

PCGK - Pressure Case Gamma

1 : 240

[illegible]

WELL INFORMATION

MWD Run Number	100	200			
Date run completed	04-Feb-14	04-Feb-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)	967.93	5,928.99			
Log End Depth (TVD, ft)	5,928.99	6,631.47			
Drill or Wipe	Drill	Drill			
Drill/Wipe Start Date and Time	03-Feb-14 03:30	04-Feb-14 05:45			
Drill/Wipe End Date and Time	03-Feb-14 20:30	04-Feb-14 16:20			
Min Inc (deg) @ Depth (TVD, ft)	0.23 @ 5,188.03	1.11 @ 5,939.99			
Max Inc (deg) @ Depth (TVD, ft)	17.25 @ 3,872.93	79.99 @ 6,622.33			
Bit TFA(in2) / Bit Type	0.90 / PDC	0.98 / PDC			
Flow Rate (gpm)	587.00	564.00			
Max AV (fpm) / CV (fpm) @ MWD	377.4 / 377.4	405.9 / 405.9			
Fluid Type	Fresh Water Gel	Fresh Water Gel			
Density (ppg) / Viscosity (spqt)	8.50 / 27.00	9.15 / 32.00			
Filtrate CL (ppm)	18.00	21.00			
pH / Fluid Loss (mptm)	8.70 / N/A	10.00 / N/A			
PV (cP) / YP (lbf2)	1 / 4.00	11 / 11.00			
% Solids / % Sand	3.20 / 0.25	11.70 / 0.50			
% 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	145.00 / PDM	151.00 / PDM			

Max Tool Temp (degF) / Source	145.90 / PCM	154.30 / PCM			
Rm @ Max Tool Temp (degF)	N/A @ N/A	N/A @ N/A			
Lead MWD Engineer	Garry Igunbor	Garry Igunbor			
Customer Representative	Jeremy Stolz	Jeremy Stolz			

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM			
Software Version	5.84	5.84			
Sub Serial Number	246473	246473			
Insert Serial Number	11145509	11145509			
Date and Time Initialized	02-Feb-14 08:50:58	02-Feb-14 08:50:58			
Date and Time Read	04-Feb-14 23:05	04-Feb-14 23:14			
ECMB SW Version	N/A	N/A			

Directional Sensor Information

Tool Type	PCDC	PCDC			
Distance From Bit (ft)	60.00	58.00			
Software Version	6.21	6.21			
Sub Serial Number	246473	246473			
Sonde Serial Number	11297588	11297588			
Sensor ID Number	N/A	N/A			
Toolface Offset (deg)	140.12	164.36			

Gamma Ray Sensor Information

Tool Type	PCG	PCG			
Distance From Bit (ft)	53.67	51.65			
Recorded Sample Period (sec)	10	10			
Software Version	8.15	8.15			
Sub Serial Number	246473	246473			
Insert/Sonde Serial Number	11293266	11293266			

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"

PGXC (Gamma Ray):

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

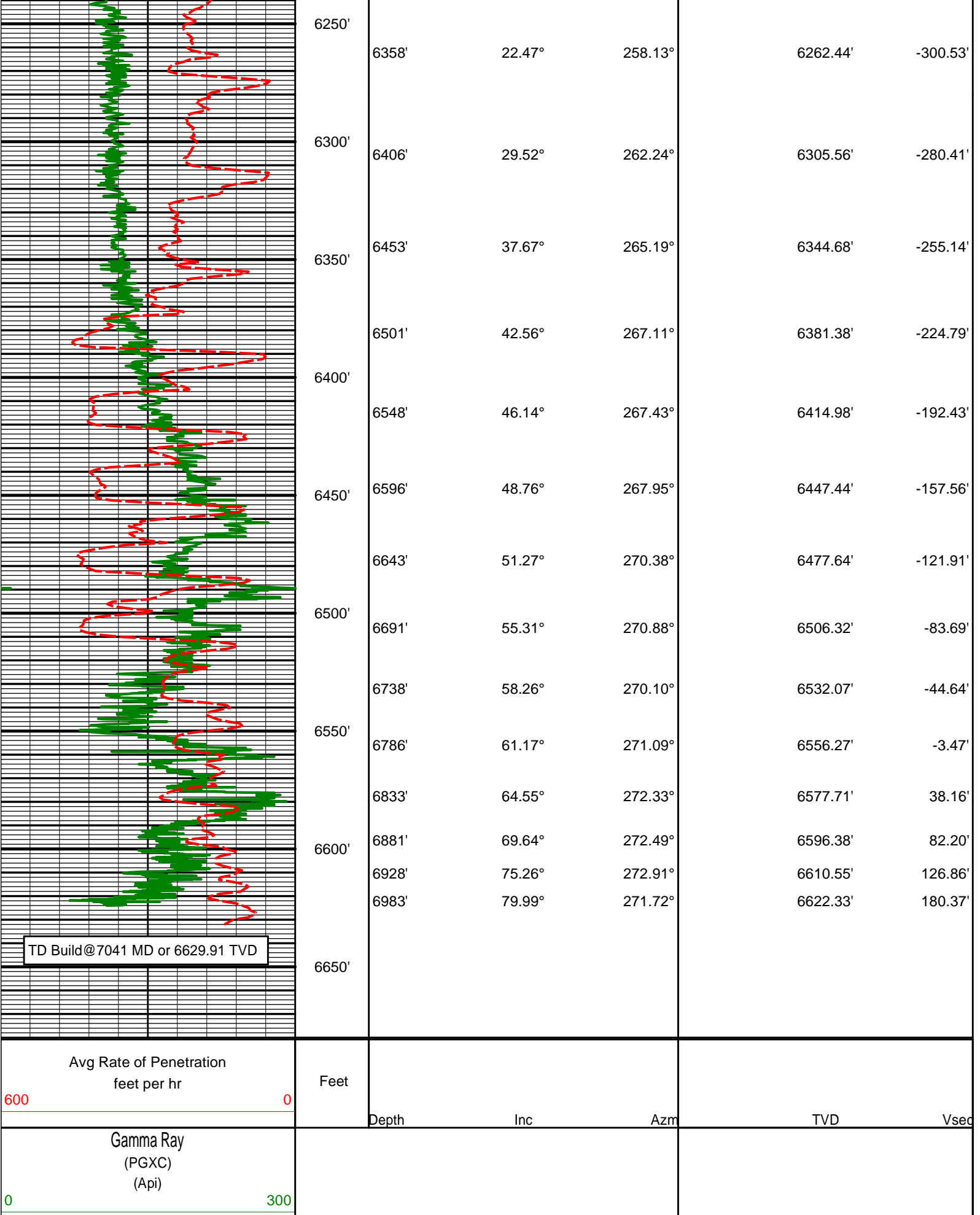
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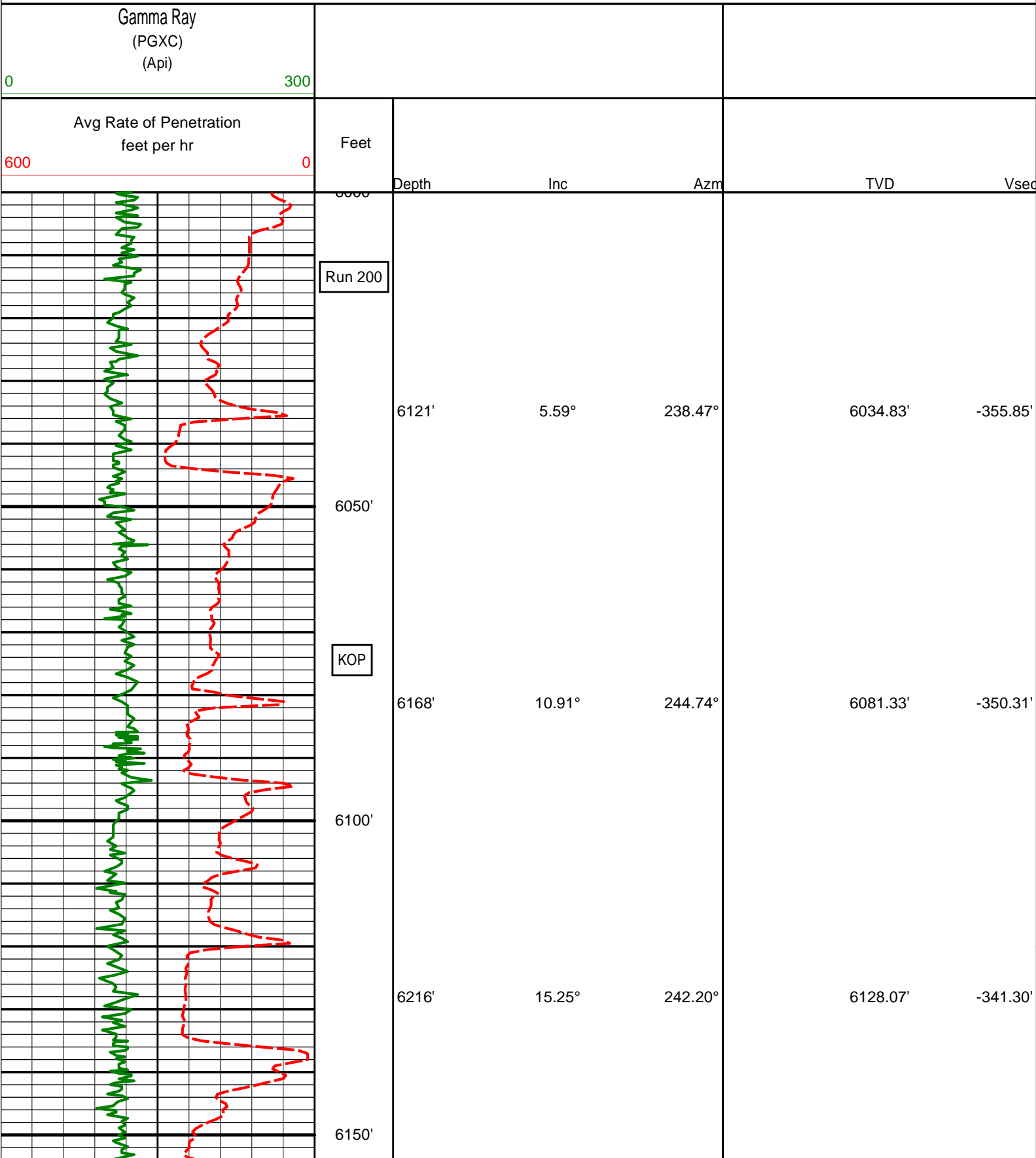
TVD Detail Log 1:600

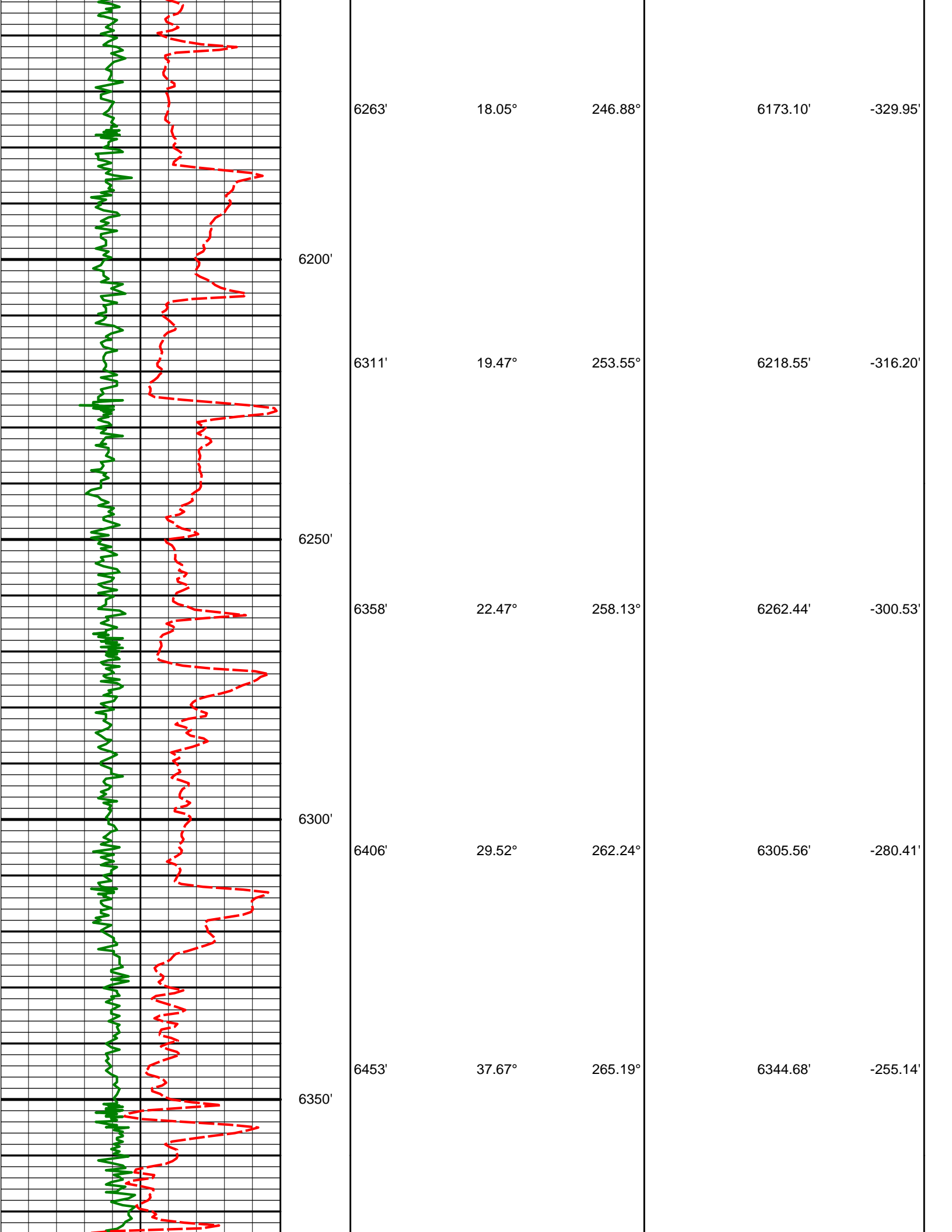
Gamma Ray (PGXC) (Api)						
0300						
Avg Rate of Penetration feet per hr	Feet					
6000	0	Depth	Inc	Azm	TVD	Vsec
	6000' Run 200					
		6121'	5.59°	238.47°	6034.83'	-355.85'
	6050'					
	KOP	6168'	10.91°	244.74°	6081.33'	-350.31'
	6100'					
		6216'	15.25°	242.20°	6128.07'	-341.30'
	6150'					
		6263'	18.05°	246.88°	6173.10'	-329.95'
	6200'					
		6311'	19.47°	253.55°	6218.55'	-316.20'

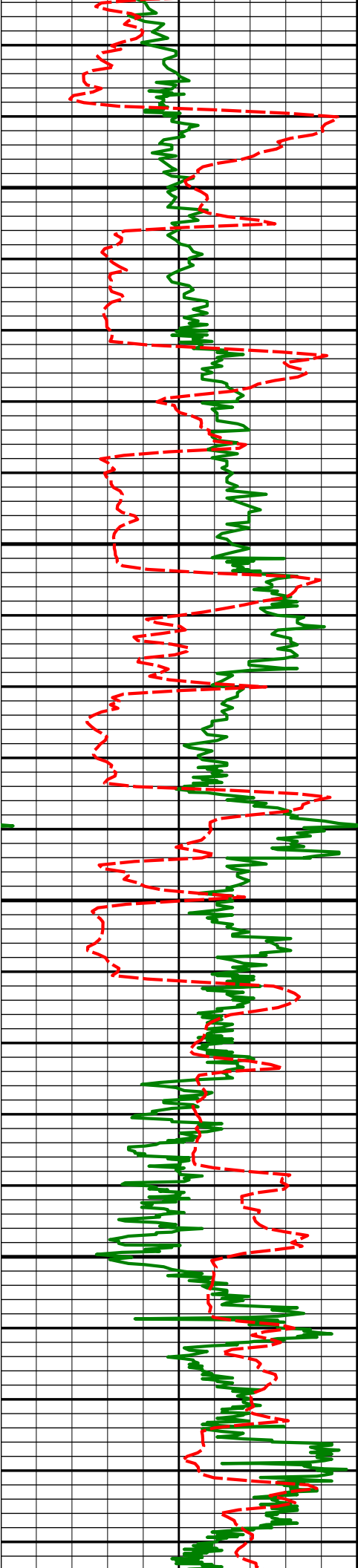


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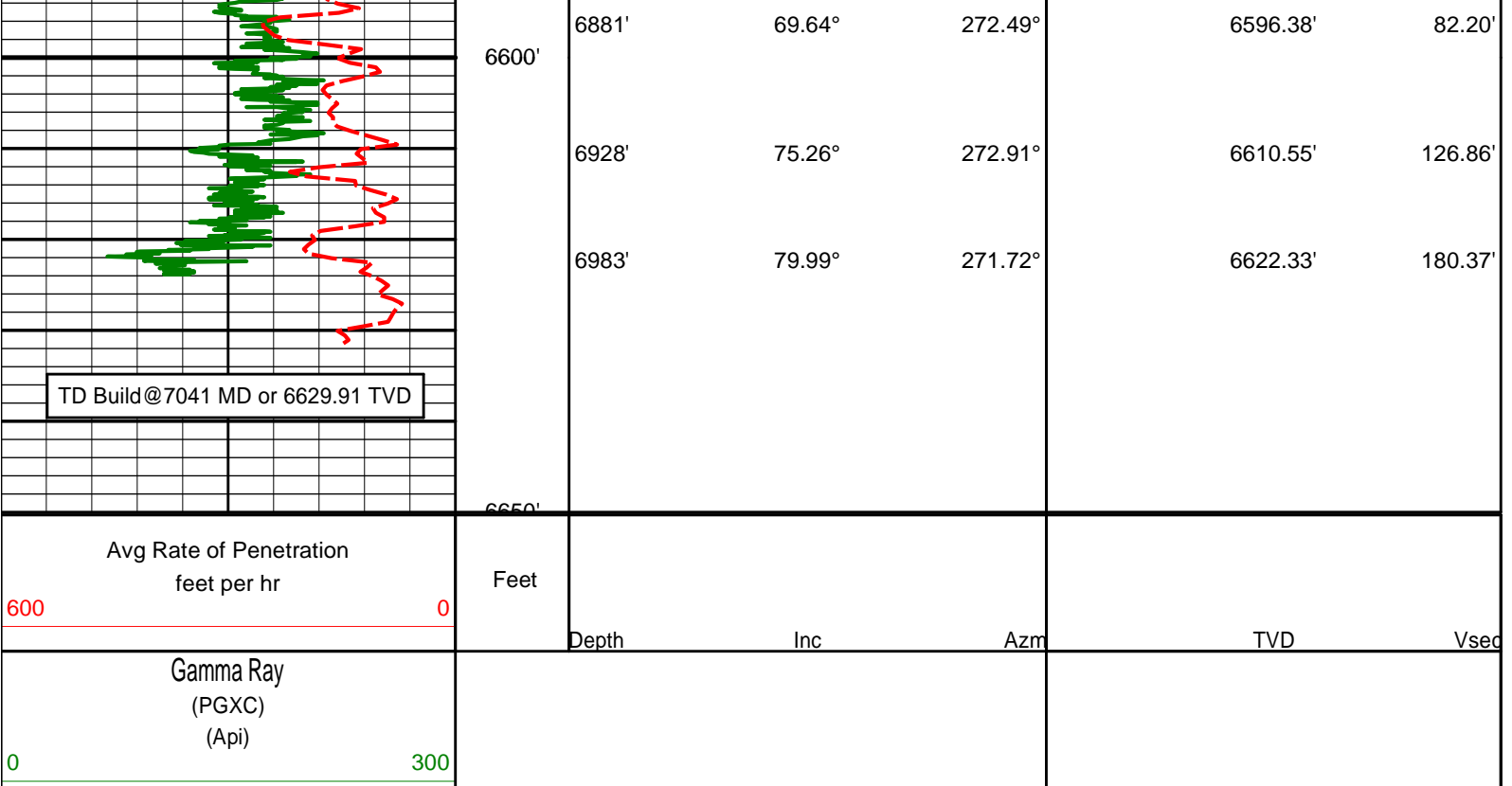
TVD Detail Log 1:240







6501'	42.56°	267.11°	6381.38'	-224.79'
6400'				
6548'	46.14°	267.43°	6414.98'	-192.43'
6450'				
6596'	48.76°	267.95°	6447.44'	-157.56'
6643'	51.27°	270.38°	6477.64'	-121.91'
6500'				
6691'	55.31°	270.88°	6506.32'	-83.69'
6738'	58.26°	270.10°	6532.07'	-44.64'
6550'				
6786'	61.17°	271.09°	6556.27'	-3.47'
6833'	64.55°	272.33°	6577.71'	38.16'



DIRECTIONAL SURVEY REPORT

Noble Energy
Wells Ranch AA21-64-1HN
Wattenberg
Weld Colorado
USA
CA-XX-0900918617

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
230.00	1.20	237.48	229.98	1.29 S	2.03 W	1.85	0.52
492.00	0.80	243.88	491.94	3.57 S	5.99 W	5.49	0.16
750.00	0.50	167.28	749.93	5.47 S	7.36 W	6.61	0.33
946.00	0.30	99.88	945.93	6.39 S	6.66 W	5.81	0.24
1108.00	0.60	175.94	1107.92	7.31 S	6.18 W	5.22	0.37
1201.00	0.62	154.95	1200.92	8.25 S	5.94 W	4.86	0.24
1294.00	1.62	75.61	1293.90	8.38 S	4.45 W	3.36	1.75
1387.00	4.70	63.58	1386.75	6.36 S	0.24 E	-1.03	3.37
1480.00	7.58	59.13	1479.21	1.51 S	8.92 E	-9.03	3.14
1574.00	9.77	55.08	1572.13	6.24 N	20.78 E	-19.83	2.42
1669.00	11.49	46.85	1665.50	17.32 N	34.29 E	-31.85	2.41
1764.00	12.51	38.76	1758.43	31.82 N	47.64 E	-43.27	2.07
1859.00	14.06	36.29	1850.88	49.14 N	60.91 E	-54.27	1.74
1954.00	13.89	34.22	1943.07	67.87 N	74.15 E	-65.06	0.56
2049.00	13.28	33.03	2035.41	86.45 N	86.51 E	-75.00	0.71
2144.00	13.88	36.04	2127.76	104.81 N	99.17 E	-85.25	0.98
2239.00	15.19	33.85	2219.72	124.36 N	112.80 E	-96.33	1.50
2333.00	14.33	31.59	2310.62	144.50 N	125.76 E	-106.65	1.10
2428.00	15.17	33.57	2402.48	164.87 N	138.79 E	-117.03	1.03
2523.00	14.04	31.20	2494.41	185.09 N	151.63 E	-127.24	1.35
2618.00	14.35	35.46	2586.52	204.53 N	164.43 E	-137.50	1.15
2713.00	13.84	37.23	2678.66	223.17 N	178.14 E	-148.76	0.70
2808.00	15.34	34.93	2770.59	242.52 N	192.21 E	-160.29	1.69
2903.00	16.03	34.23	2862.05	263.67 N	206.78 E	-172.10	0.75
2998.00	16.10	41.62	2953.35	284.36 N	222.91 E	-185.51	2.15
3093.00	15.60	41.13	3044.74	303.83 N	240.06 E	-200.09	0.54
3188.00	15.22	41.51	3136.32	322.79 N	256.73 E	-214.25	0.41
3282.00	13.69	42.09	3227.35	340.29 N	272.36 E	-227.56	1.63

3377.00	13.14	39.92	3319.75	356.91 N	286.83 E	-239.83	0.78
3472.00	10.92	31.14	3412.67	372.90 N	298.41 E	-249.32	3.02
3567.00	10.95	32.19	3505.95	388.23 N	307.87 E	-256.78	0.21
3662.00	12.34	32.70	3598.99	404.41 N	318.16 E	-264.97	1.47
3757.00	14.70	29.99	3691.35	423.40 N	329.67 E	-274.01	2.57
3851.00	16.20	29.74	3781.95	445.11 N	342.14 E	-283.65	1.60
3946.00	17.25	33.58	3872.93	468.36 N	356.51 E	-294.99	1.60
4041.00	15.85	37.30	3964.00	490.41 N	372.16 E	-307.76	1.85
4135.00	13.99	39.05	4054.82	509.45 N	387.10 E	-320.19	2.04
4230.00	10.76	41.25	4147.61	525.04 N	400.18 E	-331.22	3.44
4325.00	9.02	42.06	4241.19	537.24 N	411.02 E	-340.45	1.84
4420.00	6.97	30.63	4335.27	547.73 N	418.95 E	-346.99	2.72
4515.00	5.84	28.53	4429.67	556.93 N	424.19 E	-351.04	1.21
4610.00	4.34	34.39	4524.30	564.15 N	428.53 E	-354.45	1.67
4705.00	2.55	41.46	4619.12	568.70 N	431.96 E	-357.28	1.93
4800.00	1.18	9.45	4714.07	571.25 N	433.52 E	-358.51	1.76
4894.00	1.06	1.05	4808.05	573.07 N	433.70 E	-358.45	0.22
4989.00	1.03	342.84	4903.04	574.77 N	433.46 E	-358.00	0.35
5084.00	0.50	337.16	4998.03	575.96 N	433.05 E	-357.45	0.56
5179.00	0.26	141.94	5093.03	576.18 N	433.02 E	-357.39	0.79
5274.00	0.23	103.08	5188.03	575.96 N	433.34 E	-357.73	0.17
5369.00	0.53	151.86	5283.03	575.53 N	433.73 E	-358.18	0.44
5464.00	0.86	190.61	5378.02	574.44 N	433.81 E	-358.39	0.59
5559.00	0.87	152.32	5473.01	573.10 N	434.01 E	-358.76	0.60
5654.00	0.70	244.20	5568.00	572.21 N	433.82 E	-358.68	1.19
5749.00	0.38	219.77	5663.00	571.72 N	433.10 E	-358.03	0.41
5844.00	0.31	192.25	5758.00	571.23 N	432.84 E	-357.84	0.19
5938.00	0.35	137.37	5852.00	570.77 N	432.98 E	-358.03	0.33
5955.00	0.74	145.98	5869.00	570.64 N	433.08 E	-358.15	2.34
6026.00	1.11	147.87	5939.99	569.67 N	433.70 E	-358.88	0.52
6121.00	5.59	238.47	6034.83	566.47 N	430.24 E	-355.85	6.01
6168.00	10.91	244.74	6081.33	563.37 N	424.27 E	-350.31	11.46
6216.00	15.25	242.20	6128.07	558.49 N	414.57 E	-341.30	9.12
6263.00	18.05	246.88	6173.10	552.75 N	402.40 E	-329.95	6.60
6311.00	19.47	253.55	6218.55	547.56 N	387.89 E	-316.20	5.35
6358.00	22.47	258.13	6262.44	543.49 N	371.58 E	-300.53	7.27
6406.00	29.52	262.24	6305.56	540.01 N	350.86 E	-280.41	15.15
6453.00	37.67	265.19	6344.68	537.23 N	325.03 E	-255.14	17.68
6501.00	42.56	267.11	6381.38	535.18 N	294.18 E	-224.79	10.51
6548.00	46.14	267.43	6414.98	533.62 N	261.37 E	-192.43	7.63
6596.00	48.76	267.95	6447.44	532.20 N	226.04 E	-157.56	5.52
6643.00	51.27	270.38	6477.64	531.69 N	190.04 E	-121.91	6.65
6691.00	55.31	270.88	6506.32	532.12 N	151.57 E	-83.69	8.46
6738.00	58.26	270.10	6532.07	532.45 N	112.26 E	-44.64	6.43
6786.00	61.17	271.09	6556.27	532.88 N	70.82 E	-3.47	6.32
6833.00	64.55	272.33	6577.71	534.14 N	29.02 E	38.16	7.56
6881.00	69.64	272.49	6596.38	536.00 N	15.14 W	82.20	10.61
6928.00	75.26	272.91	6610.55	538.11 N	59.89 W	126.86	11.99
6983.00	79.99	271.72	6622.33	540.28 N	113.55 W	180.37	8.86

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 277.20 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 6983.00 FEET
IS 552.08 FEET ALONG 348.13 DEGREES (GRID)**

Tie-In @ Surface

Surveys at 230 ft, 492 ft, 750 ft and 946 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.