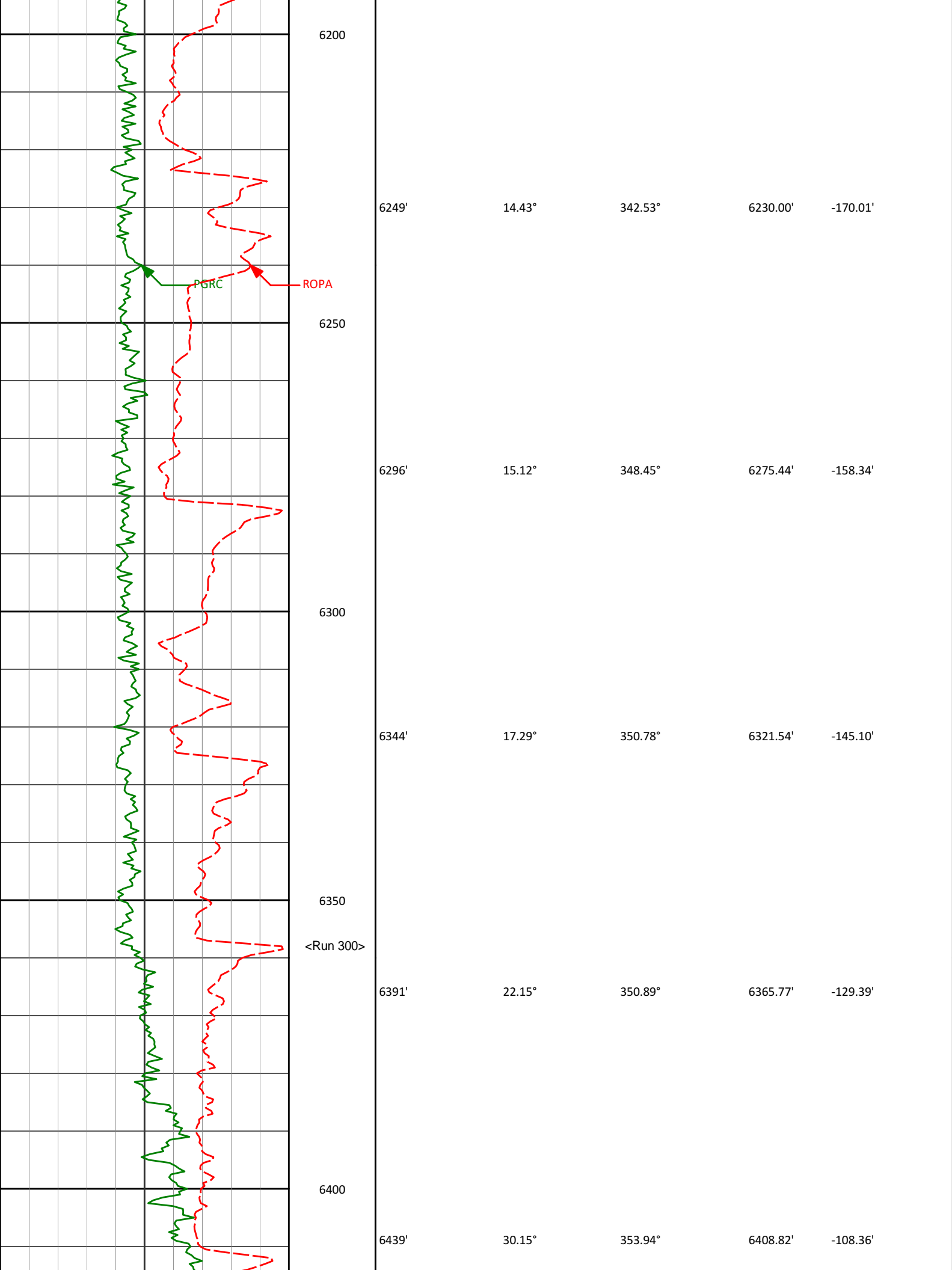
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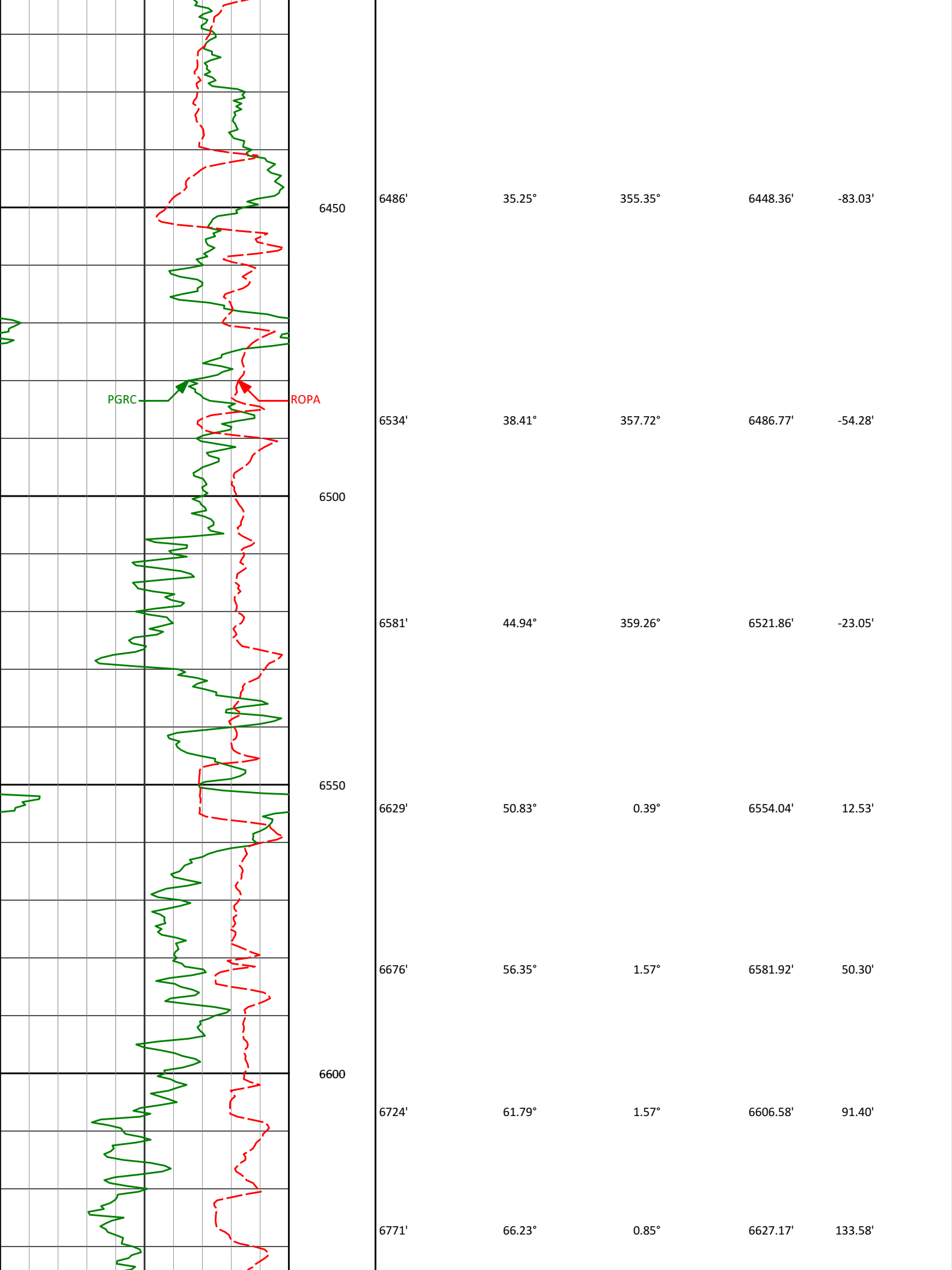
Sperry Drilling Services

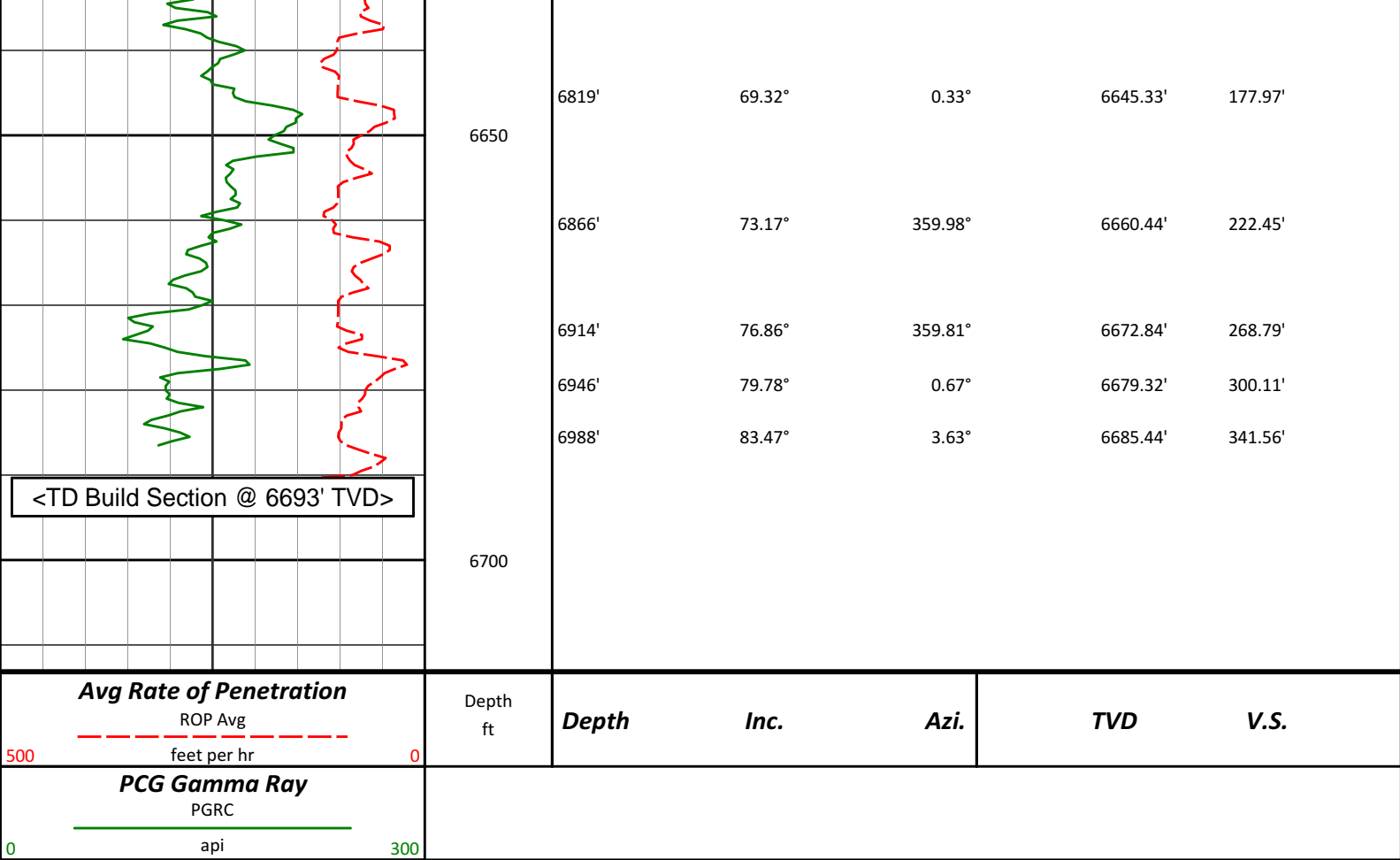
TVD Detail Log 1:240

Noble Energy, Inc
Crow Creek State AC36-77-1HN
H&P 315
T3N14R24W









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DIRECTIONAL SURVEY REPORT

Noble Energy
Crow Creek State AC36-77-1HN
Wattenberg
Weld Colorado
USA
CA-XX-0900775411

Measured Depth (feet)	Inclination (degrees)	Direction (degrees)	Vertical Depth (feet)	Latitude (feet)	Departure (feet)	Vertical Section (feet)	Dogleg (deg/100ft)
0.00	0.00	0.00	0.00	0.00 N	0.00 E	0.00	TIE-IN
330.00	0.90	246.47	329.99	1.03 S	2.38 W	-0.97	0.27
616.00	0.40	214.47	615.97	2.75 S	5.00 W	-2.61	0.21
713.00	0.43	202.99	712.97	3.37 S	5.33 W	-3.21	0.09
804.00	0.65	228.89	803.96	4.02 S	5.85 W	-3.85	0.36
897.00	0.64	244.20	896.96	4.59 S	6.72 W	-4.40	0.19
989.00	0.60	264.22	988.95	4.86 S	7.67 W	-4.64	0.24
1082.00	2.13	188.00	1081.93	6.63 S	8.40 W	-6.39	2.23
1175.00	2.51	189.37	1174.85	10.36 S	8.97 W	-10.09	0.41
1269.00	0.93	190.88	1268.80	13.14 S	9.45 W	-12.87	1.68
1362.00	0.68	165.09	1361.79	14.42 S	9.45 W	-14.14	0.47
1454.00	1.05	202.05	1453.78	15.72 S	9.63 W	-15.44	0.71
1549.00	0.84	175.68	1548.77	17.22 S	9.90 W	-16.93	0.50
1644.00	1.03	183.39	1643.76	18.77 S	9.90 W	-18.48	0.24
1739.00	0.73	158.62	1738.75	20.18 S	9.73 W	-19.90	0.51
1834.00	0.80	182.76	1833.74	21.41 S	9.54 W	-21.13	0.35
1929.00	0.66	212.77	1928.73	22.54 S	9.87 W	-22.24	0.42
2024.00	0.77	201.99	2023.73	23.59 S	10.41 W	-23.29	0.18
2119.00	3.03	225.35	2118.67	25.95 S	12.44 W	-25.58	2.46
2214.00	3.75	231.51	2213.50	29.65 S	16.65 W	-29.16	0.85
2309.00	5.32	229.16	2308.20	34.46 S	22.42 W	-33.81	1.67

2399.00	5.32	229.10	2399.20	34.48 S	22.42 W	-35.81	1.87
2404.00	6.09	215.72	2402.73	41.44 S	28.70 W	-40.60	1.62
2498.00	7.18	212.18	2496.10	50.46 S	34.74 W	-49.45	1.24
2593.00	10.31	207.97	2589.99	63.00 S	41.89 W	-61.78	3.36
2688.00	10.34	210.35	2683.45	77.86 S	50.18 W	-76.40	0.45
2783.00	10.99	212.96	2776.81	92.81 S	59.42 W	-91.07	0.85
2878.00	10.83	219.70	2870.10	107.28 S	70.04 W	-105.23	1.35
2973.00	11.02	219.29	2963.37	121.18 S	81.50 W	-118.80	0.21
3068.00	11.11	217.87	3056.61	135.43 S	92.87 W	-132.72	0.30
3162.00	9.38	218.22	3149.11	148.60 S	103.17 W	-145.59	1.84
3257.00	8.41	214.97	3242.96	160.37 S	111.94 W	-157.10	1.15
3352.00	7.81	214.44	3337.01	171.39 S	119.57 W	-167.90	0.63
3447.00	6.01	214.23	3431.32	180.83 S	126.02 W	-177.15	1.89
3542.00	5.12	215.96	3525.87	188.38 S	131.31 W	-184.55	0.95
3637.00	2.94	202.28	3620.63	194.07 S	134.73 W	-190.13	2.50
3732.00	1.35	178.03	3715.56	197.44 S	135.61 W	-193.48	1.89
3827.00	0.25	53.67	3810.55	198.44 S	135.41 W	-194.48	1.58
4112.00	0.22	135.08	4095.55	198.45 S	134.53 W	-194.52	0.11
4397.00	2.23	135.09	4380.47	202.77 S	130.23 W	-198.96	0.71
4492.00	0.26	40.80	4475.45	203.91 S	128.78 W	-200.14	2.39
4776.00	1.66	328.45	4759.40	199.91 S	130.50 W	-196.10	0.56
5061.00	1.34	347.04	5044.31	193.16 S	133.41 W	-189.26	0.20
5346.00	1.77	151.53	5329.27	193.78 S	132.06 W	-189.92	1.08
5631.00	1.27	130.69	5614.17	199.70 S	127.57 W	-195.97	0.26
5916.00	0.61	38.28	5899.14	200.57 S	124.23 W	-196.93	0.50
6024.00	0.78	41.23	6007.14	199.57 S	123.39 W	-195.95	0.16
6154.00	7.60	341.22	6136.73	190.75 S	125.58 W	-187.08	5.57
6201.00	10.53	342.20	6183.14	183.72 S	127.89 W	-179.98	6.23
6249.00	14.43	342.53	6230.00	173.83 S	131.03 W	-170.01	8.13
6296.00	15.12	348.45	6275.44	162.24 S	134.02 W	-158.34	3.53
6344.00	17.29	350.78	6321.54	149.07 S	136.41 W	-145.10	4.72
6391.00	22.15	350.89	6365.77	133.42 S	138.93 W	-129.39	10.33
6439.00	30.15	353.94	6408.82	112.46 S	141.64 W	-108.36	16.91
6486.00	35.25	355.35	6448.36	87.19 S	143.99 W	-83.03	10.98
6534.00	38.41	357.72	6486.77	58.47 S	145.71 W	-54.28	7.21
6581.00	44.94	359.26	6521.86	27.25 S	146.50 W	-23.05	14.07
6629.00	50.83	0.39	6554.04	8.34 N	146.59 W	12.53	12.39
6676.00	56.35	1.57	6581.92	46.14 N	145.93 W	50.30	11.92
6724.00	61.79	1.57	6606.58	87.29 N	144.80 W	91.40	11.33
6771.00	66.23	0.85	6627.17	129.51 N	143.92 W	133.58	9.55
6819.00	69.32	0.33	6645.33	173.94 N	143.46 W	177.97	6.50
6866.00	73.17	359.98	6660.44	218.44 N	143.34 W	222.45	8.24
6914.00	76.86	359.81	6672.84	264.80 N	143.42 W	268.79	7.69
6946.00	79.78	0.67	6679.32	296.13 N	143.29 W	300.11	9.47
6988.00	83.47	3.63	6685.44	337.64 N	141.72 W	341.56	11.23
7042.00	87.00	3.00	6689.93	391.35 N	138.61 W	395.16	6.64

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 DIRECTION OF 358.36 DEGREES (GRID)
A TOTAL CORRECTION OF 7.67 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 7042.00 FEET
IS 415.17 FEET ALONG 340.50 DEGREES (GRID)**

Surface surveys at 330 ft and 616 ft have had azimuths corrected to grid north, but were not taken by Halliburton.

Last survey is a projection from 6988 ft MD to TD at 7042 ft MD.