

PCGK - Pressure Case Gamma

1 : 240

[illegible]

WELL INFORMATION

MWD Run Number	100	200			
Date run completed	08-Apr-14	09-Apr-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)	659.99	5,754.95			
Log End Depth (TVD, ft)	5,754.95	6,454.47			
Drill or Wipe	Drill	Drill			
Drill/Wipe Start Date and Time	06-Apr-14 20:53	08-Apr-14 04:37			
Drill/Wipe End Date and Time	07-Apr-14 18:48	09-Apr-14 05:09			
Min Inc (deg) @ Depth (TVD, ft)	0.19 @ 1,758.93	0.13 @ 5,769.95			
Max Inc (deg) @ Depth (TVD, ft)	9.65 @ 3,458.31	76.17 @ 6,442.92			
Bit TFA(in2) / Bit Type	0.91 / PDC	0.98 / PDC			
Flow Rate (gpm)	540.00	536.00			
Max AV (fpm) / CV (fpm) @ MWD	213.6 / 213.6	427.3 / 427.3			
Fluid Type	Fresh Water Gel	Fresh Water Gel			
Density (ppg) / Viscosity (spqt)	9.20 / 44.00	10.65 / 40.00			
Filtrate CL (ppm)	1,900.00	1,900.00			
pH / Fluid Loss (mptm)	10.30 / N/A	10.00 / N/A			
PV (cP) / YP (lbf2)	12 / 12.00	14 / 10.00			
% Solids / % Sand	6.5 / .5	11.9 / .25			
% 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) @ Depth (ft)	145.00 / PDC	170.47 / PDC			

Max Tool Temp (degF) / Source	145.90 / PCM	158.47 / PCM			
Rm @ Max Tool Temp (degF)	N/A @ N/A	N/A @ N/A			
Lead MWD Engineer	Robert Ley	Robert Ley			
Customer Representative	Jeremy Stolz	Jeremy Stolz			

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM			
Software Version	5.84	5.84			
Sub Serial Number	11404277	11404277			
Insert Serial Number	11680106	11680106			
Date and Time Initialized	05-Apr-14 17:06	01-Jan-70 00:00			
Date and Time Read	09-Apr-14 11:03	09-Apr-14 10:53			
ECMB SW Version	N/A	N/A			

Directional Sensor Information

Tool Type	PCDC	PCDC			
Distance From Bit (ft)	58.00	58.00			
Software Version	6.21	6.21			
Sub Serial Number	11404277	11404277			
Sonde Serial Number	11478090	11478090			
Sensor ID Number	N/A	N/A			
Toolface Offset (deg)	149.32	121.99			

Gamma Ray Sensor Information

Tool Type	PCG	PCG			
Distance From Bit (ft)	51.12	50.84			
Recorded Sample Period (sec)	10	10			
Software Version	8.15	8.15			
Sub Serial Number	11404277	11404277			
Insert/Sonde Serial Number	12071281	12071281			

REMARKS

1. All depths are true vertical depths and are calibrated to the driller' pipe tally and are measured from the 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.
4. The Following smoothing parameters have been applied to the data"

PGXR (Gamma Ray CG):
Interval Resolution: 0.5 feet
Coercion Distance: 0.6 feet
Gap Fill: 3.0 feet

ROPA (Rate of Penetration):
Interval Resolution: 0.5 feet
Coercion Distance: 1.2 feet

WARRANTY

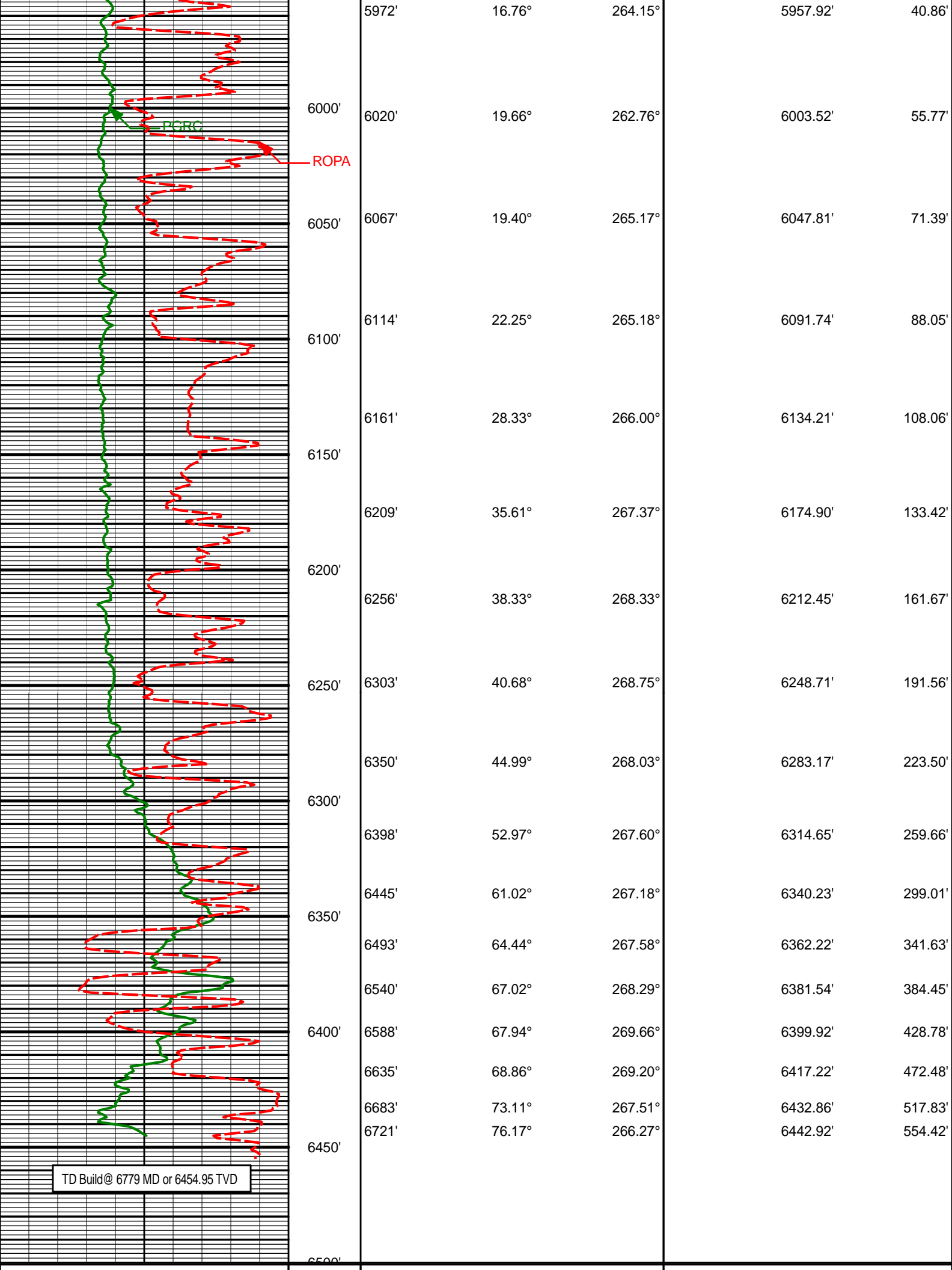
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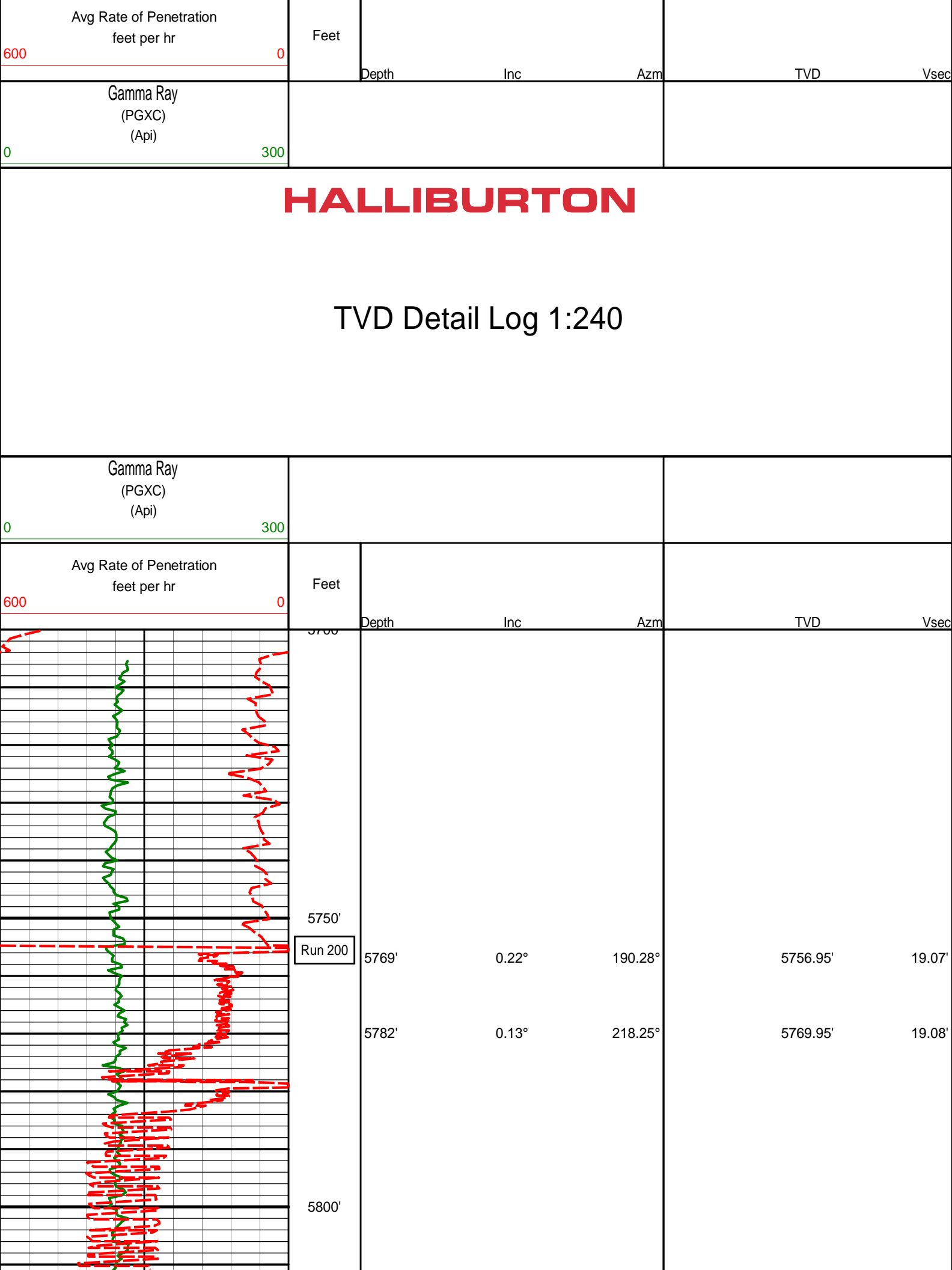
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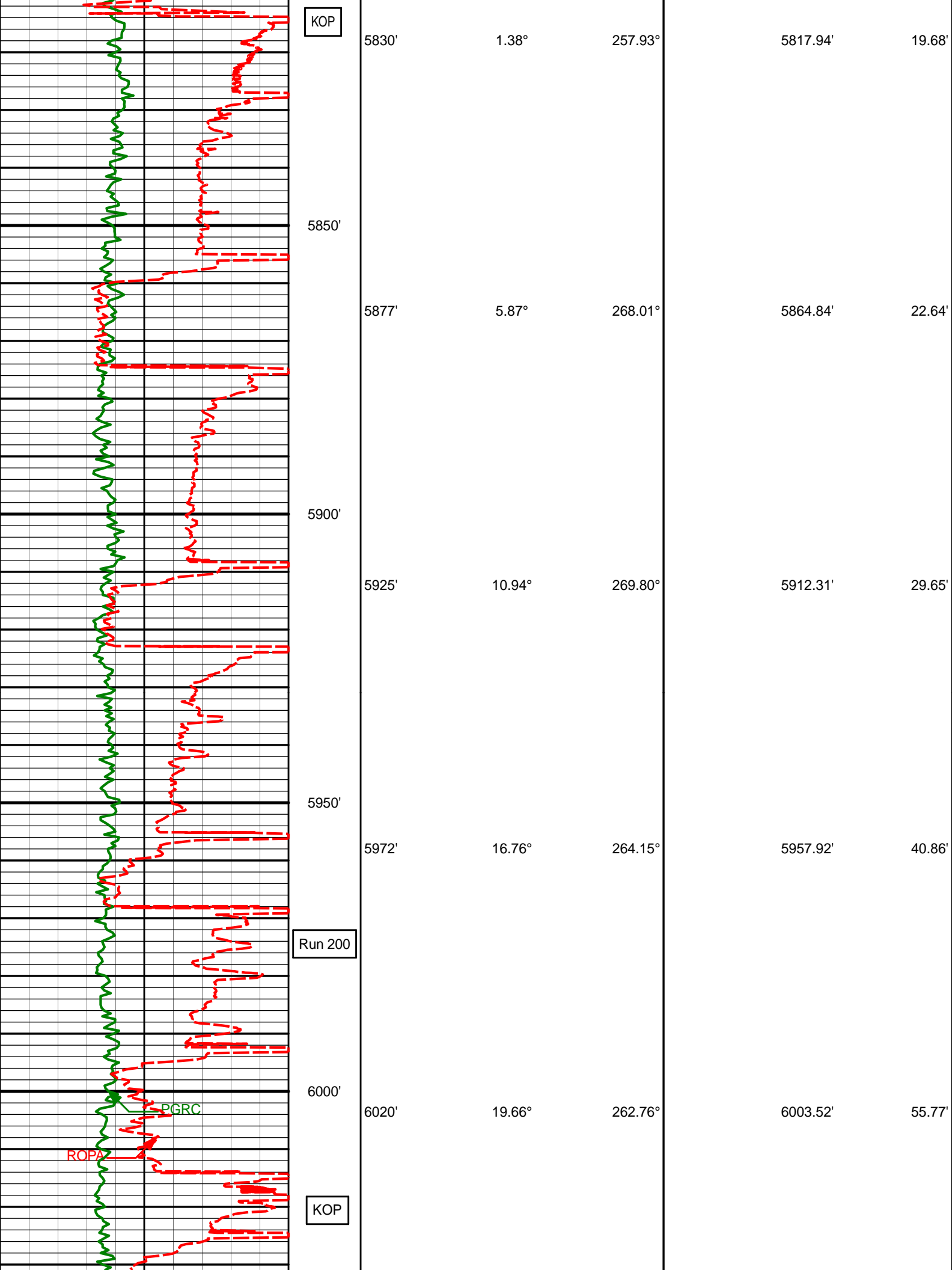
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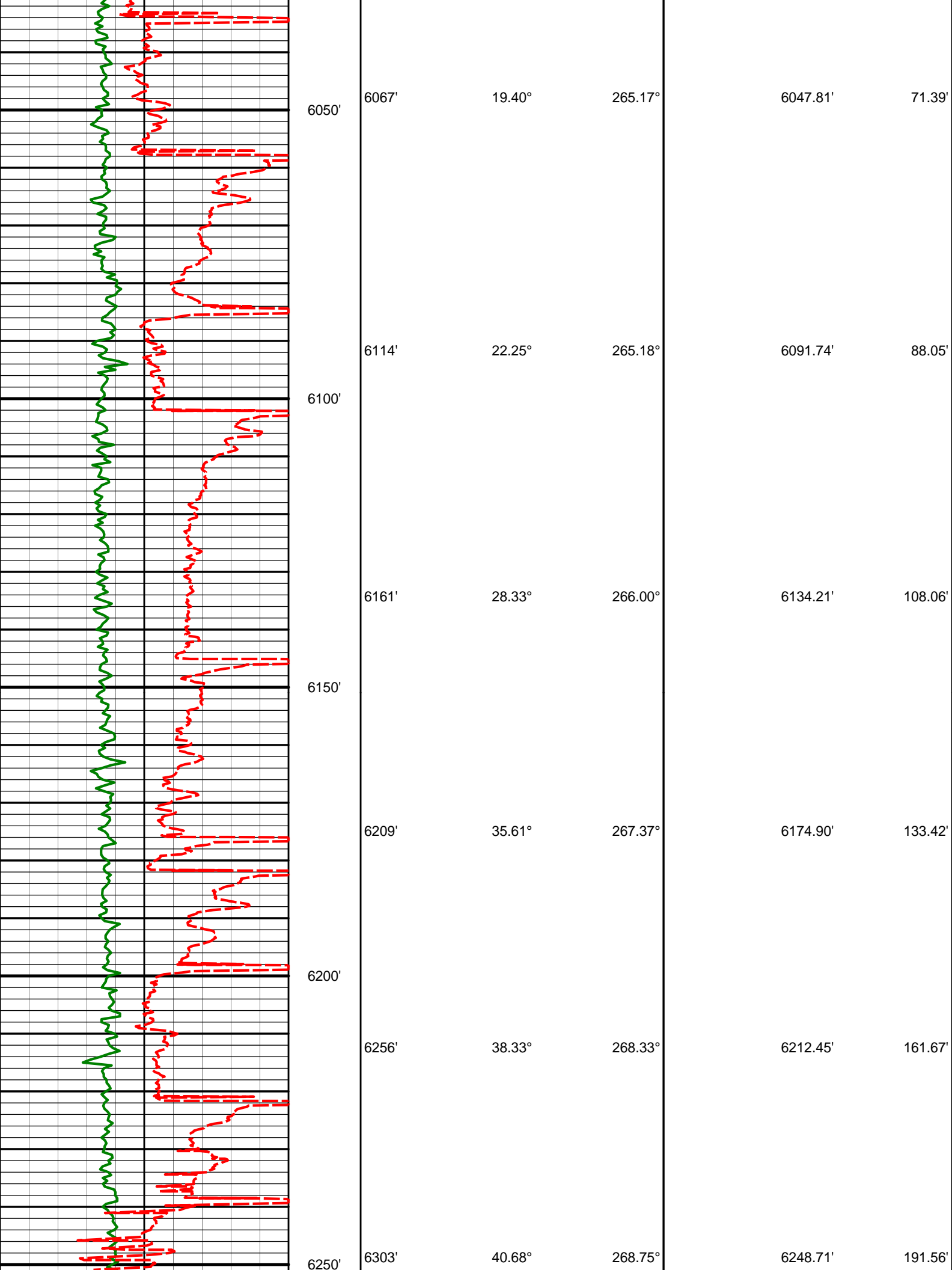
TVD Detail Log 1:600

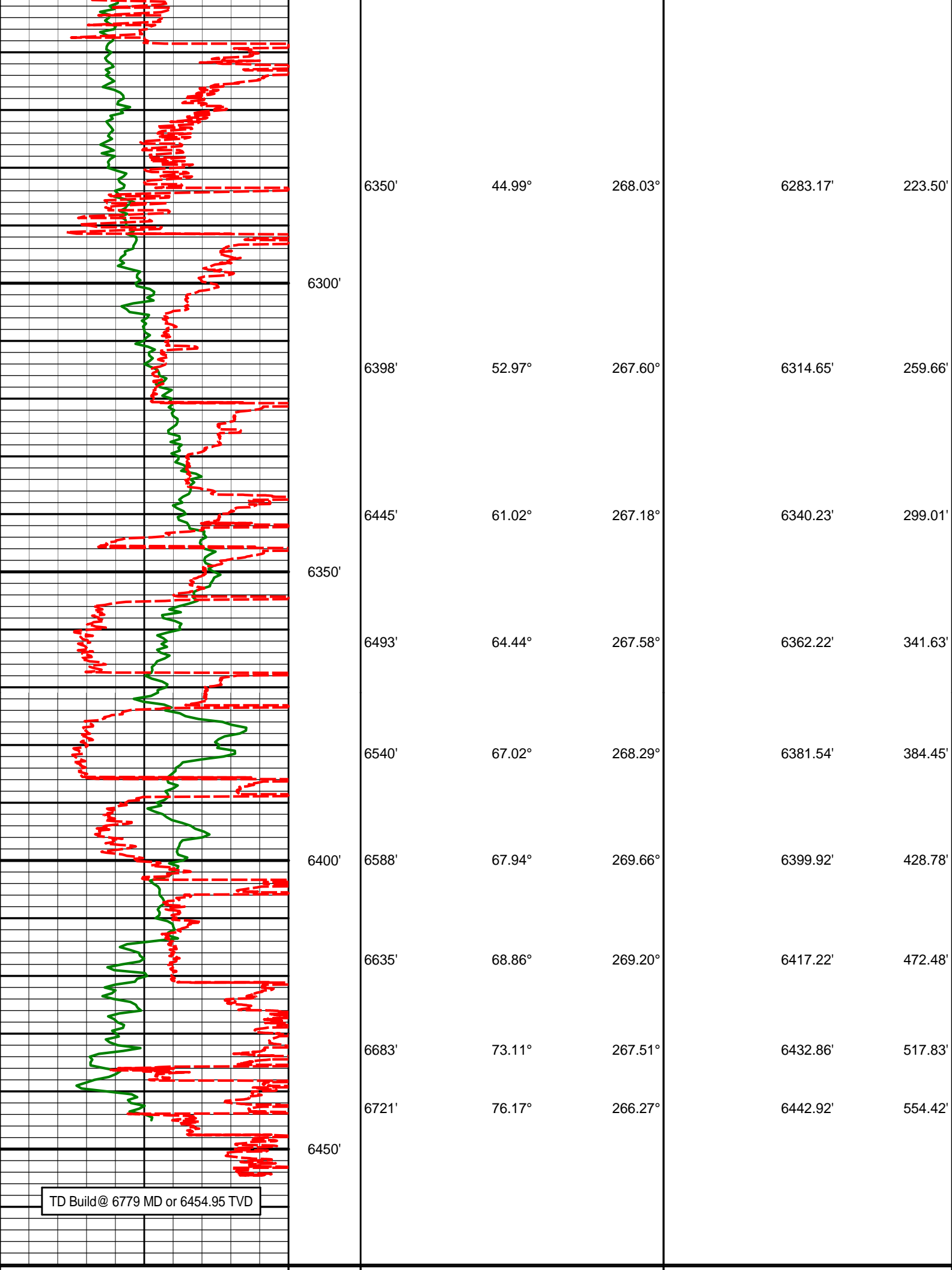
Gamma Ray (PGXC) (Api)						
0300						
Avg Rate of Penetration feet per hr	Feet					
6000		Depth	Inc	Azm	TVD	Vsec
	5700'	5709'	0.39°	189.54°	5696.95'	19.01'
	5750'					
	Run 200	5769'	0.22°	190.28°	5756.95'	19.07'
		5782'	0.13°	218.25°	5769.95'	19.08'
	5800'					
	KOP	5830'	1.38°	257.93°	5817.94'	19.68'
	5850'					
		5877'	5.87°	268.01°	5864.84'	22.64'
	5900'					
		5925'	10.94°	269.80°	5912.31'	29.65'
	5950'					











TD Build@ 6779 MD or 6454.95 TVD

Avg Rate of Penetration feet per hr	Feet				
		Depth	Inc	Azm	TVD
Gamma Ray (PGXC) (Api)					

DIRECTIONAL SURVEY REPORT

Noble Energy
Wells Ranch AE30-67-1BHNA
Wattenburg
Weld Colorado
USA
CA-XX-0901176693

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
250.00	0.50	22.07	250.00	1.01 N	0.41 E	-0.41	0.20
500.00	0.20	214.17	499.99	1.66 N	0.57 E	-0.58	0.28
629.00	0.70	180.17	628.99	0.69 N	0.45 E	-0.45	0.42
731.00	0.42	201.32	730.99	0.28 S	0.31 E	-0.31	0.34
824.00	0.46	171.23	823.98	0.97 S	0.24 E	-0.24	0.25
917.00	0.72	164.92	916.98	1.90 S	0.45 E	-0.44	0.29
1010.00	0.81	163.79	1009.97	3.10 S	0.79 E	-0.78	0.10
1103.00	0.72	156.43	1102.96	4.27 S	1.20 E	-1.19	0.14
1196.00	0.57	156.70	1195.96	5.23 S	1.62 E	-1.60	0.16
1289.00	0.37	172.58	1288.95	5.95 S	1.84 E	-1.82	0.25
1382.00	0.64	158.53	1381.95	6.73 S	2.07 E	-2.05	0.32
1475.00	0.75	55.71	1474.94	6.87 S	2.76 E	-2.74	1.17
1570.00	0.79	47.66	1569.94	6.08 S	3.76 E	-3.74	0.12
1664.00	0.64	60.78	1663.93	5.39 S	4.70 E	-4.68	0.24
1759.00	0.19	43.81	1758.93	5.01 S	5.27 E	-5.25	0.49
1853.00	0.40	36.19	1852.92	4.64 S	5.57 E	-5.56	0.23
1948.00	0.30	298.21	1947.92	4.25 S	5.55 E	-5.53	0.56
2042.00	0.66	285.02	2041.92	4.00 S	4.81 E	-4.80	0.40
2137.00	0.90	303.06	2136.91	3.45 S	3.65 E	-3.64	0.36
2232.00	1.05	307.89	2231.90	2.51 S	2.34 E	-2.33	0.18
2327.00	0.61	91.67	2326.89	1.99 S	2.16 E	-2.15	1.67
2422.00	1.27	100.39	2421.88	2.19 S	3.70 E	-3.69	0.71
2516.00	0.52	75.53	2515.87	2.27 S	5.14 E	-5.13	0.88
2611.00	1.14	10.82	2610.86	1.24 S	5.73 E	-5.73	1.09
2706.00	2.33	11.97	2705.81	1.58 N	6.31 E	-6.32	1.25
2801.00	3.72	358.03	2800.68	6.55 N	6.61 E	-6.63	1.65
2896.00	4.89	347.57	2895.41	13.59 N	5.63 E	-5.67	1.48
2990.00	6.20	350.49	2988.97	22.51 N	3.93 E	-4.00	1.43
3085.00	7.50	353.35	3083.29	33.72 N	2.36 E	-2.47	1.41
3179.00	8.00	353.39	3176.43	46.31 N	0.90 E	-1.05	0.53
3274.00	8.33	353.65	3270.47	59.72 N	0.62 W	0.42	0.35
3369.00	8.29	347.52	3364.47	73.25 N	2.86 W	2.62	0.93
3464.00	9.65	356.79	3458.31	87.89 N	4.79 W	4.50	2.08
3559.00	9.30	354.58	3552.02	103.48 N	5.96 W	5.62	0.53
3653.00	9.61	354.11	3644.74	118.84 N	7.48 W	7.09	0.34
3748.00	9.19	349.34	3738.47	134.19 N	9.70 W	9.26	0.93
3843.00	8.20	350.00	3832.37	148.31 N	12.28 W	11.79	1.05
3938.00	6.26	345.41	3926.61	160.00 N	14.76 W	14.23	2.13
4033.00	3.98	338.21	4021.23	168.08 N	17.29 W	16.73	2.49
4129.00	1.84	340.93	4117.10	172.63 N	19.03 W	18.46	2.23
4224.00	0.76	186.89	4212.09	173.44 N	19.61 W	19.03	2.68
4318.00	0.59	192.84	4306.08	172.35 N	19.79 W	19.22	0.20
4413.00	1.31	179.77	4401.07	170.79 N	19.89 W	19.33	0.79
4508.00	1.62	195.35	4496.04	168.41 N	20.24 W	19.68	0.53
4602.00	0.85	204.40	4590.01	166.49 N	20.88 W	20.33	0.84
4697.00	1.08	205.24	4685.00	165.04 N	21.56 W	21.01	0.24
4793.00	0.64	209.11	4780.99	163.75 N	22.20 W	21.66	0.46
4887.00	0.73	120.85	4874.98	162.99 N	21.94 W	21.40	1.02
4982.00	0.68	142.11	4969.98	162.23 N	21.08 W	20.54	0.28

4982.00	0.58	142.11	4589.96	162.23 N	21.08 W	20.34	0.28
5077.00	0.44	119.93	5064.97	161.60 N	20.42 W	19.88	0.34
5171.00	0.45	204.22	5158.97	161.09 N	20.25 W	19.72	0.64
5266.00	0.59	251.01	5253.97	160.59 N	20.87 W	20.34	0.46
5361.00	0.47	119.63	5348.97	160.24 N	20.99 W	20.46	1.02
5456.00	0.63	133.01	5443.96	159.69 N	20.27 W	19.74	0.21
5550.00	0.62	160.80	5537.96	158.86 N	19.73 W	19.20	0.32
5709.00	0.39	189.54	5696.95	157.51 N	19.53 W	19.01	0.21
5769.00	0.22	190.28	5756.95	157.19 N	19.59 W	19.07	0.28
5782.00	0.13	218.25	5769.95	157.16 N	19.60 W	19.08	0.94
5830.00	1.38	257.93	5817.94	156.99 N	20.20 W	19.68	2.67
5877.00	5.87	268.01	5864.84	156.79 N	23.16 W	22.64	9.61
5925.00	10.94	269.80	5912.31	156.69 N	30.17 W	29.65	10.58
5972.00	16.76	264.15	5957.92	155.98 N	41.38 W	40.86	12.70
6020.00	19.66	262.76	6003.52	154.26 N	56.28 W	55.77	6.11
6067.00	19.40	265.17	6047.81	152.61 N	71.90 W	71.39	1.80
6114.00	22.25	265.18	6091.74	151.20 N	88.55 W	88.05	6.06
6161.00	28.33	266.00	6134.21	149.68 N	108.56 W	108.06	12.96
6209.00	35.61	267.37	6174.90	148.24 N	133.92 W	133.42	15.24
6256.00	38.33	268.33	6212.45	147.18 N	162.16 W	161.67	5.92
6303.00	40.68	268.75	6248.71	146.43 N	192.05 W	191.56	5.03
6350.00	44.99	268.03	6283.17	145.52 N	223.98 W	223.50	9.23
6398.00	52.97	267.60	6314.65	144.13 N	260.14 W	259.66	16.64
6445.00	61.02	267.18	6340.23	142.33 N	299.48 W	299.01	17.14
6493.00	64.44	267.58	6362.22	140.38 N	342.09 W	341.63	7.16
6540.00	67.02	268.29	6381.54	138.84 N	384.91 W	384.45	5.66
6588.00	67.94	269.66	6399.92	138.05 N	429.24 W	428.78	3.26
6635.00	68.86	269.20	6417.22	137.62 N	472.94 W	472.48	2.16
6683.00	73.11	267.51	6432.86	136.31 N	518.29 W	517.83	9.46
6721.00	76.17	266.27	6442.92	134.32 N	554.87 W	554.42	8.65

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 269.81 DEGREES (GRID)
A TOTAL CORRECTION OF 7.57 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 6721.00 FEET
IS 570.89 FEET ALONG 283.61 DEGREES (GRID)**

Tie-In @ Surface

Surveys at 250 ft, 500 ft and 629 ft were taken and provided by HP 322 while they were drilling the surface hole and have been converted from magnetic north to grid north.