



1 : 600 / 1 : 240

WELL INFORMATION					
MWD Run Number	100				
Date run completed	10-Sep-15				
Rig Bit Number	0100				
Bit Size (in)	8.750				
Tool Nominal OD (in)	6.750				
Log Start Depth (TVD, ft)	637.99				
Log End Depth (TVD, ft)	6,528.41				
Drill or Wipe	Drill				
Drill/Wipe Start Date and Time	08-Sep-15 17:25				
Drill/Wipe End Date and Time	10-Sep-15 02:00				
Min Inc (deg) @ Depth (TVD, ft)	0.28 @ 5,409.79				
Max Inc (deg) @ Depth (TVD, ft)	84.11 @ 6,524.49				
Bit TFA(in2) / Bit Type	0.98 / PDC				
Flow Rate (gpm)	582.86				
Max AV (fpm) / CV (fpm) @ MWD	N/A / N/A				
Fluid Type	Native/Spud Mud				
Density (ppg) / Viscosity (spqt)	10.20 / 39.00				
Filtrate CL (ppm)	2,300.00				
pH / Fluid Loss (mptm)	9.60 / 8				
PV (cP) / YP (lhf2)	13 / 15.00				
% Solids / % Sand	10.20 / 0.15				
% Oil / Oil:Water Ratio	N/A / N/A				
Rm @ Measured Temp (degF)	N/A @ N/A				
Rmf @ Measured Temp (degF)	N/A @ N/A				
Rmc @ Measured Temp (degF)	N/A @ N/A				

Max Tool Temp (degF) / Source	177.64 / PCM				
Rm @ Max Tool Temp (degF)	N/A @ 175.21				
Lead MWD Engineer	Henry Schmeidler				
Customer Representative	Johnny Sanchez				

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM				
Software Version	5.93				
Sub Serial Number	11404299				
Insert Serial Number	11619985				
Date and Time Initialized	08-Sep-15 12:28				
Date and Time Read	10-Sep-15 06:43				
ECMB SW Version	N/A				

Directional Sensor Information

Tool Type	PCDC				
Distance From Bit (ft)	66.00				
Software Version	6.33				
Sub Serial Number	11404299				
Sonde Serial Number	10859920				
Sensor ID Number	N/A				
Toolface Offset (deg)	160.70				

Gamma Ray Sensor Information

Tool Type	PCG				
Distance From Bit (ft)	58.77				
Recorded Sample Period (sec)	10				
Software Version	8.15				
Sub Serial Number	11404299				
Insert/Sonde Serial Number	11680918				

REMARKS

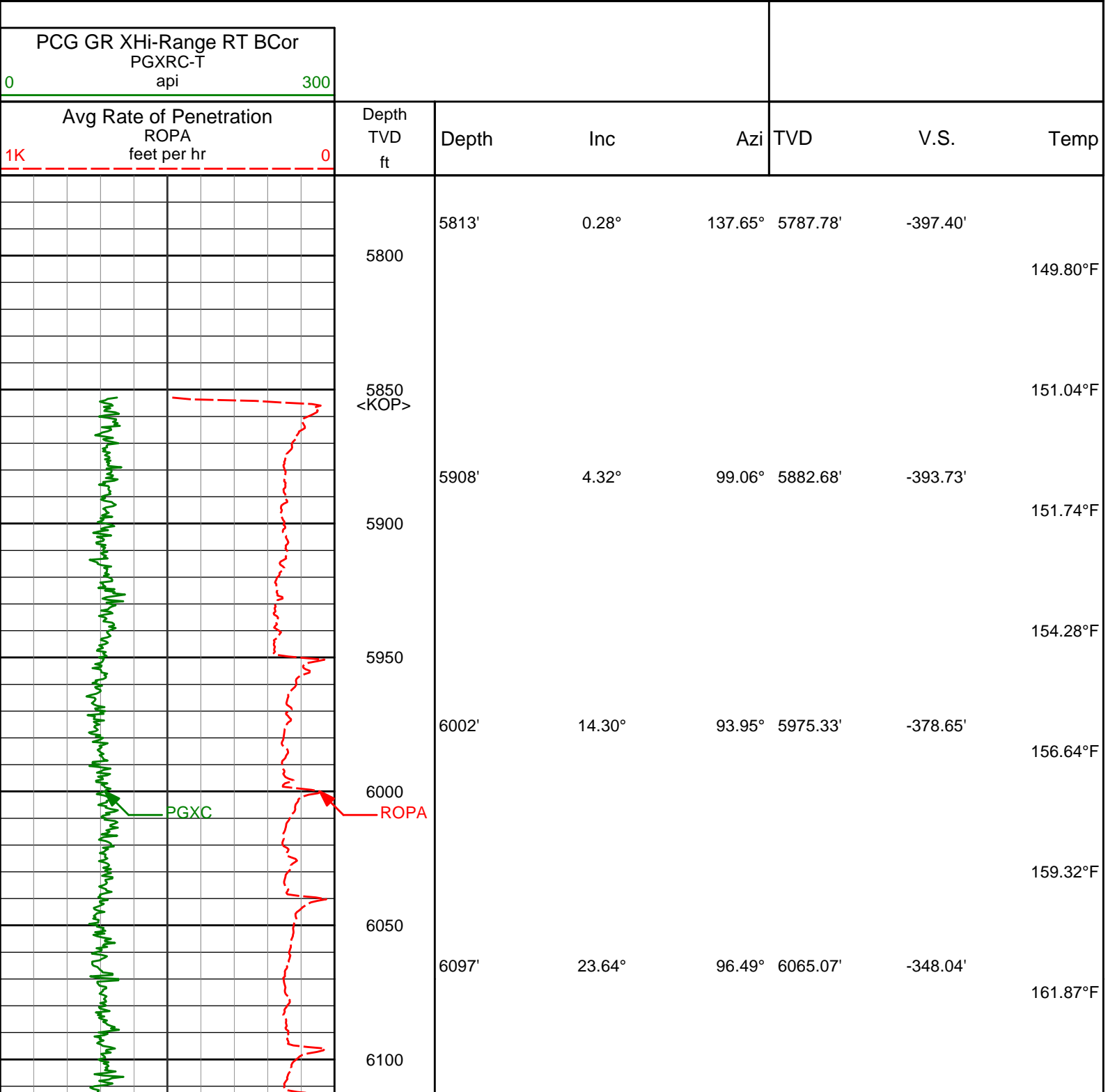
1. All depths are calibrated to driller's pipe tally and are total vertical depth from the drill floor.
2. No depth corrections have been made for pipe stretch or compression.
3. All data presented is recorded (memory data) unless otherwise stated.
4. Environmental parameters used in gamma and resistance processing:
Hole Size: 8.75"
Mud Density: 9.9-11.0
5. The following smoothing parameters have been applied to the data:
Interval: 0.5 ft
Coercion Distance: 1.2 ft (ROPA)
Interval: 0.5 ft
Coercion Distance: 0.6 ft (Gamma Ray)

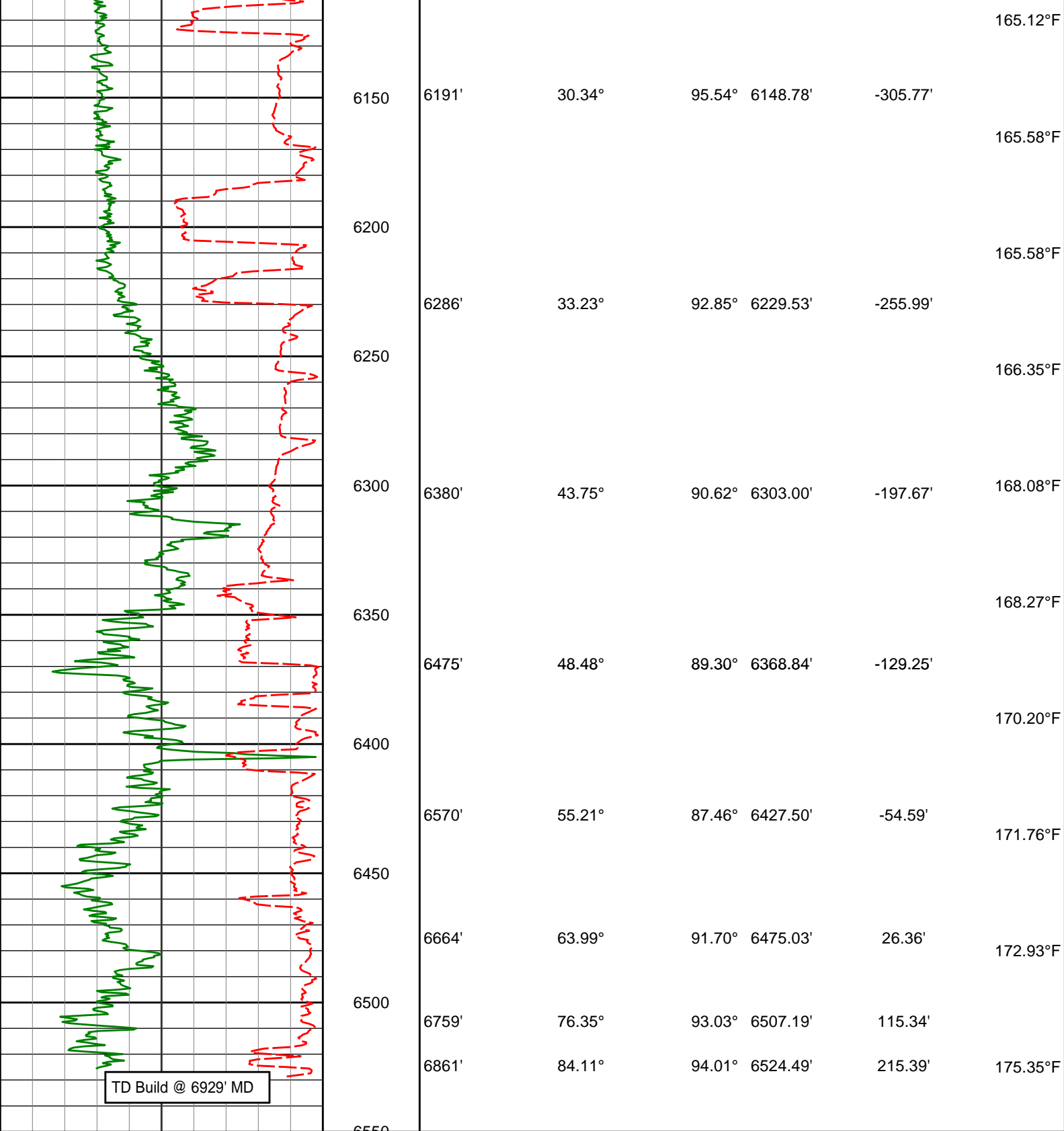
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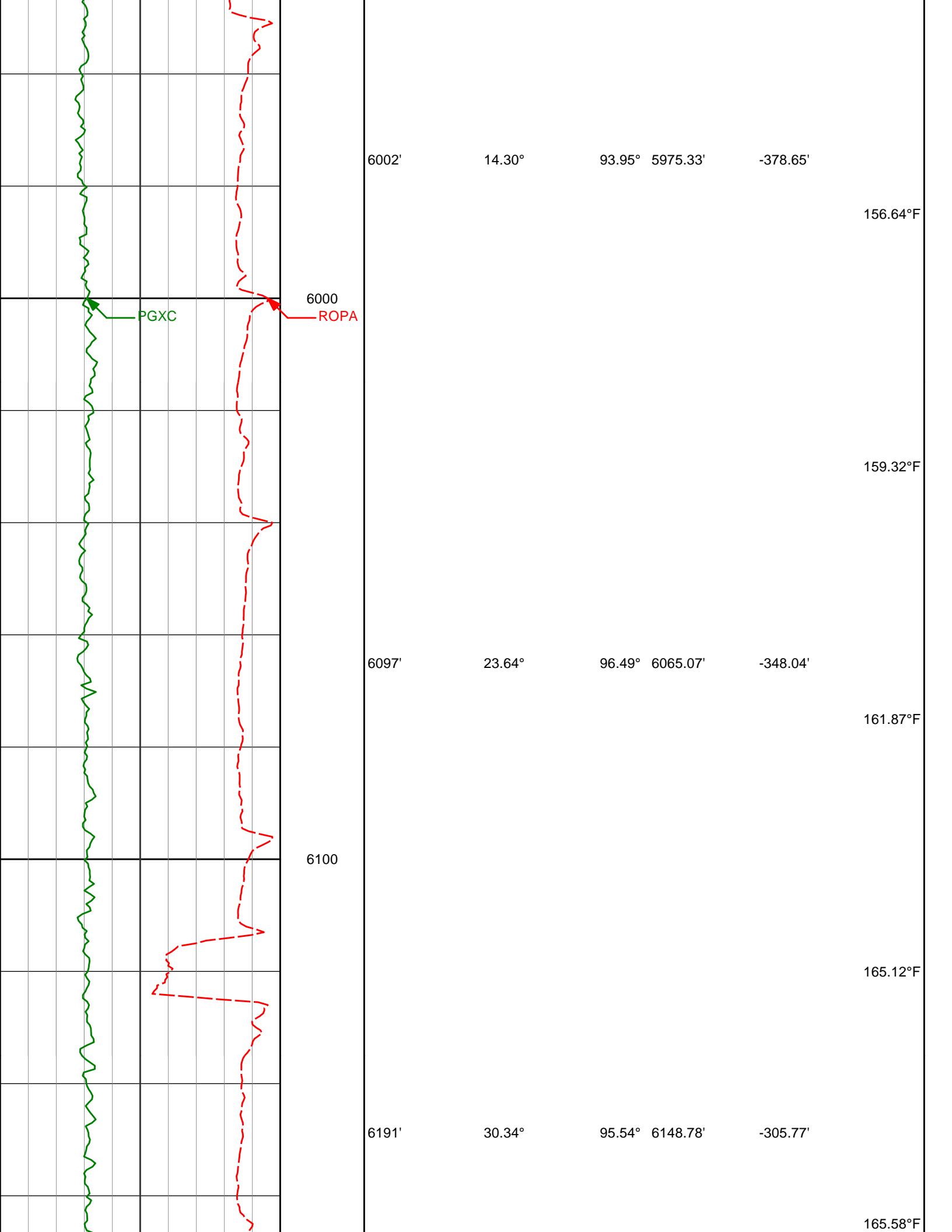
TVD Detail 1:600 Scale

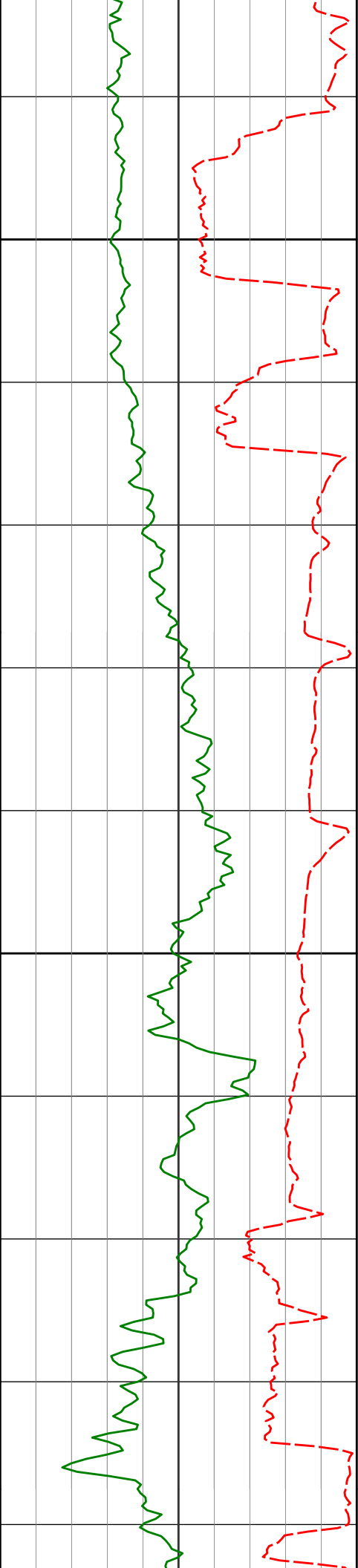




Avg Rate of Penetration ROPA feet per hr		Depth TVD ft	Depth	Inc	Azi	TVD	V.S.	Temp
PCG GR XHi-Range RT BCor PGXRC-T api								

TVD Detail 1:240 Scale												
<div>PCG GR XHi-Range RT PGXRC-T api</div> <div>0300</div>												
<div>Avg Rate of Penetration ROPA feet per hr</div> <div>1K0</div>						Depth TVD ft	Depth	Inc	Azi	TVD	V.S.	Temp
						5800	5813'	0.28°	137.65°	5787.78'	-397.40'	
												149.80°F
						<KOP>						151.04°F
						5900	5908'	4.32°	99.06°	5882.68'	-393.73'	
												151.74°F
												154.28°F





6200

6286'

33.23°

92.85°

6229.53'

-255.99'

165.58°F

6300

6380'

43.75°

90.62°

6303.00'

-197.67'

168.08°F

6475'

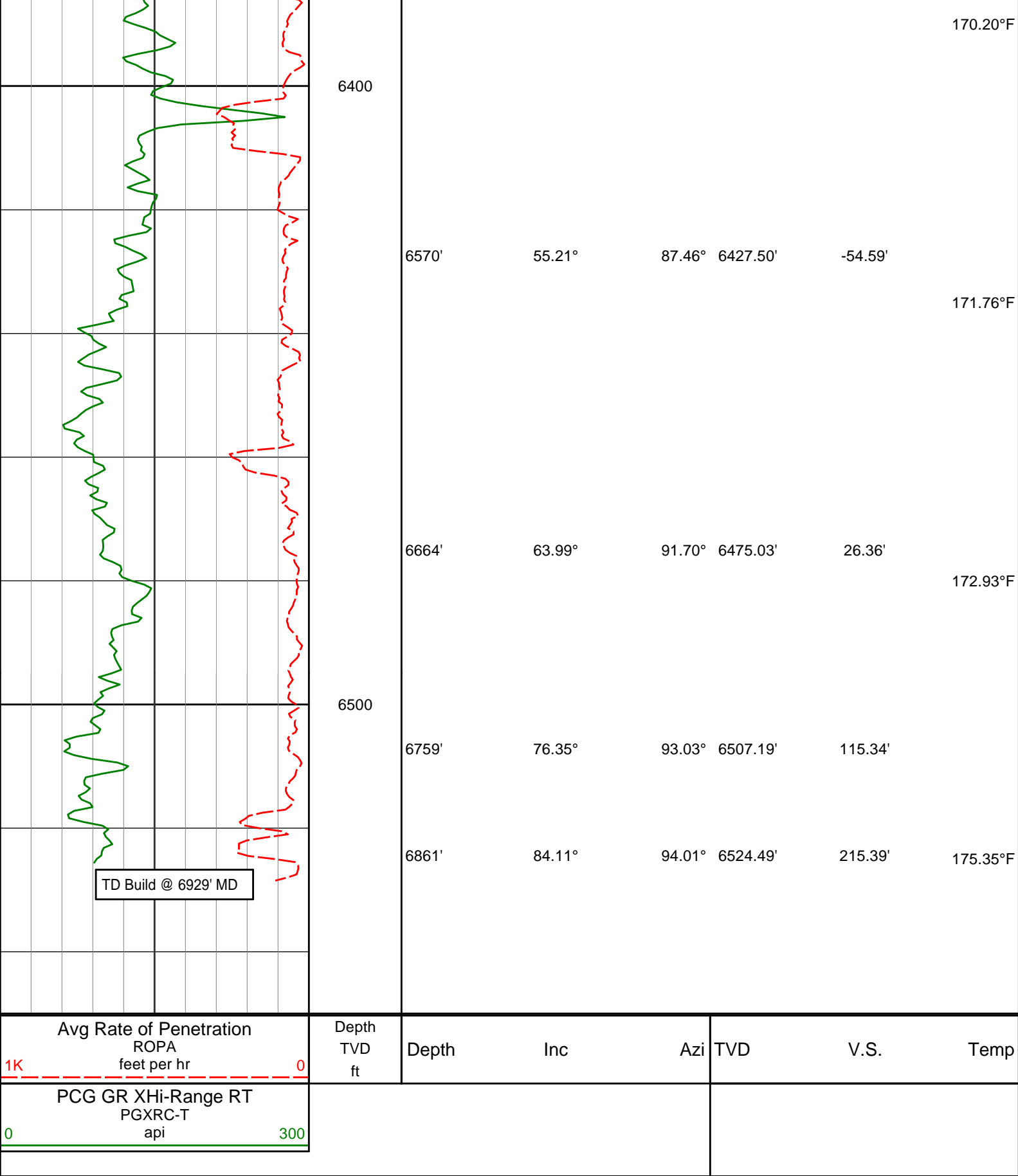
48.48°

89.30°

6368.84'

-129.25'

168.27°F



HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble Energy
Wells Ranch AE32-640

Wattenburg Weld Colorado USA CA-XX-0902674374							
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
646.00	0.50	220.31	645.99	2.14 S	1.81 W	-1.87	0.08
741.00	0.56	222.43	740.99	2.79 S	2.39 W	-2.47	0.07
836.00	0.81	220.60	835.98	3.65 S	3.15 W	-3.24	0.27
1025.00	0.65	206.57	1024.97	5.63 S	4.50 W	-4.65	0.13
1212.00	0.40	223.15	1211.96	7.07 S	5.43 W	-5.62	0.16
1491.00	0.70	224.15	1490.94	9.01 S	7.29 W	-7.53	0.11
1583.00	0.81	224.92	1582.94	9.87 S	8.14 W	-8.41	0.12
1768.00	0.48	267.06	1767.93	10.84 S	9.83 W	-10.12	0.30
1861.00	3.55	272.02	1860.86	10.75 S	13.10 W	-13.39	3.31
1953.00	4.40	262.61	1952.64	11.11 S	19.45 W	-19.75	1.16
2047.00	5.35	263.72	2046.29	12.05 S	27.39 W	-27.71	1.01
2140.00	6.66	267.99	2138.78	12.72 S	37.08 W	-37.42	1.48
2234.00	8.67	263.83	2231.94	13.67 S	49.57 W	-49.93	2.22
2327.00	9.85	258.81	2323.73	15.97 S	64.35 W	-64.76	1.54
2419.00	8.70	252.98	2414.52	19.53 S	78.72 W	-79.23	1.62
2511.00	7.84	249.44	2505.57	23.77 S	91.25 W	-91.86	1.08
2603.00	8.44	260.52	2596.65	27.08 S	103.78 W	-104.48	1.82
2694.00	7.93	262.08	2686.72	29.05 S	116.59 W	-117.34	0.61
2788.00	7.43	261.26	2779.87	30.87 S	129.02 W	-129.82	0.54
2881.00	7.27	261.16	2872.11	32.69 S	140.78 W	-141.63	0.18
2975.00	8.69	264.17	2965.20	34.32 S	153.73 W	-154.61	1.58
3070.00	7.01	260.05	3059.30	36.05 S	166.58 W	-167.51	1.86
3164.00	6.02	253.63	3152.70	38.43 S	176.97 W	-177.95	1.31
3260.00	6.70	262.63	3248.11	40.57 S	187.35 W	-188.39	1.25
3353.00	7.40	270.07	3340.41	41.26 S	198.72 W	-199.78	1.24
3448.00	7.04	265.79	3434.65	41.68 S	210.65 W	-211.71	0.68
3543.00	7.47	271.81	3528.89	41.91 S	222.62 W	-223.69	0.92
3637.00	9.10	279.14	3621.91	40.54 S	236.06 W	-237.09	2.06
3732.00	9.33	277.98	3715.69	38.28 S	251.10 W	-252.06	0.32
3827.00	9.74	277.85	3809.37	36.11 S	266.69 W	-267.58	0.44
3921.00	9.51	277.30	3902.05	34.04 S	282.27 W	-283.10	0.27
4016.00	8.58	261.41	3995.88	34.10 S	297.07 W	-297.89	2.79
4110.00	7.96	258.78	4088.91	36.41 S	310.39 W	-311.27	0.78
4299.00	6.55	259.80	4276.39	40.87 S	333.83 W	-334.82	0.75
4394.00	6.17	263.38	4370.80	42.41 S	344.23 W	-345.26	0.57
4489.00	5.19	257.06	4465.34	43.96 S	353.49 W	-354.56	1.23
4583.00	4.75	258.60	4558.98	45.68 S	361.44 W	-362.56	0.49
4678.00	4.16	244.16	4653.70	47.96 S	368.40 W	-369.58	1.33
4772.00	3.93	234.63	4747.47	51.32 S	374.10 W	-375.36	0.76
4867.00	3.48	230.03	4842.27	55.05 S	378.96 W	-380.33	0.56
4961.00	3.56	235.98	4936.09	58.52 S	383.57 W	-385.03	0.40
5056.00	2.95	244.00	5030.94	61.24 S	388.21 W	-389.74	0.80
5151.00	2.16	236.19	5125.84	63.31 S	391.89 W	-393.48	0.90
5245.00	1.15	205.94	5219.80	65.15 S	393.78 W	-395.41	1.38
5340.00	0.49	211.87	5314.79	66.35 S	394.41 W	-396.08	0.71
5435.00	0.28	291.89	5409.79	66.61 S	394.83 W	-396.51	0.54
5529.00	0.81	274.59	5503.79	66.47 S	395.70 W	-397.37	0.58
5624.00	0.56	167.44	5598.78	66.86 S	396.27 W	-397.95	1.16
5718.00	0.53	157.87	5692.78	67.71 S	396.00 W	-397.71	0.10
5813.00	0.28	137.65	5787.78	68.29 S	395.68 W	-397.40	0.30
5908.00	4.32	99.06	5882.68	69.03 S	391.98 W	-393.73	4.32
6002.00	14.30	93.95	5975.33	70.39 S	376.86 W	-378.65	10.64
6097.00	23.64	96.49	6065.07	73.36 S	346.16 W	-348.04	9.87
6191.00	30.34	95.54	6148.78	77.79 S	303.75 W	-305.77	7.15
6286.00	33.23	92.85	6229.53	81.40 S	253.86 W	-255.99	3.38
6380.00	43.75	90.62	6303.00	83.04 S	195.47 W	-197.67	11.28
6475.00	48.48	89.30	6368.84	82.96 S	127.02 W	-129.25	5.09
6570.00	55.21	87.46	6427.50	80.79 S	52.40 W	-54.59	7.24
6664.00	63.99	91.70	6475.03	80.33 S	28.57 E	26.36	10.12
6759.00	76.35	93.03	6507.19	84.05 S	117.69 E	115.34	13.07
6861.00	84.11	94.01	6524.49	90.22 S	217.94 E	215.39	7.66

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 88.43 DEGREES (GRID)
A TOTAL CORRECTION OF 7.32 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 6861.00 FEET
IS 235.88 FEET ALONG 112.49 DEGREES (GRID)**

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