

**PCGC: Pressure Case Gamma**  
**PCDC: Pressure Case Directional**

[illegible]

## WELL INFORMATION

<b>MWD Run Number</b>	100	200			
<b>Date run completed</b>	07-Jul-13	08-Jul-13			
<b>Rig Bit Number</b>	2	3			
<b>Bit Size (in)</b>	8.750	8.750			
<b>Tool Nominal OD (in)</b>	6.750	6.750			
<b>Log Start Depth (TVD, ft)</b>	630.99	5,879.83			
<b>Log End Depth (TVD, ft)</b>	5,879.83	6,587.59			
<b>Drill or Wipe</b>	Drill	Drill			
<b>Drill/Wipe Start Date and Time</b>	06-Jul-13 03:30	07-Jul-13 04:30			
<b>Drill/Wipe End Date and Time</b>	06-Jul-13 20:40	07-Jul-13 21:10			
<b>Min Inc (deg) @ Depth (TVD, ft)</b>	.30 @ 582.99	.60 @ 5,902.83			
<b>Max Inc (deg) @ Depth (TVD, ft)</b>	17.46 @ 2,740.56	82.61 @ 6,583.27			
<b>Bit TFA(in2) / Bit Type</b>	.75 / PDC	.75 / PDC			
<b>Flow Rate (gpm)</b>	586.40	499.71			
<b>Max AV (fpm) / CV (fpm) @ MWD</b>	N/A / N/A	N/A / N/A			
<b>Fluid Type</b>	Fresh Water Gel	Fresh Water Gel			
<b>Density (ppg) / Viscosity (spqt)</b>	8.90 / 30.00	10.35 / 36.00			
<b>Filtrate CL (ppm)</b>	1,100.00	1,500.00			
<b>pH / Fluid Loss (mptm)</b>	9.40 / 0	9.30 / 0			
<b>PV (cP) / YP (lbf2)</b>	4 / 5.00	9 / 7.00			
<b>% Solids / % Sand</b>	3.40 / 0.30	10.7 / 0.50			
<b>% Oil / Oil:Water Ratio</b>	N/A / N/A	N/A / N/A			
<b>Rm @ Measured Temp (degF)</b>	N/A @ N/A	N/A @ N/A			
<b>Rmf @ Measured Temp (degF)</b>	N/A @ N/A	N/A @ N/A			
<b>Rmc @ Measured Temp (degF)</b>	N/A @ N/A	N/A @ N/A			
<b>Max Tool Temp (deg F) @ C</b>	152.83 / 317.09	175.94 / 326.69			

Max Tool Temp (degF) / Source	158.60 / PCM	175.21 / PCM			
Rm @ Max Tool Temp (degF)	N/A @ N/A	N/A @ N/A			
Lead MWD Engineer	Chris Sorensen	Chris Sorensen			
Customer Representative	Martin Suarez	Martin Suarez			

## SENSOR INFORMATION

### Downhole Processor Information

Tool Type	PCM	PCM			
Software Version	5.84	5.84			
Sub Serial Number	11341333	11341333			
Insert Serial Number	11680798	11680798			
Date and Time Initialized	05-Jul-13 16:37	05-Jul-13 16:37			
Date and Time Read	08-Jul-13 06:05	08-Jul-13 05:59			
ECMB SW Version	N/A	N/A			

### Directional Sensor Information

Tool Type	PCDC	PCDC			
Distance From Bit (ft)	53.76	52.22			
Software Version	6.21	6.21			
Sub Serial Number	11341333	11341333			
Sonde Serial Number	11297515	11297515			
Sensor ID Number	N/A	N/A			
Toolface Offset (deg)	354.14	23.89			

### Gamma Ray Sensor Information

Tool Type	PCG	PCG			
Distance From Bit (ft)	48.76	47.22			
Recorded Sample Period (sec)	10	10			
Software Version	8.15	8.15			
Sub Serial Number	11341333	11341333			
Insert/Sonde Serial Number	11681023	11681023			

## 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 7.4.20
6. Gap in gamma from 2373 ft to 2415 ft, and gap in ROP from 2421 ft to 2466 ft was a result from a shutdown of the rig floor's depth tracking while continually drilling.

## WARRANTY

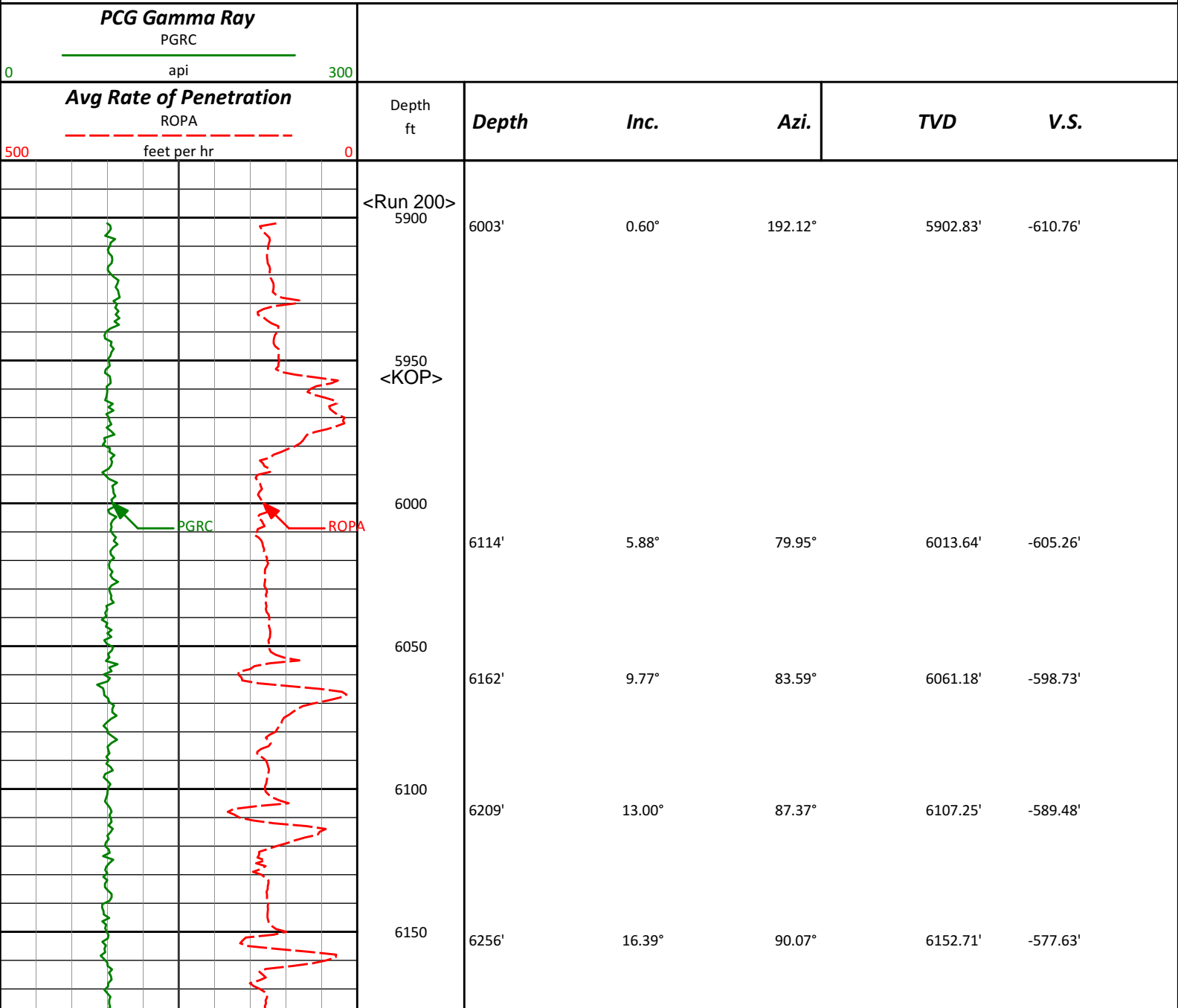
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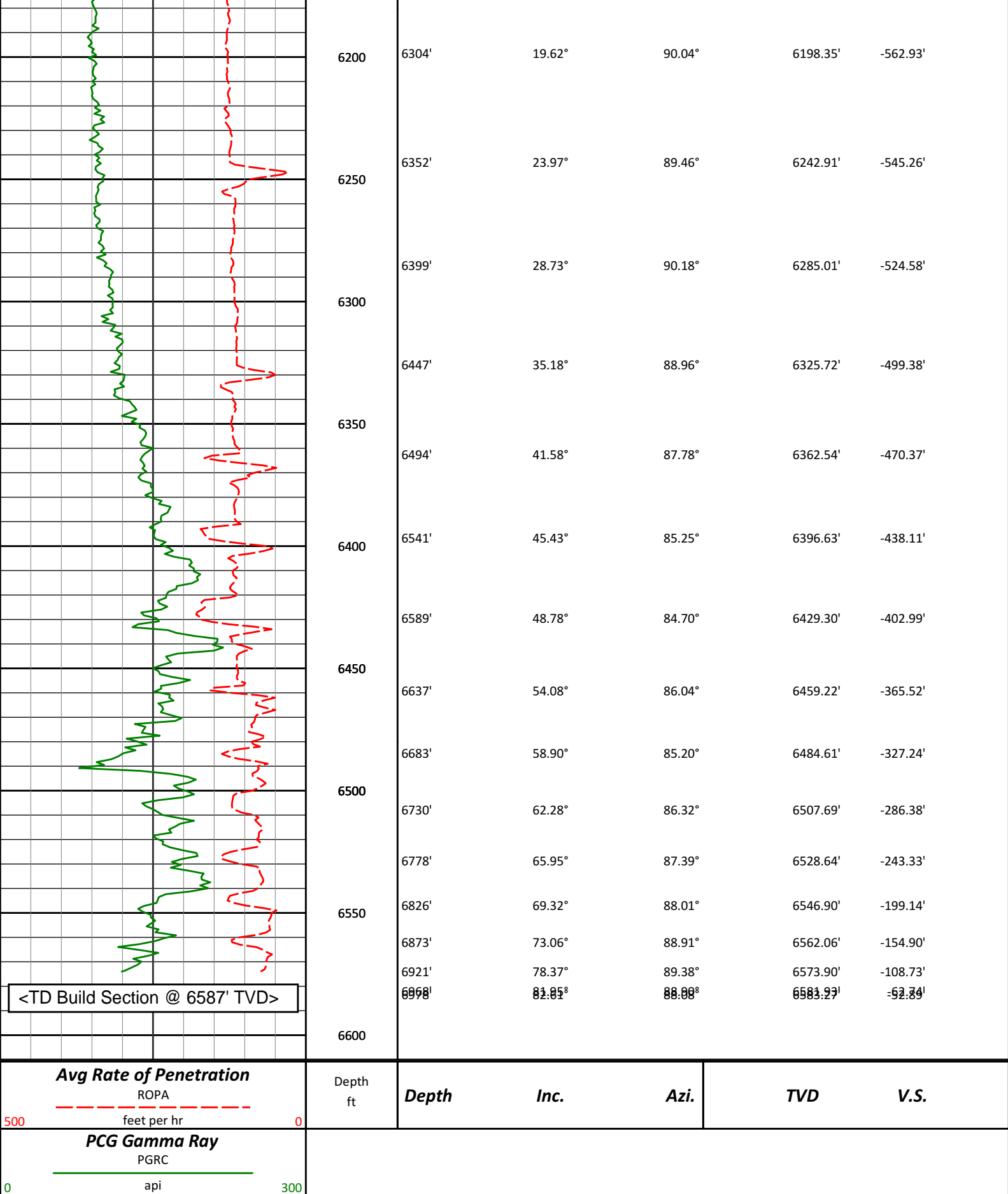
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Sperry Drilling Services

TVD Detail Log 1:600

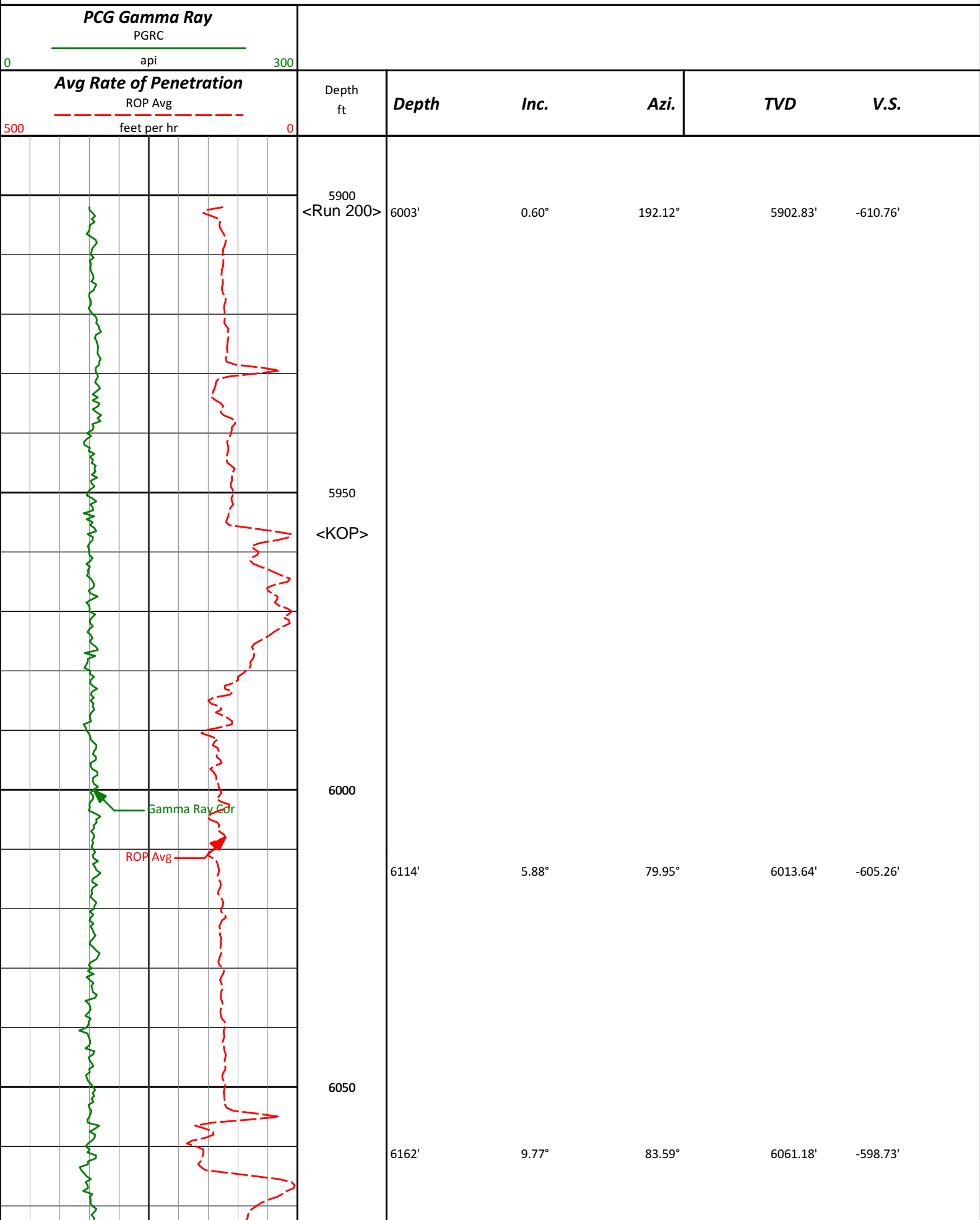
Noble Energy, Inc  
Trebor B11-67-1HN  
H&P 315  
T5N R64W

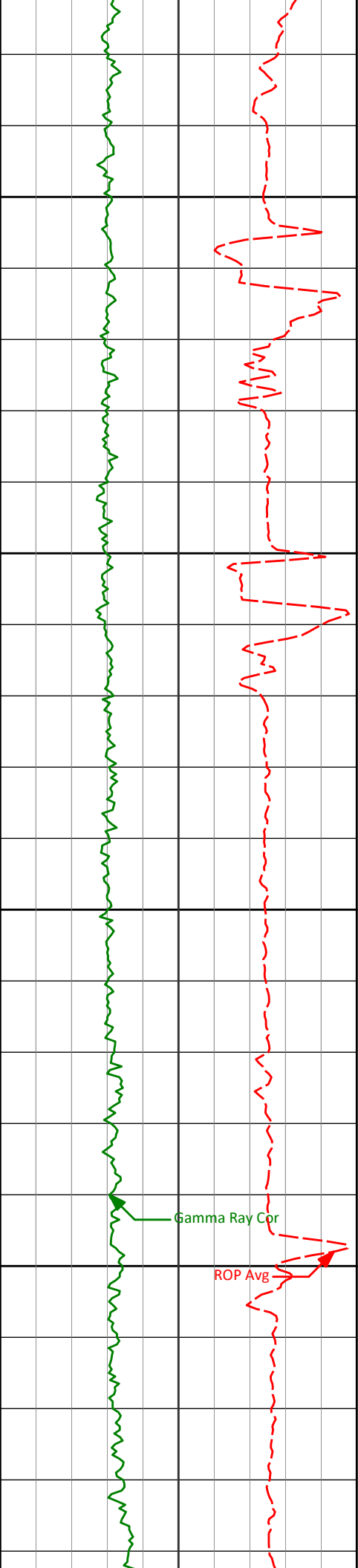




**HALLIBURTON**  
**Sperry Drilling Services**

**TVD Detail Log 1:240**





6100

6209'

13.00°

87.37°

6107.25'

-589.48'

6150

6256'

16.39°

90.07°

6152.71'

-577.63'

6200

6304'

19.62°

90.04°

6198.35'

-562.93'

6250

6352'

23.97°

89.46°

6242.91'

-545.26'

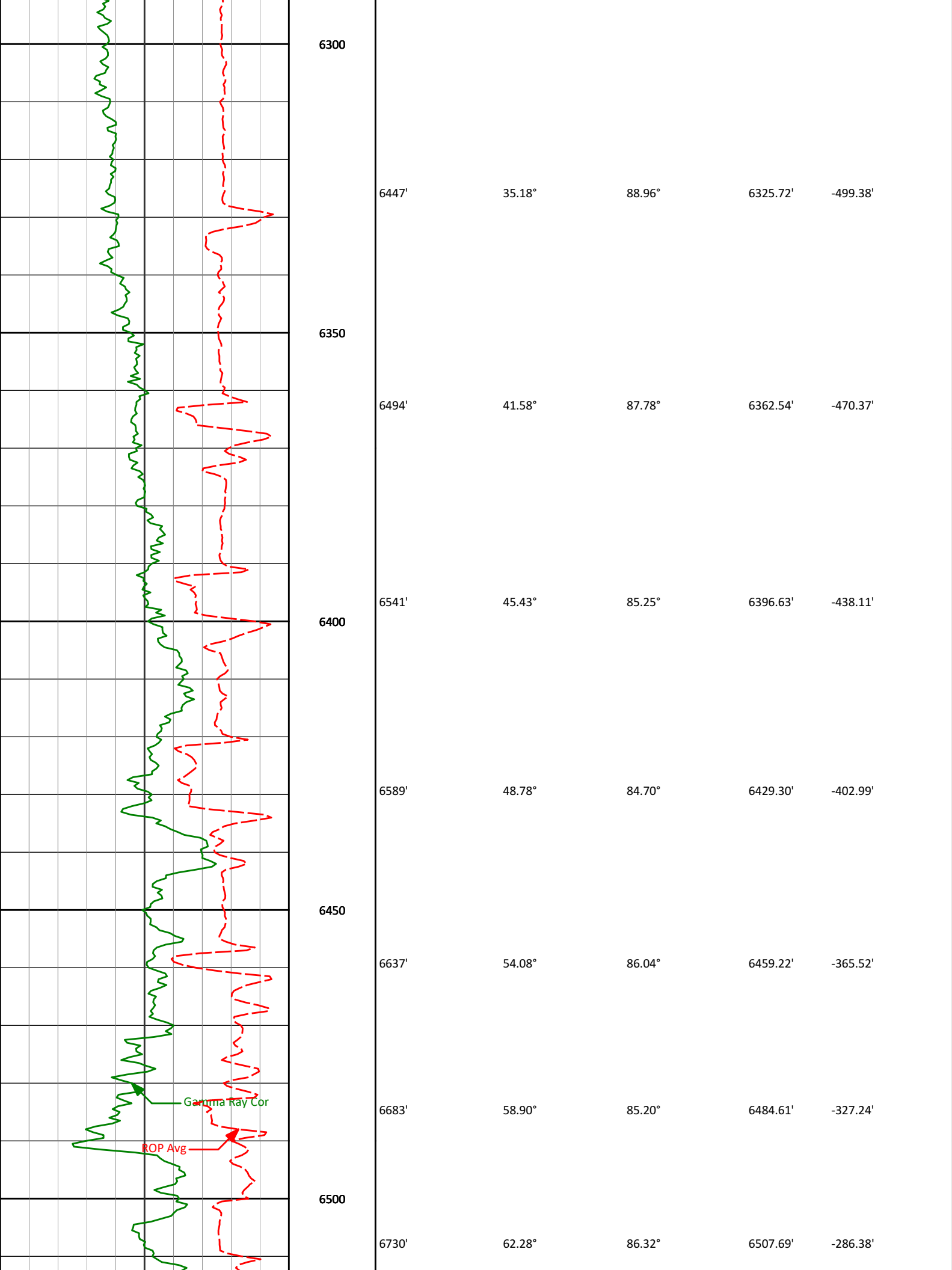
6399'

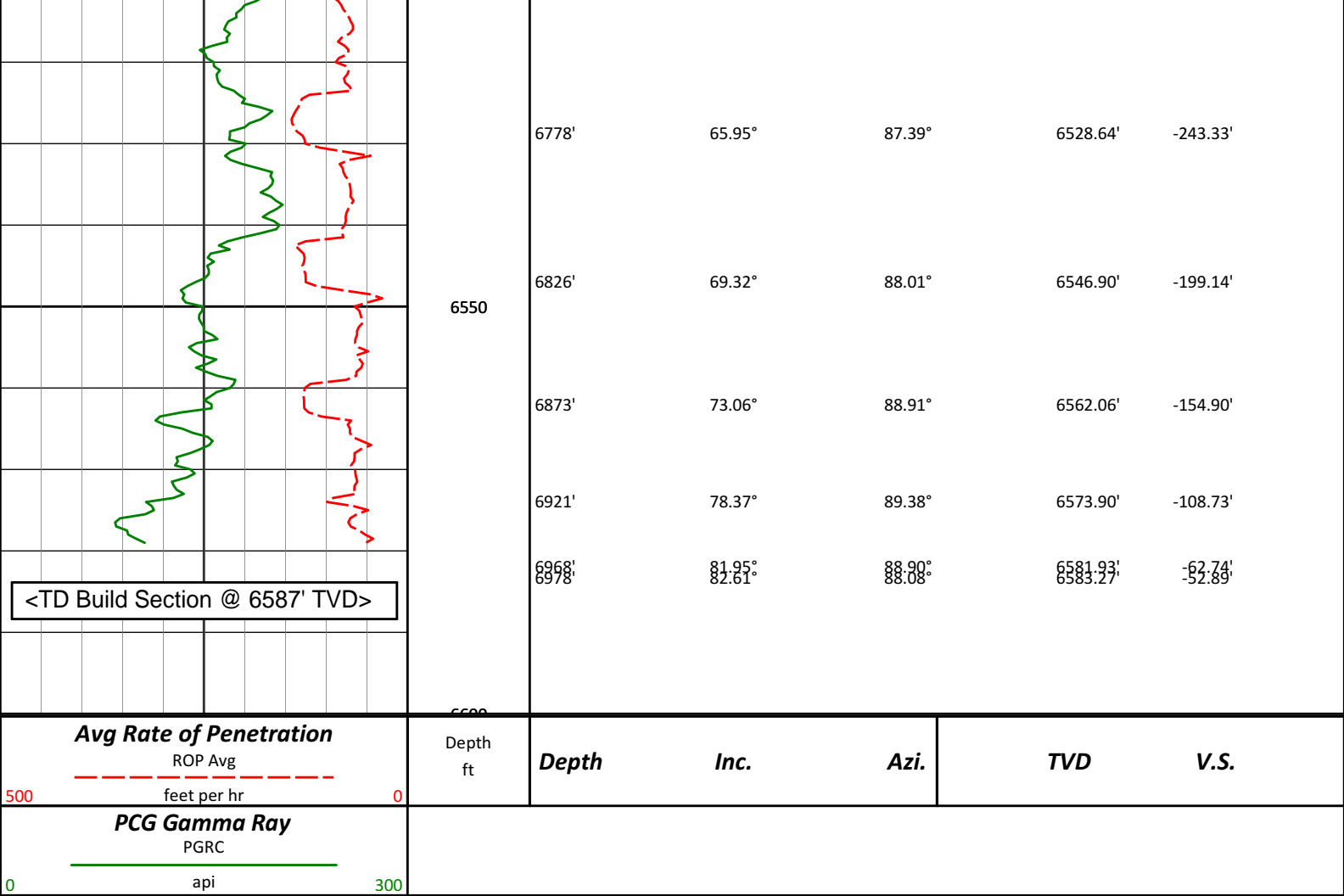
28.73°

90.18°

6285.01'

-524.58'





## HALLIBURTON

### DIRECTIONAL SURVEY REPORT

Noble Energy  
Trebor B11-67-1HN  
Wattenberg  
Weld Colorado  
USA  
CA-XX-0900544024

Surface surveys at 303 ft and 583 ft have had azimuths corrected to grid north, but were not taken by Halliburton.

Last Survey is projection from 6978 ft MD to TD at 7032 ft MD.

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
303.00	0.40	299.55	303.00	0.52 N	0.92 W	-0.84	0.13
583.00	0.30	232.55	582.99	0.56 N	2.35 W	-2.26	0.14
718.00	0.86	233.07	717.99	0.26 S	3.44 W	-3.44	0.41
811.00	0.88	337.24	810.98	0.02 S	4.27 W	-4.23	1.47
903.00	0.52	349.41	902.97	1.04 N	4.62 W	-4.44	0.41
996.00	0.73	336.54	995.97	2.00 N	4.93 W	-4.62	0.26
1090.00	3.21	338.91	1089.90	5.00 N	6.12 W	-5.40	2.64
1182.00	4.05	329.42	1181.72	10.21 N	8.70 W	-7.27	1.12
1275.00	4.98	317.84	1274.43	16.02 N	13.08 W	-10.85	1.39
1368.00	6.81	308.19	1366.94	22.42 N	20.12 W	-16.98	2.24
1463.00	9.29	301.72	1461.00	29.94 N	31.07 W	-26.85	2.78
1558.00	11.62	300.18	1554.41	38.79 N	45.87 W	-40.35	2.46
1653.00	13.45	301.02	1647.14	49.29 N	63.61 W	-56.55	1.94
1748.00	15.49	303.71	1739.13	62.02 N	83.63 W	-74.72	2.26



1843.00	16.35	302.81	1830.48	76.31 N	105.42 W	-94.44	0.94
1938.00	15.98	302.55	1921.73	90.59 N	127.68 W	-114.62	0.39
2033.00	16.86	300.87	2012.85	104.70 N	150.53 W	-135.41	1.05
2128.00	16.87	298.49	2103.77	118.34 N	174.48 W	-157.34	0.73
2223.00	15.44	297.95	2195.01	130.85 N	197.77 W	-178.78	1.51
2317.00	16.33	301.62	2285.42	143.64 N	220.08 W	-199.21	1.43
2412.00	16.51	305.11	2376.55	158.41 N	242.50 W	-219.48	1.05
2507.00	15.09	303.86	2467.96	173.07 N	263.82 W	-238.68	1.54
2602.00	17.22	305.62	2559.20	188.15 N	285.52 W	-258.21	2.30
2697.00	17.34	305.58	2649.91	204.58 N	308.47 W	-278.79	0.13
2792.00	17.46	305.86	2740.56	221.17 N	331.54 W	-299.46	0.15
2887.00	16.46	304.82	2831.43	237.20 N	354.13 W	-319.75	1.10
2982.00	15.71	304.71	2922.71	252.20 N	375.75 W	-339.20	0.79
3077.00	14.22	303.84	3014.49	266.02 N	396.01 W	-357.46	1.59
3172.00	15.54	306.87	3106.30	280.16 N	415.88 W	-375.29	1.62
3267.00	13.28	303.23	3198.31	293.77 N	435.19 W	-392.63	2.56
3361.00	14.55	306.47	3289.55	306.71 N	453.71 W	-409.29	1.58
3456.00	16.43	304.16	3381.10	321.34 N	474.42 W	-427.89	2.08
3551.00	15.36	303.93	3472.47	335.91 N	495.98 W	-447.34	1.12
3646.00	16.40	303.63	3563.84	350.37 N	517.59 W	-466.85	1.10
3741.00	15.36	304.97	3655.21	365.01 N	539.07 W	-486.21	1.16
3836.00	13.90	304.29	3747.13	378.65 N	558.81 W	-503.98	1.55
3931.00	13.36	305.12	3839.45	391.39 N	577.21 W	-520.54	0.60
4026.00	11.75	305.10	3932.18	403.26 N	594.10 W	-535.71	1.70
4121.00	10.06	304.71	4025.46	413.55 N	608.84 W	-548.96	1.77
4216.00	8.67	303.21	4119.19	422.20 N	621.65 W	-560.53	1.49
4310.00	7.91	304.59	4212.21	429.75 N	632.91 W	-570.69	0.84
4405.00	7.38	305.60	4306.37	437.02 N	643.25 W	-579.98	0.58
4500.00	6.36	310.67	4400.68	444.00 N	652.20 W	-587.93	1.25
4595.00	3.87	307.75	4495.30	449.39 N	658.73 W	-593.69	2.63
4690.00	3.05	298.05	4590.12	452.54 N	663.50 W	-598.01	1.06
4785.00	3.11	273.61	4684.99	453.90 N	668.30 W	-602.59	1.37
4880.00	0.80	348.92	4779.94	454.71 N	671.01 W	-605.16	3.17
4975.00	0.34	29.63	4874.93	455.61 N	670.99 W	-605.03	0.61
5070.00	0.46	326.56	4969.93	456.17 N	671.06 W	-605.02	0.45
5354.00	1.02	185.78	5253.92	454.61 N	671.94 W	-606.10	0.49
5639.00	1.19	197.44	5538.87	449.27 N	673.08 W	-607.94	0.10
5924.00	0.61	220.64	5823.83	445.31 N	674.95 W	-610.31	0.24
6003.00	0.60	192.12	5902.83	444.60 N	675.31 W	-610.76	0.37
6114.00	5.88	79.95	6013.64	445.03 N	669.82 W	-605.26	5.53
6162.00	9.77	83.59	6061.18	445.91 N	663.35 W	-598.73	8.15
6209.00	13.00	87.37	6107.25	446.60 N	654.10 W	-589.48	7.06
6256.00	16.39	90.07	6152.71	446.83 N	642.19 W	-577.63	7.35
6304.00	19.62	90.04	6198.35	446.82 N	627.35 W	-562.93	6.73
6352.00	23.97	89.46	6242.91	446.91 N	609.54 W	-545.26	9.09
6399.00	28.73	90.18	6285.01	446.96 N	588.68 W	-524.58	10.15
6447.00	35.18	88.96	6325.72	447.17 N	563.29 W	-499.38	13.49
6494.00	41.58	87.78	6362.54	448.03 N	534.14 W	-470.37	13.70
6541.00	45.43	85.25	6396.63	450.02 N	501.86 W	-438.11	9.00
6589.00	48.78	84.70	6429.30	453.10 N	466.84 W	-402.99	7.02
6637.00	54.08	86.04	6459.22	456.12 N	429.44 W	-365.52	11.26
6683.00	58.90	85.20	6484.61	459.05 N	391.21 W	-327.24	10.58
6730.00	62.28	86.32	6507.69	462.07 N	350.39 W	-286.38	7.49
6778.00	65.95	87.39	6528.64	464.43 N	307.28 W	-243.33	7.91
6826.00	69.32	88.01	6546.90	466.21 N	262.93 W	-199.14	7.12
6873.00	73.06	88.91	6562.06	467.41 N	218.47 W	-154.90	8.17
6921.00	78.37	89.38	6573.90	468.10 N	171.98 W	-108.73	11.10
6968.00	81.95	88.90	6581.93	468.79 N	125.68 W	-62.74	7.68
6978.00	82.61	88.08	6583.27	469.06 N	115.77 W	-52.89	10.47
7032.00	88.20	88.30	6587.59	470.75 N	62.00 W	0.64	10.36

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 82.42 DEGREES (GRID)  
A TOTAL CORRECTION OF 7.85 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED  
  
HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.

HORIZONTAL DISPLACEMENT(CLOSURE) AT 7032.00 FEET  
IS 474.82 FEET ALONG 352.50 DEGREES (GRID)

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