

PCGK - Pressure Case Gamma

1 : 240

[illegible]

WELL INFORMATION

MWD Run Number	100	200			
Date run completed	12-Feb-14	13-Feb-14			
Rig Bit Number	100	200			
Bit Size (in)	8.750	8.750			
Tool Nominal OD (in)	6.750	6.750			
Log Start Depth (TVD, ft)	968.97	5,848.53			
Log End Depth (TVD, ft)	5,848.53	6,629.53			
Drill or Wipe	Drill	Drill			
Drill/Wipe Start Date and Time	11-Feb-14 00:48	12-Feb-14 03:00			
Drill/Wipe End Date and Time	12-Feb-14 05:17	13-Feb-14 07:15			
Min Inc (deg) @ Depth (TVD, ft)	0.40 @ 250.00	10.43 @ 5,883.90			
Max Inc (deg) @ Depth (TVD, ft)	18.22 @ 2,946.43	84.68 @ 6,627.42			
Bit TFA(in2) / Bit Type	1.24 / PDC	0.98 / PDC			
Flow Rate (gpm)	563.00	515.00			
Max AV (fpm) / CV (fpm) @ MWD	448.6 / 448.6	448.6 / 448.6			
Fluid Type	Fresh Water Gel	Fresh Water Gel			
Density (ppg) / Viscosity (spqt)	8.50 / 27.50	10.70 / 35.00			
Filtrate CL (ppm)	80.00	2,200.00			
pH / Fluid Loss (mptm)	10.00 / N/A	8.90 / N/A			
PV (cP) / YP (lbf2)	2 / 3.00	11 / 11.00			
% Solids / % Sand	.8 / 1.1	11.1 / .4			
% 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 (deg F) / S	112.00 / 20M	112.00 / 20M			

Max Tool Temp (degF) / Source	412.20 / PCM	412.20 / PCM			
Rm @ Max Tool Temp (degF)	N/A @ N/A	N/A @ N/A			
Lead MWD Engineer	Robert Ley	Robert Ley			
Customer Representative	Charles Collver	Charles Collver			

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM			
Software Version	5.84	5.84			
Sub Serial Number	246473	246473			
Insert Serial Number	11680738	11680738			
Date and Time Initialized	10-Feb-14 09:47	10-Feb-14 09:47			
Date and Time Read	13-Feb-14 16:44	13-Feb-14 15:54			
ECMB SW Version	N/A	N/A			

Directional Sensor Information

Tool Type	PCDC	PCDC			
Distance From Bit (ft)	61.00	58.00			
Software Version	6.21	6.21			
Sub Serial Number	246473	246473			
Sonde Serial Number	11638621	11638621			
Sensor ID Number	N/A	N/A			
Toolface Offset (deg)	310.62	81.36			

Gamma Ray Sensor Information

Tool Type	PCG	PCG			
Distance From Bit (ft)	53.86	51.12			
Recorded Sample Period (sec)	10	10			
Software Version	8.15	8.15			
Sub Serial Number	246473	246473			
Insert/Sonde Serial Number	11681001	11681001			

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

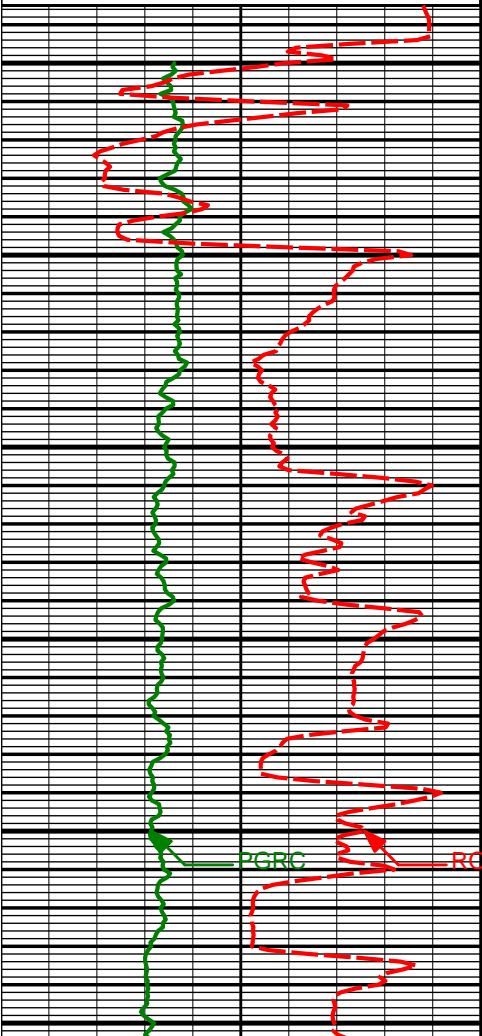
WARRANTY

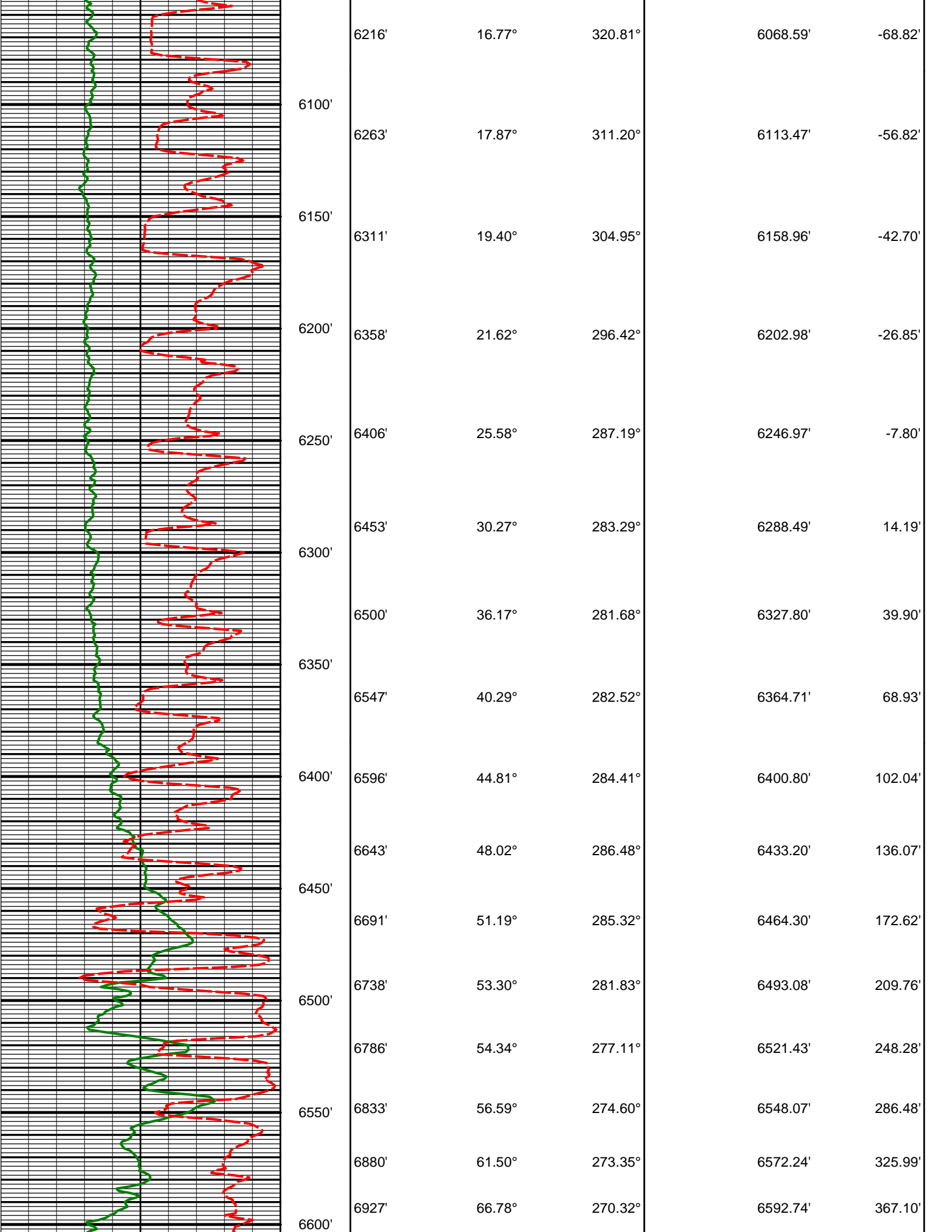
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TVD Detail Log 1:600

Gamma Ray (PGXC) (Api)						
0300						
Avg Rate of Penetration feet per hr	Feet					
6000						
	Run 200	Depth	Inc	Azm	TVD	Vsec
		5929'	11.85°	20.08°	5788.73'	-89.88'
		5800'				
		6026'	10.43°	20.78°	5883.90'	-91.57'
		5900'				
		KOP				
		6073'	10.87°	1.97°	5930.11'	-90.96'
		5950'				
		6121'	13.99°	339.95°	5977.00'	-86.57'
		6000'				
PGRC ROPA		6168'	15.44°	330.97°	6022.46'	-78.92'
		6050'				



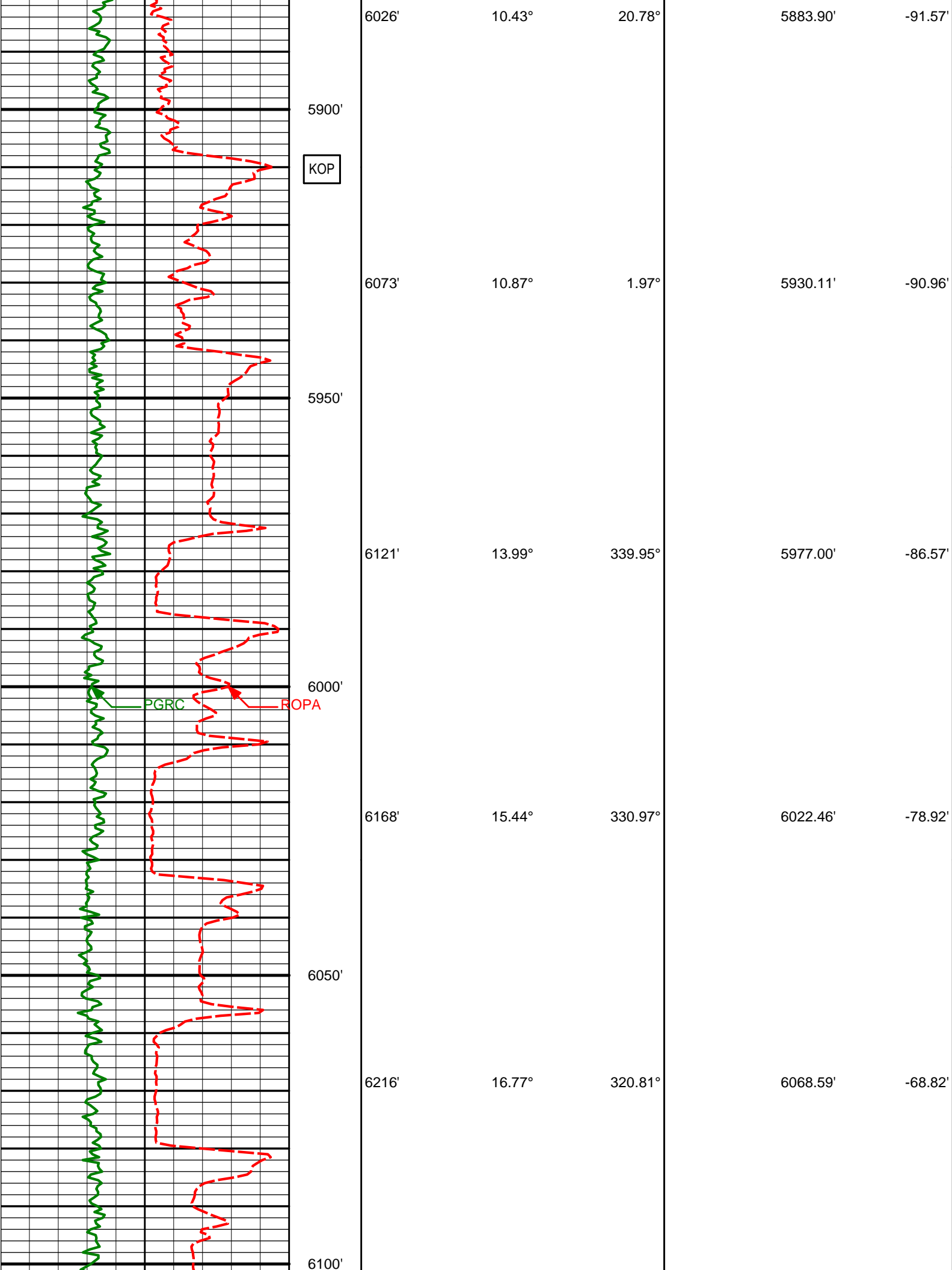
			6975'	72.95°	267.47°	6609.26'	410.32'
			7022'	79.21°	265.52°	6620.56'	453.49'
			7071'	84.68°	265.58°	6627.42'	499.15'

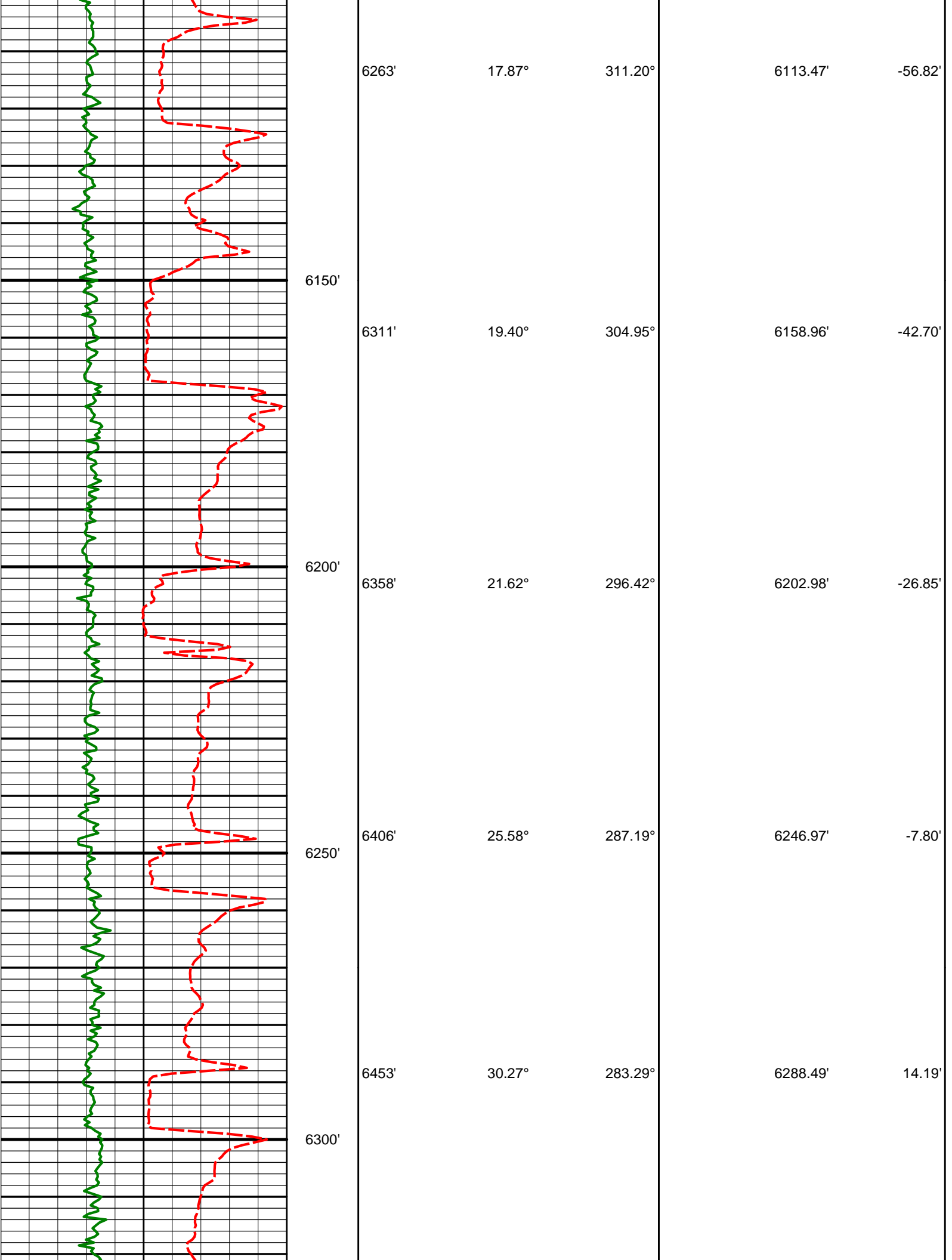
Avg Rate of Penetration feet per hr <div>600</div> <div>0</div>	Feet					
		Depth	Inc	Azm	TVD	Vsec
Gamma Ray (PGXC) (Api) <div>0</div> <div>300</div>						

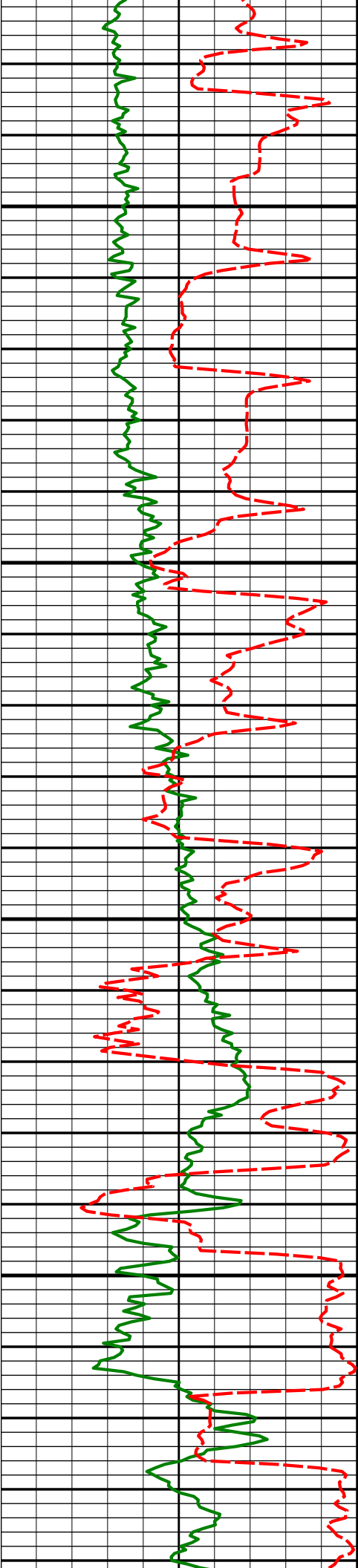
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TVD Detail Log 1:240

Gamma Ray (PGXC) (Api) <div>0</div> <div>300</div>						
Avg Rate of Penetration feet per hr <div>600</div> <div>0</div>	Feet					
		Depth	Inc	Azm	TVD	Vsec
	5800'					
	Run 200					







6350'

6500'

36.17°

281.68°

6327.80'

39.90'

6547'

40.29°

282.52°

6364.71'

68.93'

6400'

6596'

44.81°

284.41°

6400.80'

102.04'

6643'

48.02°

286.48°

6433.20'

136.07'

6450'

6691'

51.19°

285.32°

6464.30'

172.62'

6738'

53.30°

281.83°

6493.08'

209.76'

6500'

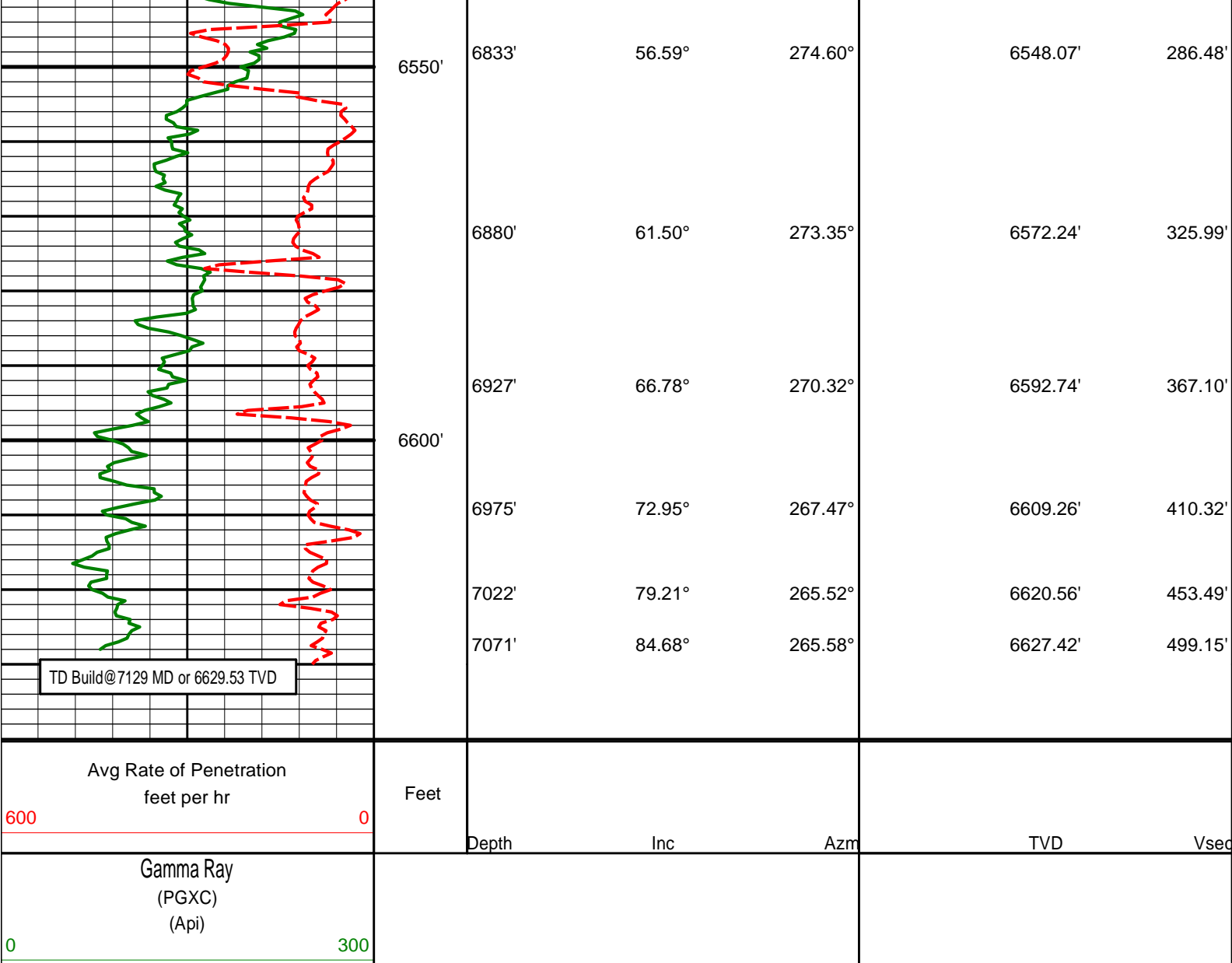
6786'

54.34°

277.11°

6521.43'

248.28'



DIRECTIONAL SURVEY REPORT

Noble Energy
Wells Ranch AA21-65-1HN
Wattenberg
Weld Colorado
USA
CA-XX-0900918618

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	0.40	203.38	250.00	0.80 S	0.35 W	0.12	0.16
500.00	0.40	97.08	499.99	1.71 S	0.17 E	-0.62	0.26
750.00	0.40	266.78	749.99	1.87 S	0.17 E	-0.65	0.32
950.00	1.20	192.88	949.97	3.95 S	1.00 W	-0.08	0.58
1014.00	1.41	220.07	1013.96	5.20 S	1.65 W	0.23	1.01
1107.00	1.24	217.44	1106.93	6.88 S	3.00 W	1.09	0.20
1200.00	1.19	21.38	1199.93	6.78 S	3.26 W	1.36	2.58
1293.00	3.32	32.20	1292.85	3.60 S	1.48 W	0.48	2.33
1386.00	5.66	27.30	1385.56	2.75 N	2.06 E	-1.27	2.55
1479.00	8.33	26.20	1477.86	12.87 N	7.14 E	-3.51	2.88
1574.00	9.93	21.22	1571.65	26.68 N	13.14 E	-5.67	1.87
1669.00	11.94	21.13	1664.92	43.48 N	19.65 E	-7.53	2.12
1763.00	12.60	18.73	1756.78	62.25 N	26.44 E	-9.15	0.89
1858.00	14.66	16.51	1849.10	83.59 N	33.19 E	-10.05	2.24

1953.00	15.50	15.12	1940.83	107.37 N	39.91 E	-10.29	0.97
2048.00	14.60	19.20	2032.57	130.93 N	47.16 E	-11.09	1.47
2143.00	14.19	19.88	2124.59	153.19 N	55.06 E	-12.86	0.47
2238.00	14.70	21.64	2216.59	175.34 N	63.46 E	-15.14	0.71
2333.00	14.72	19.30	2308.47	197.94 N	71.90 E	-17.34	0.63
2427.00	15.77	24.80	2399.17	220.80 N	81.20 E	-20.30	1.90
2522.00	16.61	20.30	2490.41	245.26 N	91.33 E	-23.65	1.59
2617.00	15.28	17.50	2581.75	269.93 N	99.81 E	-25.34	1.62
2712.00	15.20	21.88	2673.41	293.42 N	108.21 E	-27.28	1.21
2807.00	15.88	20.92	2764.94	317.12 N	117.49 E	-30.00	0.77
2902.00	17.34	22.74	2855.97	342.32 N	127.61 E	-33.14	1.63
2997.00	18.22	22.35	2946.43	369.12 N	138.73 E	-36.82	0.94
3092.00	16.55	20.74	3037.09	395.51 N	149.17 E	-39.96	1.83
3187.00	16.36	21.28	3128.20	420.63 N	158.82 E	-42.66	0.26
3281.00	14.88	19.51	3218.73	444.35 N	167.65 E	-44.96	1.65
3377.00	13.40	20.21	3311.81	466.41 N	175.62 E	-46.84	1.55
3472.00	13.50	22.76	3404.21	486.97 N	183.71 E	-49.24	0.63
3566.00	13.72	18.37	3495.57	507.67 N	191.47 E	-51.29	1.12
3661.00	14.82	16.17	3587.64	530.03 N	198.40 E	-52.10	1.29
3756.00	16.42	19.07	3679.13	554.40 N	206.17 E	-53.19	1.88
3851.00	17.69	19.39	3769.95	580.70 N	215.35 E	-55.13	1.34
3945.00	17.63	18.91	3859.52	607.64 N	224.70 E	-57.08	0.17
4040.00	16.65	18.70	3950.30	634.14 N	233.73 E	-58.82	1.04
4135.00	16.01	15.98	4041.47	659.63 N	241.70 E	-59.81	1.04
4229.00	15.34	17.74	4131.97	683.93 N	249.06 E	-60.52	0.88
4324.00	13.07	19.59	4224.06	706.02 N	256.49 E	-61.89	2.44
4419.00	12.85	17.00	4316.64	726.24 N	263.18 E	-63.03	0.65
4514.00	13.58	18.45	4409.12	746.93 N	269.80 E	-63.98	0.85
4609.00	12.89	16.91	4501.60	767.65 N	276.42 E	-64.91	0.81
4704.00	12.69	14.48	4594.24	787.89 N	282.11 E	-65.08	0.61
4799.00	12.68	15.61	4686.92	808.04 N	287.53 E	-65.01	0.26
4894.00	12.62	20.90	4779.62	827.78 N	294.03 E	-66.10	1.22
4989.00	13.65	24.00	4872.14	847.71 N	302.29 E	-68.83	1.31
5084.00	15.11	22.41	4964.16	869.40 N	311.57 E	-72.08	1.59
5178.00	13.79	21.57	5055.18	891.15 N	320.36 E	-74.85	1.42
5273.00	13.58	19.20	5147.49	912.21 N	328.19 E	-76.87	0.63
5368.00	12.69	15.65	5240.00	932.79 N	334.68 E	-77.71	1.26
5463.00	12.36	17.37	5332.74	952.54 N	340.53 E	-78.16	0.52
5558.00	11.47	22.91	5425.69	970.95 N	347.24 E	-79.80	1.53
5653.00	11.76	24.40	5518.75	988.47 N	354.92 E	-82.61	0.44
5748.00	12.00	24.83	5611.72	1006.25 N	363.06 E	-85.79	0.27
5843.00	12.16	20.35	5704.61	1024.59 N	370.69 E	-88.33	1.00
5929.00	11.85	20.08	5788.73	1041.37 N	376.87 E	-89.88	0.36
6026.00	10.43	20.78	5883.90	1058.94 N	383.41 E	-91.57	1.47
6073.00	10.87	1.97	5930.11	1067.35 N	385.07 E	-90.96	7.42
6121.00	13.99	339.95	5977.00	1077.33 N	383.24 E	-86.57	11.71
6168.00	15.44	330.97	6022.46	1088.14 N	378.25 E	-78.92	5.74
6216.00	16.77	320.81	6068.59	1099.10 N	370.77 E	-68.82	6.48
6263.00	17.87	311.20	6113.47	1109.10 N	361.06 E	-56.82	6.51
6311.00	19.40	304.95	6158.96	1118.52 N	348.99 E	-42.70	5.24
6358.00	21.62	296.42	6202.98	1126.85 N	334.83 E	-26.85	7.92
6406.00	25.58	287.19	6246.97	1133.85 N	317.00 E	-7.80	11.26
6453.00	30.27	283.29	6288.49	1139.58 N	295.76 E	14.19	10.70
6500.00	36.17	281.68	6327.80	1145.12 N	270.63 E	39.90	12.69
6547.00	40.29	282.52	6364.71	1151.22 N	242.20 E	68.93	8.84
6596.00	44.81	284.41	6400.80	1158.96 N	209.99 E	102.04	9.57
6643.00	48.02	286.48	6433.20	1168.04 N	177.19 E	136.07	7.55
6691.00	51.19	285.32	6464.30	1178.04 N	142.03 E	172.62	6.87
6738.00	53.30	281.83	6493.08	1186.75 N	105.92 E	209.76	7.38
6786.00	54.34	277.11	6521.43	1193.11 N	67.72 E	248.28	8.23
6833.00	56.59	274.60	6548.07	1197.05 N	29.21 E	286.48	6.50
6880.00	61.50	273.35	6572.24	1199.83 N	10.99 W	325.99	10.69
6927.00	66.78	270.32	6592.74	1201.16 N	53.24 W	367.10	12.64
6975.00	72.95	267.47	6609.26	1200.27 N	98.27 W	410.32	14.01
7022.00	79.21	265.52	6620.56	1197.47 N	143.78 W	453.49	13.91
7071.00	84.68	265.58	6627.42	1193.71 N	192.13 W	499.15	11.16

TVD VALUES GIVEN RELATIVE TO DRILLING MEASUREMENT POINT

VERTICAL SECTION RELATIVE TO WELL HEAD

VERTICAL SECTION IS COMPUTED ALONG A DIRECTION OF 285.24 DEGREES (GRID)

A TOTAL CORRECTION OF 7.68 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED

HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.

HORIZONTAL DISPLACEMENT(CLOSURE) AT 7071.00 FEET

IS 1209.07 FEET ALONG 350.86 DEGREES (GRID)

Tie-In @ Surface

Surveys at 250 ft, 500 ft, 750 ft, and 950 were taken and provided by HP 322 while they were drilling the surface hole and have been covered from magnetic north to grid north.

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