



1 : 600 / 1 : 240

WELL INFORMATION					
MWD Run Number	100	200			
Date run completed	18-Sep-15	19-Sep-15			
Rig Bit Number	2	3			
Bit Size (in)	8.750	8.750			
Tool Nominal OD (in)	6.750	6.680			
Log Start Depth (MD, ft)	637.00	6,578.00			
Log End Depth (MD, ft)	6,578.00	7,024.00			
Drill or Wipe	Drill	Drill			
Drill/Wipe Start Date and Time	17-Sep-15 01:33	18-Sep-15 14:05			
Drill/Wipe End Date and Time	17-Sep-15 01:33	18-Sep-15 14:35			
Min Inc (deg) @ Depth (MD, ft)	0.10 @ 661.00	52.16 @ 6,623.00			
Max Inc (deg) @ Depth (MD, ft)	45.42 @ 6,528.00	88.92 @ 6,963.00			
Bit TFA(in2) / Bit Type	0.98 / PDC	0.98 / PDC			
Flow Rate (gpm)	592.33	550.50			
Max AV (fpm) / CV (fpm) @ MWD	N/A / N/A	N/A / N/A			
Fluid Type	Native/Spud Mud	Native/Spud Mud			
Density (ppg) / Viscosity (spqt)	8.60 / 28.00	10.14 / 43.00			
Filtrate CL (ppm)	N/A	N/A			
pH / Fluid Loss (mptm)	7.60 / 7	8.60 / 14			
PV (cP) / YP (lbf2)	3 / 1.00	10 / 15.00			
% Solids / % Sand	2.00 / 0.00	3.50 / 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	175.01 / PDM	175.01 / PDM			

Max Tool Temp (degF) / Source	175.21 / PCM	175.21 / PCM			
Rm @ Max Tool Temp (degF)	N/A @ N/A	N/A @ N/A			
Lead MWD Engineer	Adam Sampson	Adam Sampson			
Customer Representative	Charles Colvile	Charles Colvile			

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM			
Software Version	5.93	5.93			
Sub Serial Number	11619287	11619287			
Insert Serial Number	11680789	11680789			
Date and Time Initialized	16-Sep-15 10:21	01-Jan-70 00:00			
Date and Time Read	19-Sep-15 17:11	19-Sep-15 17:21			
ECMB SW Version	N/A	N/A			

Directional Sensor Information

Tool Type	PCDC	PCDC			
Distance From Bit (ft)	61.00	61.00			
Software Version	6.21	6.21			
Sub Serial Number	11619287	11619287			
Sonde Serial Number	10993516	10993516			
Sensor ID Number	N/A	N/A			
Toolface Offset (deg)	312.37	82.70			

Gamma Ray Sensor Information

Tool Type	PCG	PCG			
Distance From Bit (ft)	49.23	49.33			
Recorded Sample Period (sec)	15	15			
Software Version	8.15	8.15			
Sub Serial Number	11619287	11619287			
Insert/Sonde Serial Number	11680999	11680999			

REMARKS

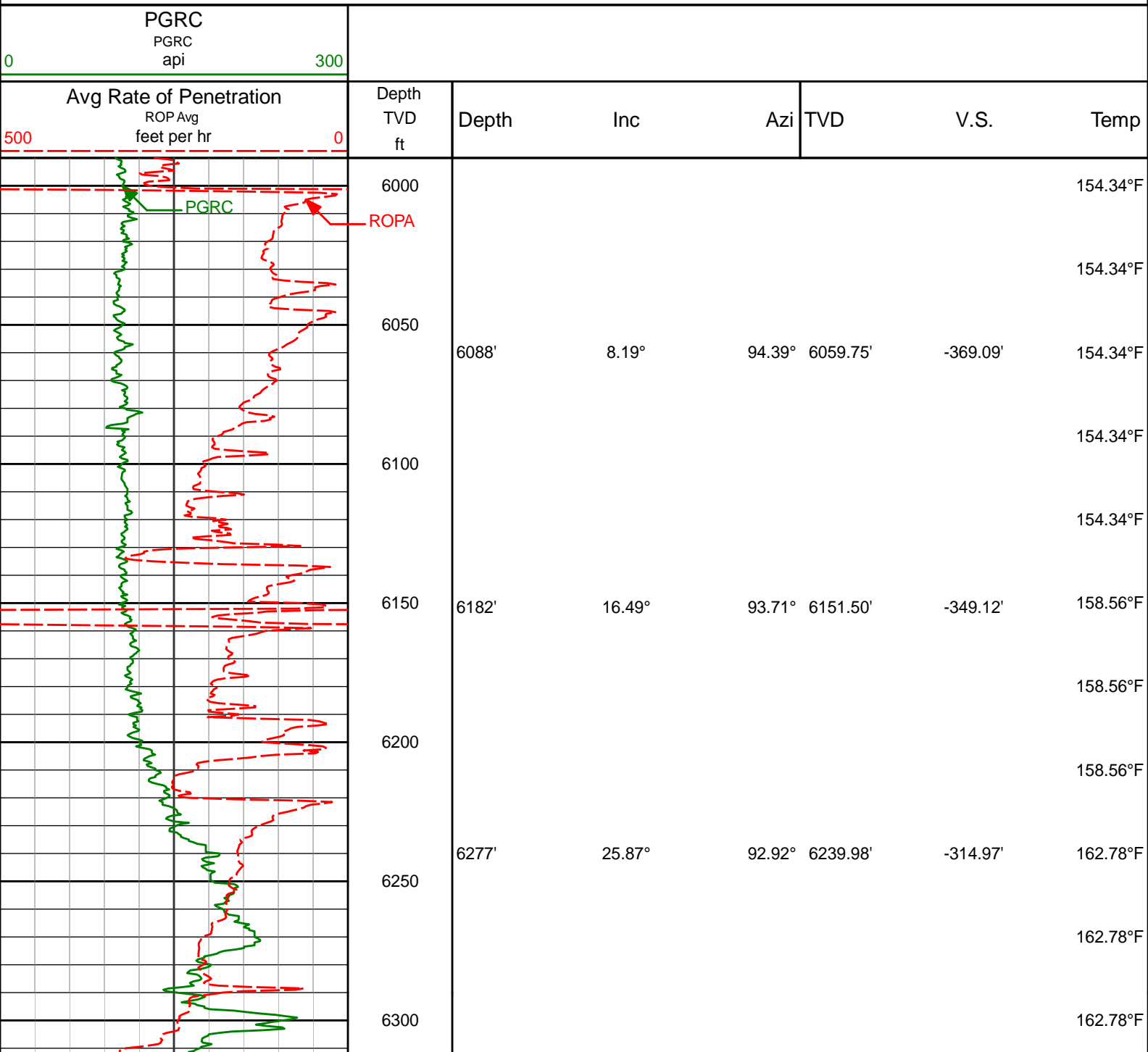
1. All depths are calibrated to the driller's pipe tally and are measured from the Rig drill floor.
2. No depth corrections have been made for pipe stretch or compression.
3. All data presented is recorded (memory data) unless otherwise stated.
 - ROPA: Average Rate of Penetration is real time data.
 - PGRC: Smooth Pressure Case Gamma Ray Borehole corrected is recorded data.
4. The following smoothing parameters have been applied to the data:
 - All ROP in logs - 0.5 ft interval, 1.2 ft coercion distance.
 - Gamma in 2" (1:600) logs - 1 ft interval, 3 ft coercion distance.
 - Gamma in 5" (1:240) logs - 0.5 ft interval, 0.6 ft coercion distance.
5. INSITE version 8.3.0.

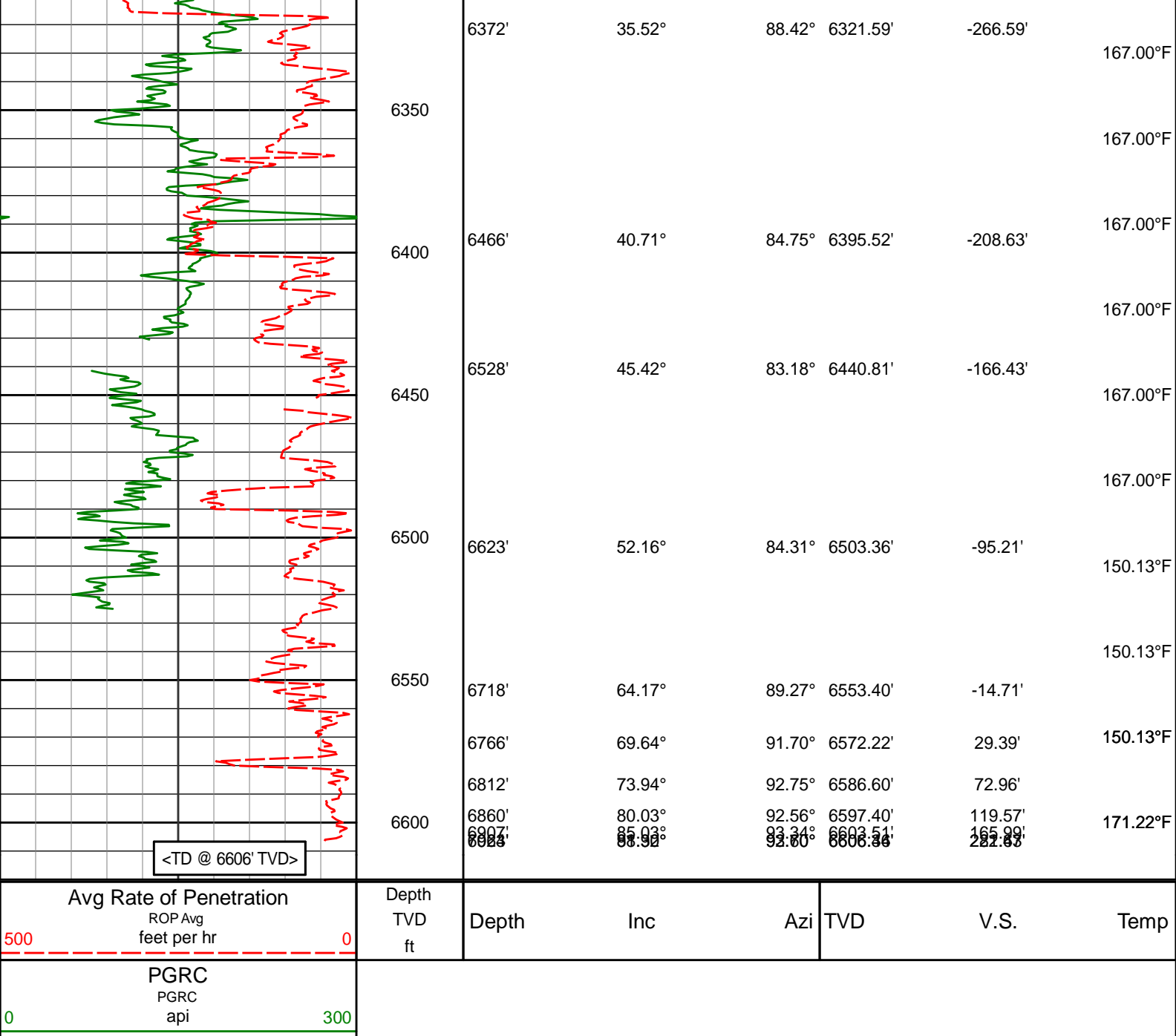
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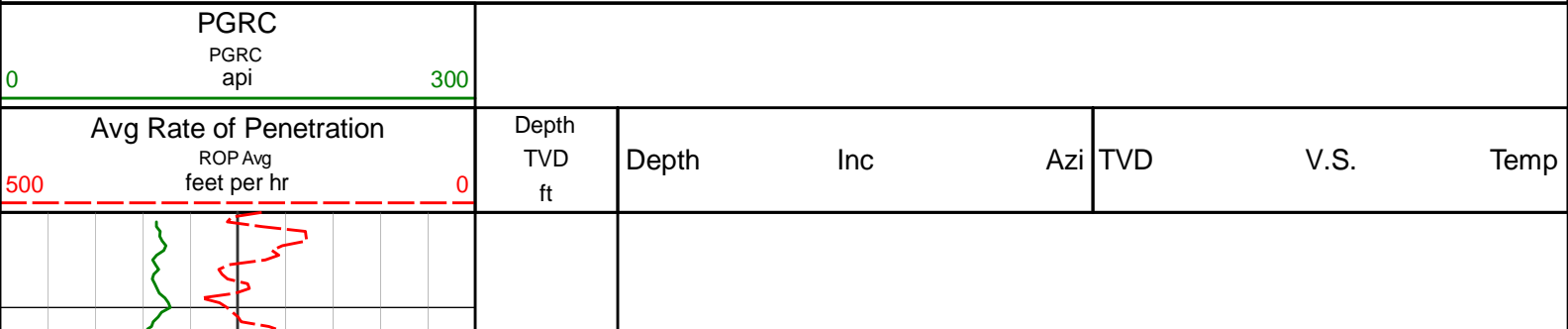
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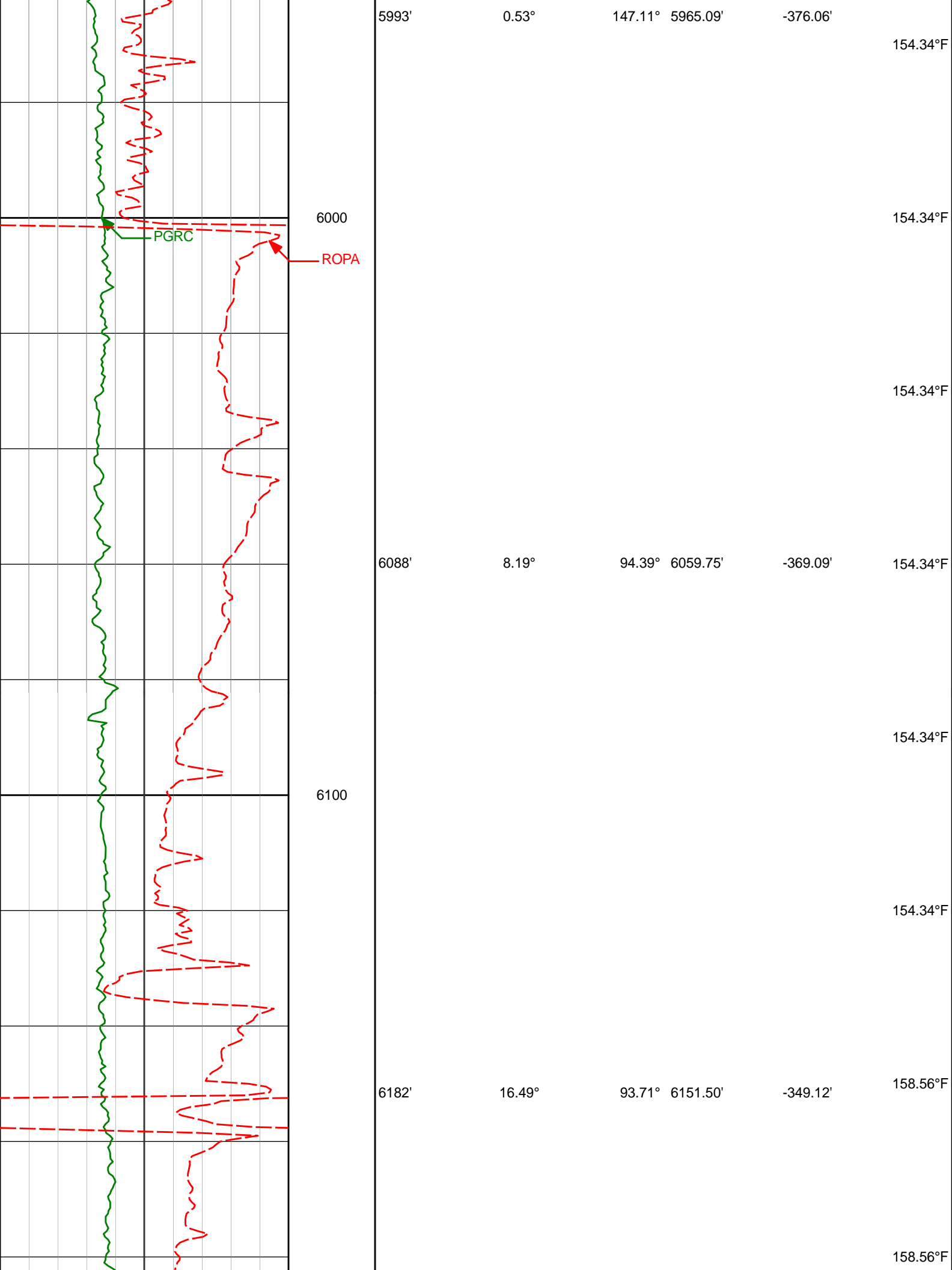
TVD Detail 1:600 Scale

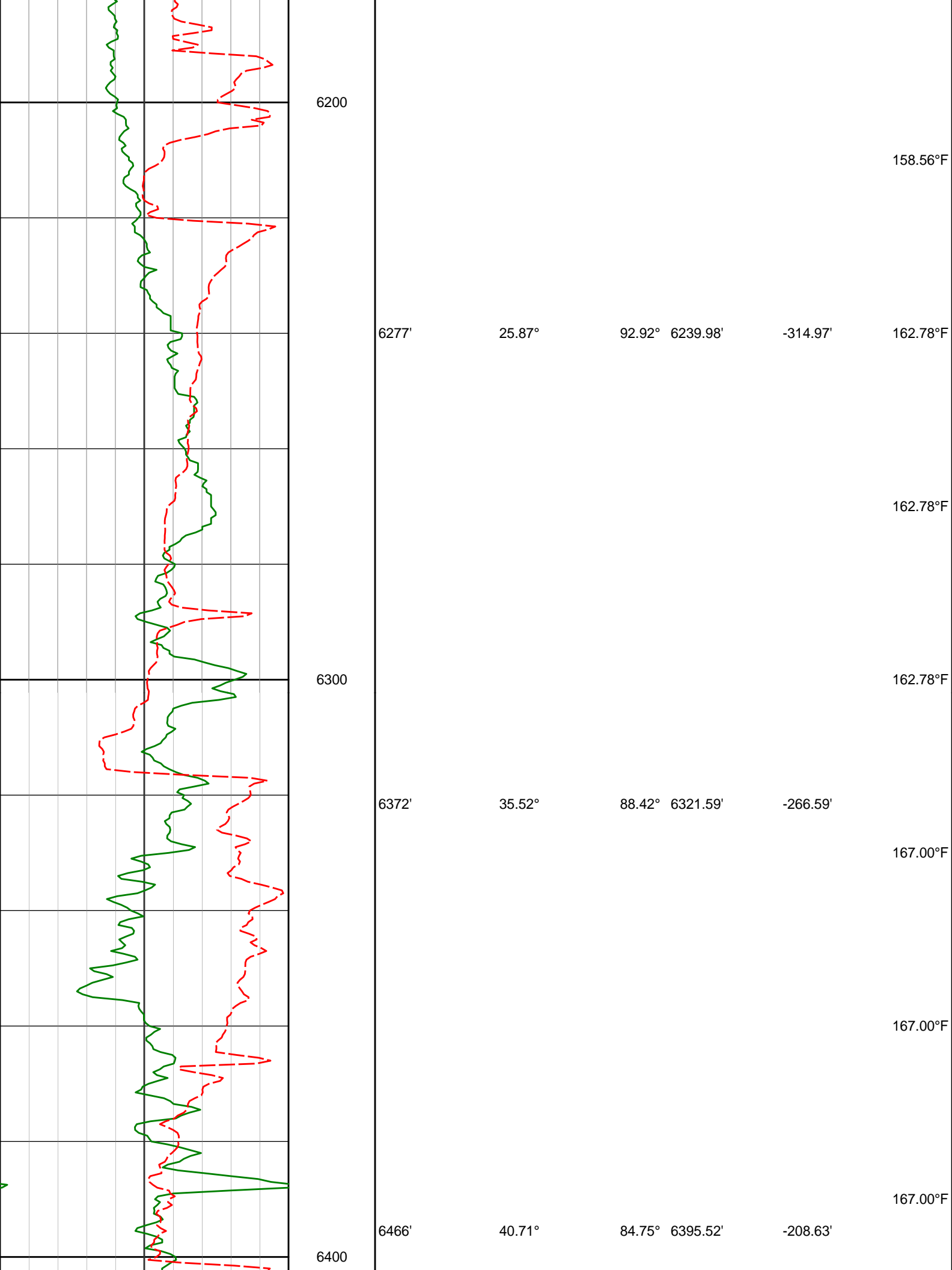


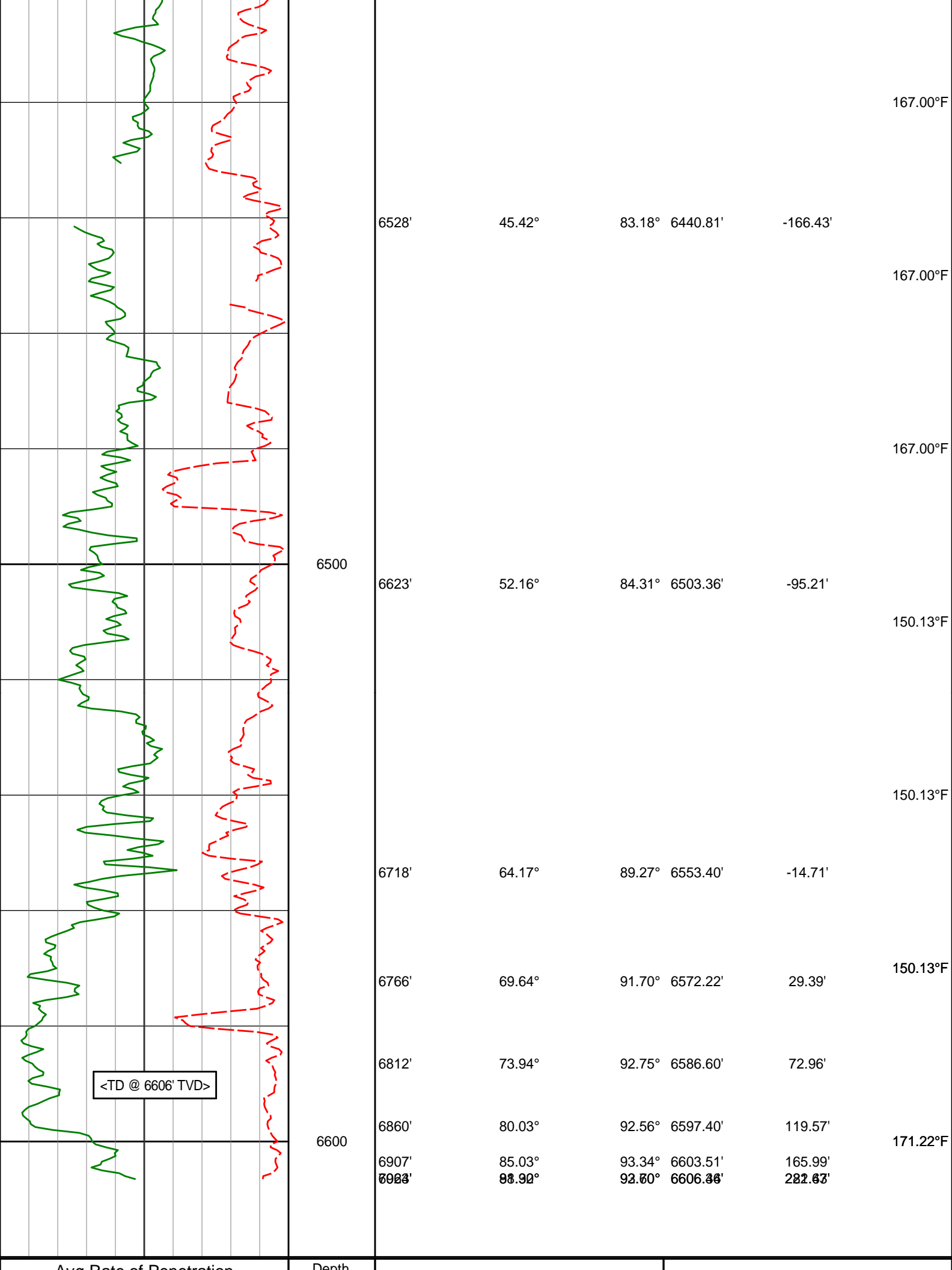


TVD Detail 1:240 Scale









Avg Rate of Penetration		TVD	Depth	Inc	Azi	TVD	V.S.	Temp
ROP Avg feet per hr		ft						
PGRC								
PGRC api								

DIRECTIONAL SURVEY REPORT

Noble Energy
Wells Ranch AE32-620
Wattenberg
Weld Colorado
USA
CA-XX-0902715780

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
300.00	0.05	68.42	300.00	0.05 N	0.12 E	0.12	0.02
637.00	0.10	68.42	637.00	0.21 N	0.53 E	0.54	0.01
661.00	0.10	68.42	661.00	0.23 N	0.57 E	0.58	0.01
755.00	0.11	144.23	755.00	0.18 N	0.70 E	0.70	0.14
943.00	0.22	140.95	943.00	0.24 S	1.03 E	1.02	0.06
1037.00	0.28	149.27	1037.00	0.58 S	1.26 E	1.24	0.07
1222.00	0.22	147.50	1222.00	1.27 S	1.68 E	1.64	0.03
1496.00	0.19	86.15	1495.99	1.69 S	2.42 E	2.37	0.08
1588.00	0.21	103.88	1587.99	1.72 S	2.73 E	2.68	0.07
1680.00	0.17	68.31	1679.99	1.71 S	3.02 E	2.96	0.13
1770.00	0.17	341.75	1769.99	1.53 S	3.10 E	3.05	0.26
1862.00	3.17	288.82	1861.94	0.58 S	0.65 E	0.63	3.33
1954.00	4.60	293.28	1953.73	1.70 N	5.14 W	-5.09	1.59
2045.00	5.76	292.14	2044.36	4.86 N	12.72 W	-12.56	1.29
2137.00	8.29	287.29	2135.66	8.58 N	23.34 W	-23.05	2.82
2228.00	9.65	276.22	2225.55	11.35 N	37.18 W	-36.80	2.41
2319.00	10.95	260.71	2315.10	10.78 N	53.29 W	-52.92	3.35
2411.00	10.26	258.55	2405.53	7.75 N	69.94 W	-69.66	0.86
2502.00	9.70	256.98	2495.16	4.41 N	85.35 W	-85.17	0.69
2594.00	9.19	256.20	2585.91	0.92 N	100.03 W	-99.95	0.57
2685.00	8.52	254.39	2675.83	2.63 S	113.57 W	-113.60	0.80
2777.00	8.04	252.90	2766.87	6.36 S	126.28 W	-126.42	0.57
2869.00	8.58	257.50	2857.90	9.73 S	139.14 W	-139.37	0.93
2963.00	8.03	257.95	2950.91	12.62 S	152.41 W	-152.73	0.59
3057.00	8.36	267.25	3043.96	14.32 S	165.66 W	-166.03	1.45
3151.00	9.32	267.91	3136.84	14.93 S	180.10 W	-180.48	1.03
3246.00	8.15	262.49	3230.74	16.09 S	194.46 W	-194.87	1.51
3341.00	7.09	260.74	3324.90	17.91 S	206.92 W	-207.38	1.14
3436.00	8.95	268.69	3418.97	19.02 S	220.10 W	-220.59	2.28
3530.00	8.99	267.62	3511.82	19.49 S	234.74 W	-235.24	0.18
3625.00	9.24	267.58	3605.62	20.12 S	249.78 W	-250.29	0.27
3720.00	9.74	267.79	3699.32	20.75 S	265.43 W	-265.96	0.53
3815.00	9.96	268.28	3792.92	21.31 S	281.68 W	-282.21	0.25
3909.00	9.46	267.19	3885.57	21.94 S	297.53 W	-298.07	0.57
4004.00	8.82	267.94	3979.36	22.58 S	312.61 W	-313.17	0.68
4099.00	8.05	265.95	4073.33	23.31 S	326.53 W	-327.10	0.87
4194.00	6.85	265.63	4167.53	24.21 S	338.82 W	-339.41	1.27
4288.00	6.36	264.25	4260.90	25.16 S	349.58 W	-350.20	0.54
4383.00	4.72	259.83	4355.46	26.38 S	358.67 W	-359.32	1.78
4478.00	2.87	250.72	4450.25	27.85 S	364.76 W	-365.45	2.04
4573.00	0.75	231.36	4545.19	29.03 S	367.49 W	-368.22	2.29
4667.00	0.39	232.26	4639.19	29.60 S	368.22 W	-368.97	0.38
4762.00	0.24	263.31	4734.19	29.83 S	368.67 W	-369.43	0.23
4857.00	0.35	288.81	4829.19	29.76 S	369.14 W	-369.90	0.18
4951.00	0.30	294.40	4923.18	29.56 S	369.64 W	-370.39	0.06
5046.00	0.25	324.87	5018.18	29.28 S	369.99 W	-370.73	0.16
5141.00	0.33	357.34	5113.18	28.84 S	370.13 W	-370.85	0.19
5236.00	0.70	12.28	5208.18	28.00 S	370.02 W	-370.71	0.42
5330.00	1.05	0.26	5302.17	26.57 S	369.89 W	-370.54	0.42
5425.00	1.27	262.94	5397.15	25.83 S	370.93 W	-371.56	1.84
5520.00	1.41	276.42	5492.13	25.83 S	373.13 W	-373.76	0.36
5614.00	0.21	254.22	5588.14	25.83 S	375.33 W	-375.95	0.28

5614.00	0.94	254.88	5586.11	25.90 S	375.02 W	-375.65	0.68
5709.00	0.34	212.73	5681.10	26.34 S	375.92 W	-376.57	0.76
5804.00	0.54	175.74	5776.10	27.02 S	376.04 W	-376.71	0.35
5898.00	0.74	158.81	5870.10	28.03 S	375.79 W	-376.49	0.29
5993.00	0.53	147.11	5965.09	28.96 S	375.33 W	-376.06	0.26
6088.00	8.19	94.39	6059.75	29.85 S	368.34 W	-369.09	8.30
6182.00	16.49	93.71	6151.50	31.23 S	348.31 W	-349.12	8.83
6277.00	25.87	92.92	6239.98	33.16 S	314.08 W	-314.97	9.88
6372.00	35.52	88.42	6321.59	33.45 S	265.67 W	-266.59	10.44
6466.00	40.71	84.75	6395.52	29.89 S	207.80 W	-208.63	6.02
6528.00	45.42	83.18	6440.81	25.41 S	165.71 W	-166.43	7.79
6623.00	52.16	84.31	6503.36	17.67 S	94.70 W	-95.21	7.16
6718.00	64.17	89.27	6553.40	13.39 S	14.30 W	-14.71	13.38
6766.00	69.64	91.70	6572.22	13.79 S	29.83 E	29.39	12.31
6812.00	73.94	92.75	6586.60	15.49 S	73.49 E	72.96	9.61
6860.00	80.03	92.56	6597.40	17.65 S	120.18 E	119.57	12.68
6907.00	85.03	93.34	6603.51	20.05 S	166.70 E	165.99	10.78
6963.00	88.92	93.60	6606.46	23.44 S	222.51 E	221.67	6.96
7024.00	91.30	92.70	6606.34	26.79 S	283.42 E	282.43	4.17

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 88.20 DEGREES (GRID)
A TOTAL CORRECTION OF 7.56 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 7024.00 FEET
IS 284.68 FEET ALONG 95.40 DEGREES (GRID)**

**survey @ 300' and 637' are interpolated surveys
final survey is a projection to td**