

PCGK: Pressure Case Gamma
PCDC: Pressure Case Directional

[illegible]

WELL INFORMATION

MWD Run Number	200	300			
Date run completed	01-Jul-14	02-Jul-14			
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)	638.99	5,315.54			
Log End Depth (TVD, ft)	5,315.54	6,026.48			
Drill or Wipe	Drill	Drill			
Drill/Wipe Start Date and Time	30-Jun-14 08:50	01-Jul-14 11:15			
Drill/Wipe End Date and Time	01-Jul-14 00:46	02-Jul-14 00:15			
Min Inc (deg) @ Depth (TVD, ft)	0.22 @ 1,273.97	8.82 @ 5,375.80			
Max Inc (deg) @ Depth (TVD, ft)	11.41 @ 3,696.42	82.73 @ 6,020.98			
Bit TFA(in2) / Bit Type	0.74 / PDC	0.86 / PDC			
Flow Rate (gpm)	592.34	550.00			
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)	9.60 / 36.00	10.50 / 40.00			
Filtrate CL (ppm)	200.00	200.00			
pH / Fluid Loss (mptm)	8.50 / 7	8.20 / 0			
PV (cP) / YP (lbf2)	10 / 8.00	13 / 10.00			
% Solids / % Sand	6.50 / 0.05	10.00 / 0.10			
% 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 (in F) / S	150.10 / PCM	125.50 / PCM			

Max Tool Temp (degF) / Source	150.10 / PCM	165.58 / PCM			
Rm @ Max Tool Temp (degF)	N/A @ N/A	N/A @ N/A			
Lead MWD Engineer	Juan Pablo Centeno	Juan Pablo Centeno			
Customer Representative	Dave Nielsen	Dave Nielsen			

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM			
Software Version	5.93	5.93			
Sub Serial Number	245494	245494			
Insert Serial Number	11620315	11620315			
Date and Time Initialized	29-Jun-14 19:15	01-Jan-70 00:00			
Date and Time Read	02-Jul-14 08:21	02-Jul-14 08:27			
ECMB SW Version	N/A	N/A			

Directional Sensor Information

Tool Type	PCDC	PCDC			
Distance From Bit (ft)	53.87	51.42			
Software Version	6.21	6.21			
Sub Serial Number	245494	245494			
Sonde Serial Number	11638628	11638628			
Sensor ID Number	N/A	N/A			
Toolface Offset (deg)	79.57	15.95			

Gamma Ray Sensor Information

Tool Type	PCG	PCG			
Distance From Bit (ft)	48.77	46.32			
Recorded Sample Period (sec)	10	10			
Software Version	8.15	8.15			
Sub Serial Number	245494	245494			
Insert/Sonde Serial Number	11579806	11579806			

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:
 - 2" (1:600) log - 1 ft. interval, 3 ft. coercion distance, 5 ft. gap fill.
 - 5" (1:240) log for ROP - 0.5 ft. interval, 1.2 ft. coercion distance, 3 ft. gap fill.
 - 5" (1:240) log for Gamma Ray - 0.5 ft. interval, 0.6 ft. coercion distance, 3 ft. gap fill.
5. INSITE version 8.0.20.

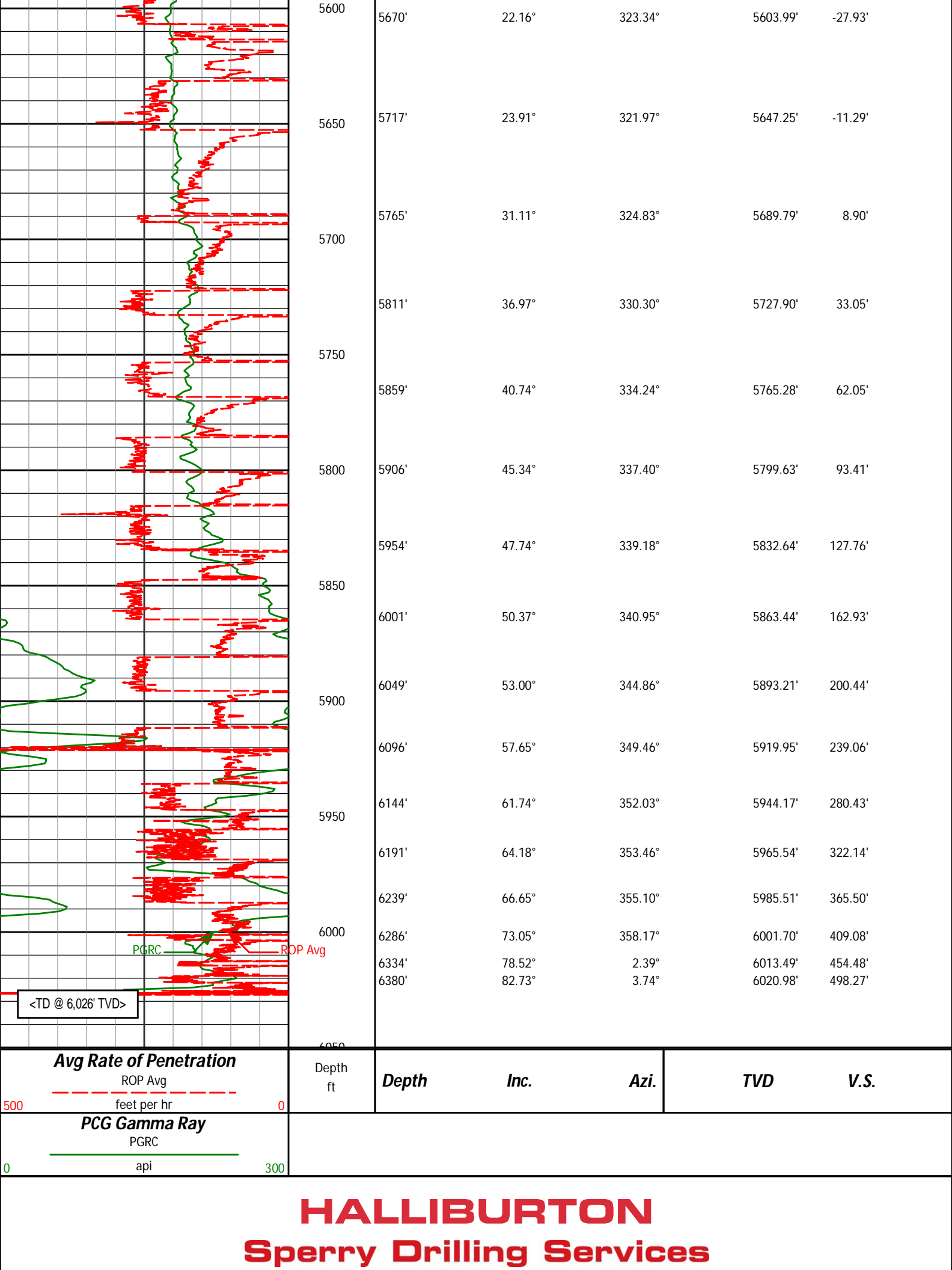
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HALLIBURTON
Sperry Drilling Services
TVD Main Log 1:600

Noble Energy
Rainbow LC28-76-1BHNA
H&P 273
T9N, R59W

PCG Gamma Ray PGRC 0 300 api						
Avg Rate of Penetration ROP Avg 500 0 feet per hr		Depth ft	Depth	Inc.	Azi.	TVD V.S.
		<Run 300>	5385'	8.99°	257.68°	5329.36' -84.97'
		5350				
		<KOP>	5432'	8.82°	272.74°	5375.80' -84.05'
		5400				
			5480'	10.55°	308.73°	5423.16' -79.69'
		5450				
			5527'	15.13°	321.75°	5468.98' -70.84'
		5500				
			5575'	18.35°	324.40°	5514.94' -58.28'
		5550				
			5622'	20.43°	325.42°	5559.27' -43.91'



Avg Rate of Penetration

ROP Avg

feet per hr

PCG Gamma Ray

PGRC

api

Depth
ft

Depth

Inc.

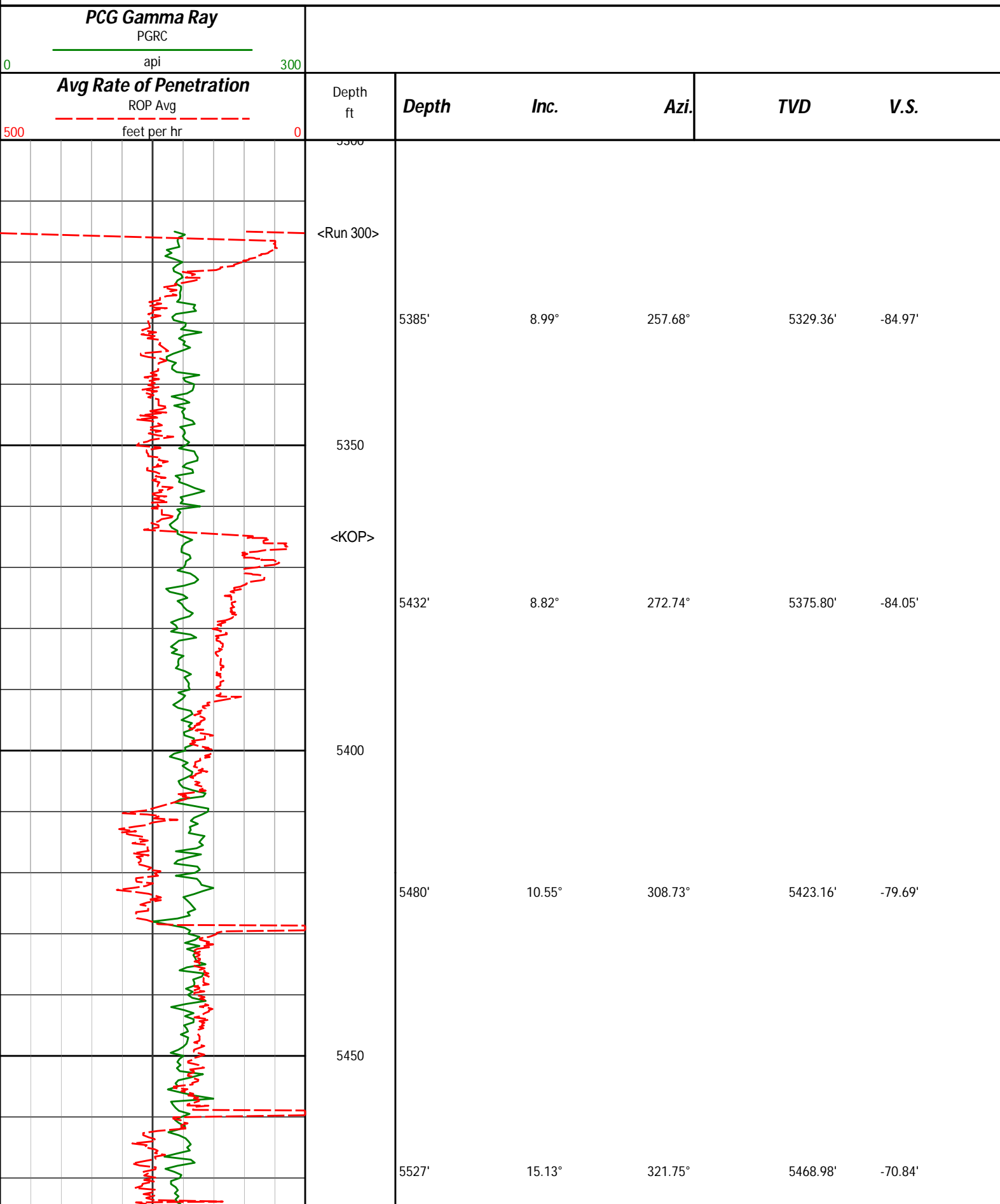
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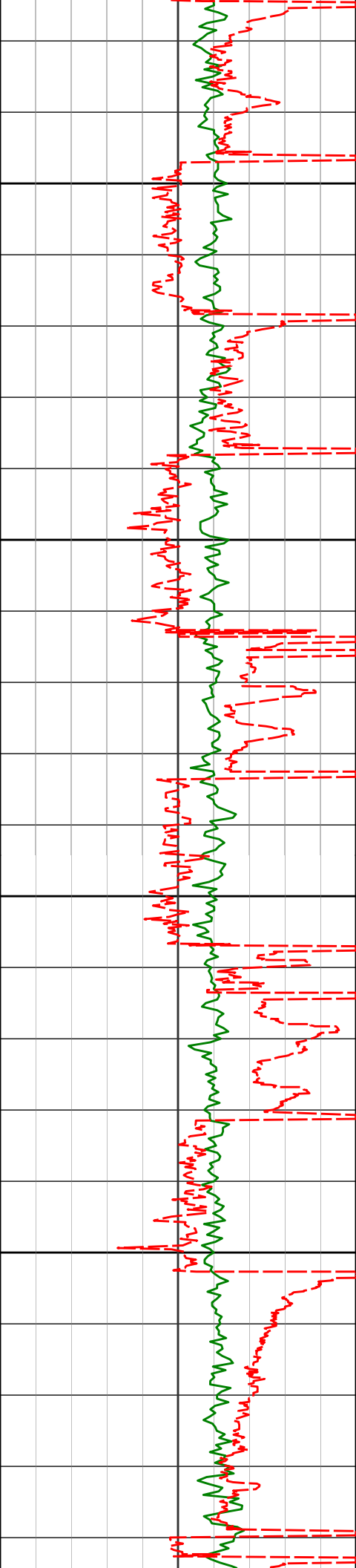
TVD

V.S.

TVD Detail Log 1:240

Noble Energy
Rainbow LC28-76-1BHNA
H&P 273
T9N, R59W





5500

5575'

18.35°

324.40°

5514.94'

-58.28'

5550

5622'

20.43°

325.42°

5559.27'

-43.91'

5600

5670'

22.16°

323.34°

5603.99'

-27.93'

5650

5717'

23.91°

321.97°

5647.25'

-11.29'

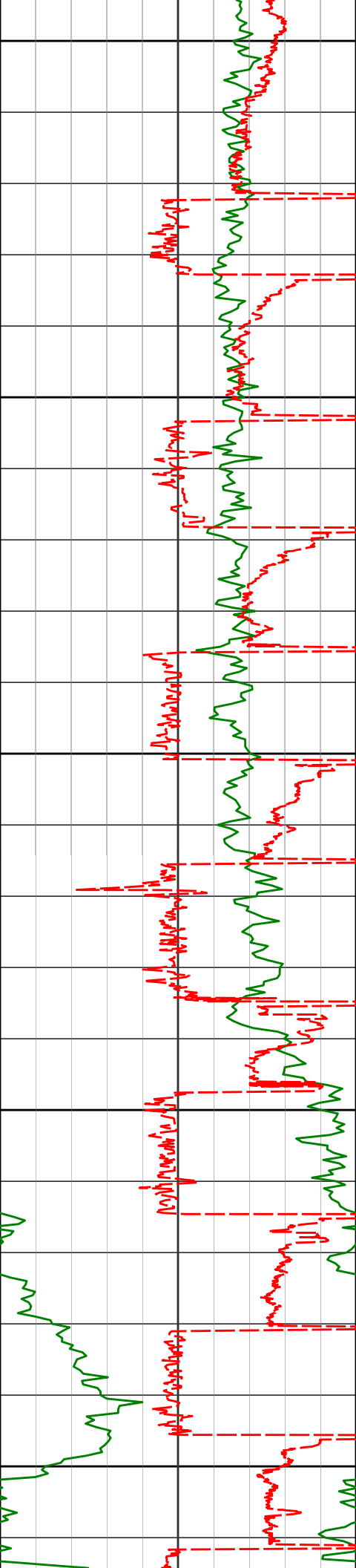
5765'

31.11°

324.83°

5689.79'

8.90'



5700

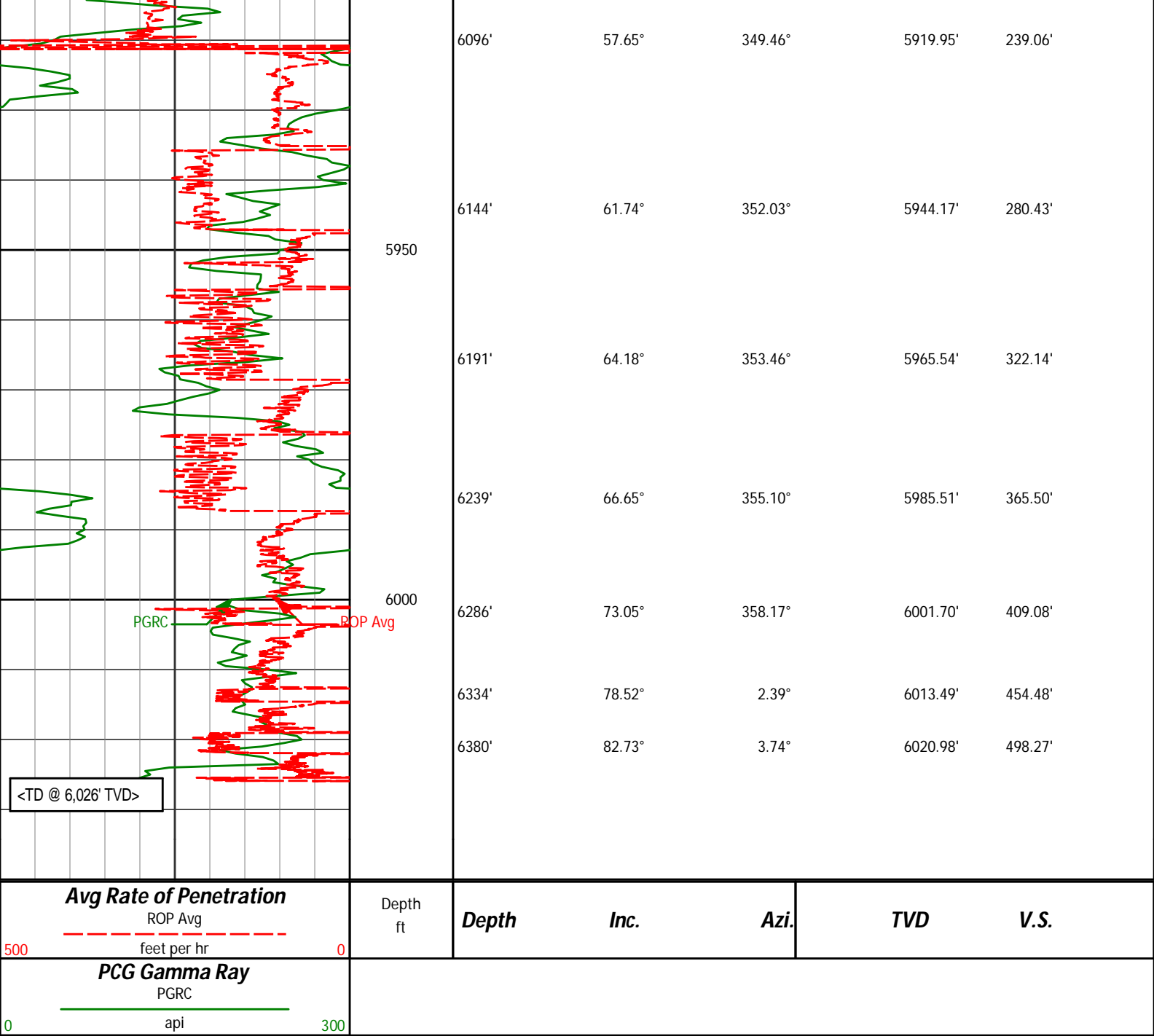
5750

5800

5850

5900

5811'	36.97°	330.30°	5727.90'	33.05'
5859'	40.74°	334.24°	5765.28'	62.05'
5906'	45.34°	337.40°	5799.63'	93.41'
5954'	47.74°	339.18°	5832.64'	127.76'
6001'	50.37°	340.95°	5863.44'	162.93'
6049'	53.00°	344.86°	5893.21'	200.44'



HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble Energy
Rainbow LC28-76-1BHNA
Wattenberg
Weld Colorado
USA
CA-XX-0901400243

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
356.00	0.40	358.14	356.00	1.24 N	0.04 W	1.22	0.11
607.00	0.40	181.04	607.00	1.24 N	0.08 W	1.23	0.32
716.00	0.67	235.30	715.99	0.50 N	0.62 W	0.62	0.50
809.00	0.58	222.68	808.99	0.16 S	1.38 W	0.14	0.18
1088.00	0.38	242.02	1087.98	1.63 S	3.16 W	-0.93	0.09

1274.00	0.22	244.38	1273.97	2.08 S	4.04 W	-1.18	0.08
1367.00	3.28	262.44	1366.92	2.51 S	6.84 W	-1.01	3.30
1460.00	4.53	251.36	1459.70	4.03 S	12.96 W	-1.22	1.56
1553.00	5.53	252.35	1552.34	6.57 S	20.71 W	-2.06	1.08
1645.00	6.73	248.80	1643.81	9.86 S	29.96 W	-3.34	1.36
1737.00	8.11	248.62	1735.04	14.17 S	41.03 W	-5.23	1.50
1832.00	9.32	251.68	1828.95	19.03 S	54.57 W	-7.13	1.36
1927.00	10.13	249.02	1922.58	24.44 S	69.67 W	-9.24	0.98
2022.00	9.43	249.88	2016.20	30.11 S	84.78 W	-11.61	0.75
2117.00	10.80	250.92	2109.72	35.70 S	100.50 W	-13.76	1.45
2212.00	11.10	250.58	2202.99	41.65 S	117.54 W	-16.00	0.33
2307.00	10.98	250.23	2296.23	47.75 S	134.68 W	-18.36	0.15
2401.00	10.09	249.89	2388.65	53.61 S	150.83 W	-20.69	0.94
2496.00	9.67	250.55	2482.24	59.13 S	166.18 W	-22.86	0.46
2591.00	10.79	250.71	2575.72	64.72 S	182.09 W	-24.98	1.17
2686.00	11.19	250.85	2668.98	70.69 S	199.20 W	-27.21	0.43
2781.00	11.34	251.96	2762.15	76.60 S	216.79 W	-29.30	0.28
2875.00	10.27	250.17	2854.48	82.31 S	233.46 W	-31.37	1.20
2970.00	9.69	249.96	2948.05	87.92 S	248.93 W	-33.60	0.61
3065.00	9.15	249.03	3041.77	93.36 S	263.49 W	-35.86	0.58
3160.00	8.81	247.54	3135.60	98.84 S	277.27 W	-38.32	0.44
3255.00	9.84	248.71	3229.35	104.57 S	291.55 W	-40.92	1.11
3350.00	9.68	249.18	3322.97	110.36 S	306.58 W	-43.41	0.19
3445.00	10.27	249.14	3416.53	116.21 S	321.96 W	-45.90	0.63
3540.00	11.16	247.55	3509.88	122.74 S	338.37 W	-48.83	0.98
3635.00	10.59	249.91	3603.17	129.25 S	355.07 W	-51.69	0.76
3730.00	11.41	250.81	3696.42	135.33 S	372.14 W	-54.05	0.87
3825.00	10.11	253.27	3789.75	140.82 S	389.00 W	-55.87	1.44
3920.00	9.86	248.53	3883.32	146.20 S	404.55 W	-57.85	0.91
4014.00	8.39	245.63	3976.13	151.98 S	418.28 W	-60.61	1.64
4109.00	7.32	250.49	4070.23	156.86 S	430.30 W	-62.85	1.32
4204.00	8.02	246.14	4164.38	161.56 S	442.07 W	-64.98	0.95
4299.00	8.63	241.67	4258.38	167.62 S	454.40 W	-68.31	0.94
4394.00	9.98	242.67	4352.13	174.79 S	467.99 W	-72.46	1.42
4489.00	8.67	249.42	4445.88	181.08 S	482.01 W	-75.66	1.79
4583.00	9.27	257.69	4538.73	185.19 S	496.04 W	-76.73	1.51
4678.00	9.78	257.75	4632.42	188.53 S	511.40 W	-76.76	0.54
4773.00	9.14	249.56	4726.13	192.88 S	526.35 W	-77.87	1.57
4868.00	9.87	251.37	4819.83	198.11 S	541.14 W	-79.88	0.84
4963.00	10.04	252.06	4913.40	203.26 S	556.73 W	-81.64	0.22
5058.00	9.91	252.94	5006.96	208.21 S	572.42 W	-83.17	0.21
5152.00	9.19	254.45	5099.66	212.60 S	587.39 W	-84.31	0.81
5247.00	10.09	257.31	5193.32	216.46 S	602.82 W	-84.85	1.07
5315.00	9.75	257.64	5260.30	219.00 S	614.26 W	-84.93	0.51
5385.00	8.99	257.68	5329.36	221.44 S	625.39 W	-84.97	1.09
5432.00	8.82	272.74	5375.80	222.05 S	632.58 W	-84.05	4.96
5480.00	10.55	308.73	5423.16	219.12 S	639.69 W	-79.69	12.88
5527.00	15.13	321.75	5468.98	211.61 S	646.85 W	-70.84	11.48
5575.00	18.35	324.40	5514.94	200.54 S	655.13 W	-58.28	6.88
5622.00	20.43	325.42	5559.27	187.77 S	664.10 W	-43.91	4.49
5670.00	22.16	323.34	5603.99	173.61 S	674.26 W	-27.93	3.93
5717.00	23.91	321.97	5647.25	158.99 S	685.42 W	-11.29	3.89
5765.00	31.11	324.83	5689.79	141.17 S	698.57 W	8.90	15.25
5811.00	36.97	330.30	5727.90	119.41 S	712.29 W	33.05	14.37
5859.00	40.74	334.24	5765.28	92.76 S	726.25 W	62.05	9.38
5906.00	45.34	337.40	5799.63	63.49 S	739.35 W	93.41	10.80
5954.00	47.74	339.18	5832.64	31.13 S	752.22 W	127.76	5.68
6001.00	50.37	340.95	5863.44	2.24 N	764.31 W	162.93	6.28
6049.00	53.00	344.86	5893.21	38.23 N	775.36 W	200.44	8.41
6096.00	57.65	349.46	5919.95	75.90 N	783.90 W	239.06	12.76
6144.00	61.74	352.03	5944.17	116.79 N	790.54 W	280.43	9.69
6191.00	64.18	353.46	5965.54	158.31 N	795.82 W	322.14	5.85
6239.00	66.65	355.10	5985.51	201.74 N	800.16 W	365.50	6.02
6286.00	73.05	358.17	6001.70	245.76 N	802.72 W	409.08	14.92
6334.00	78.52	2.39	6013.49	292.26 N	802.48 W	454.48	14.23
6380.00	82.73	3.74	6020.98	337.57 N	800.04 W	498.27	9.62
6448.00	88.00	359.00	6026.48	405.28 N	798.43 W	564.13	10.40

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 347.86 DEGREES (GRID)
A TOTAL CORRECTION OF 7.14 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED

HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 6448.00 FEET
IS 895.40 FEET ALONG 296.91 DEGREES (GRID)

Surface surveys at 356 ft and 607 ft have had azimuths corrected to grid north, but were not taken by Halliburton.

Last survey is a projection from 6380 ft MD to TD at 6448 ft MD.

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