

PCGC: Pressure Case Gamma



1 : 600 / 1 : 240

[illegible]

WELL INFORMATION

MWD Run Number	100	200			
Date run completed	09-Feb-15	10-Feb-15			
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)	915.97	6,397.94			
Log End Depth (TVD, ft)	6,397.94	6,631.43			
Drill or Wipe	Drill	Drill			
Drill/Wipe Start Date and Time	09-Feb-15 01:25	10-Feb-15 02:45			
Drill/Wipe End Date and Time	09-Feb-15 18:00	10-Feb-15 10:05			
Min Inc (deg) @ Depth (TVD, ft)	0.40 @ 1,006.97	33.10 @ 6,387.97			
Max Inc (deg) @ Depth (TVD, ft)	29.98 @ 6,348.77	77.67 @ 6,623.13			
Bit TFA(in2) / Bit Type	1.21 / PDC	1.21 / PDC			
Flow Rate (gpm)	600.00	550.00			
Max AV (fpm) / CV (fpm) @ MWD	N/A / N/A	N/A / N/A			
Fluid Type	Fresh Water Gel	Fresh Water Gel			
Density (ppg) / Viscosity (spqt)	9.95 / 40.00	10.30 / 40.00			
Filtrate CL (ppm)	1,400.00	140.00			
pH / Fluid Loss (mptm)	9.00 / 0	9.00 / 6			
PV (cP) / YP (lhf2)	11 / 9.00	11 / 9.00			
% Solids / % Sand	9.50 / 0.30	3.7 / 0.30			
% 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) / Source	154.34 / PCM	158.56 / PCM			
Rm @ Max Tool Temp (degF)	N/A @ N/A	N/A @ N/A			
Lead MWD Engineer	Paul Kock	Paul Kock			
Customer Representative	Dave Nielsen	Justin Fields			

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM			
Software Version	5.93	5.93			
Sub Serial Number	11107081	11107081			
Insert Serial Number	11680742	11680742			
Date and Time Initialized	08-Feb-15 13:06	08-Feb-14 13:06			
Date and Time Read	10-Feb-15 14:26	10-Feb-15 14:38			
ECMB SW Version	N/A	N/A			

Directional Sensor Information

Tool Type	PCDC	PCDC			
Distance From Bit (ft)	56.46	52.10			
Software Version	6.33	6.33			
Sub Serial Number	11107081	11107081			
Sonde Serial Number	11477956	11477956			
Sensor ID Number	N/A	N/A			
Toolface Offset (deg)	238.40	95.90			

Gamma Ray Sensor Information

Tool Type	PCG	PCG			
Distance From Bit (ft)	46.34	41.98			
Recorded Sample Period (sec)	10	10			
Software Version	8.15	8.15			
Sub Serial Number	11107081	11107081			
Insert/Sonde Serial Number	11121362	11121362			

REMARKS

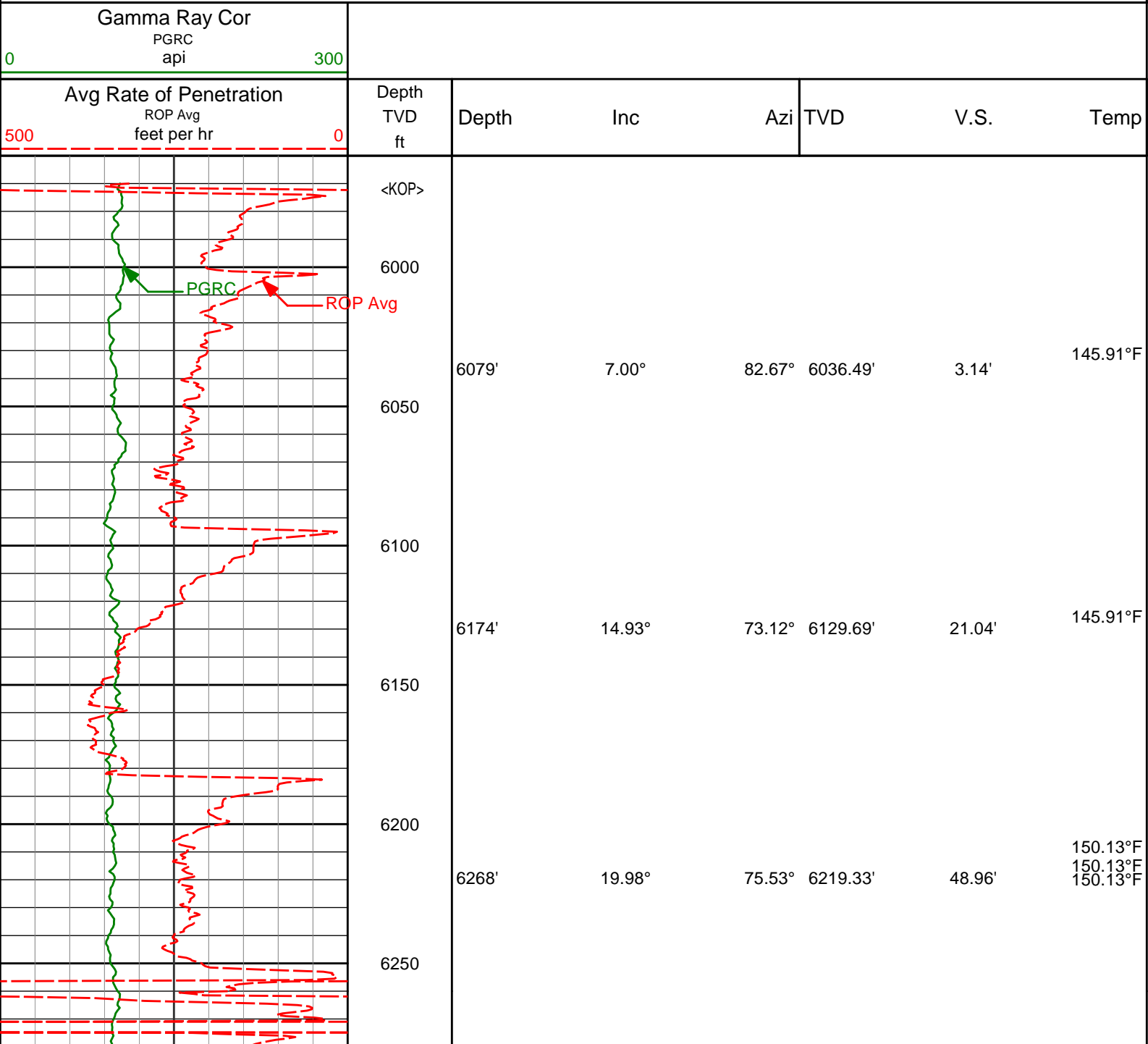
1. All depths are calibrated to the driller's pipe tally and are measured from the Rig drill floor.
2. No depth corrections have been made for pipe stretch or compression.
3. All data presented is recorded (memory data) unless otherwise stated.
 - ROPA: Average Rate of Penetration is real time data.
 - 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 8.1.10.

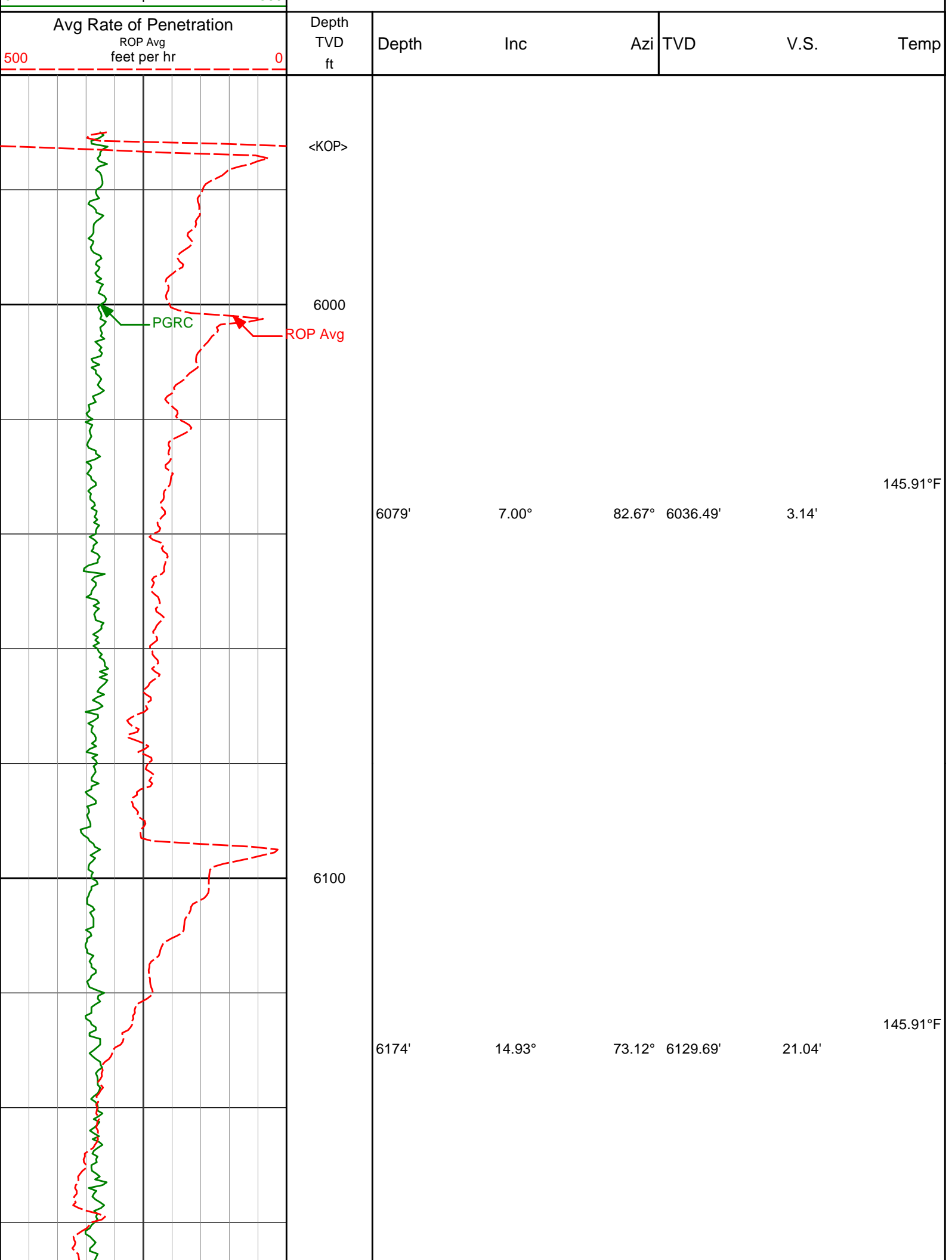
WARRANTY

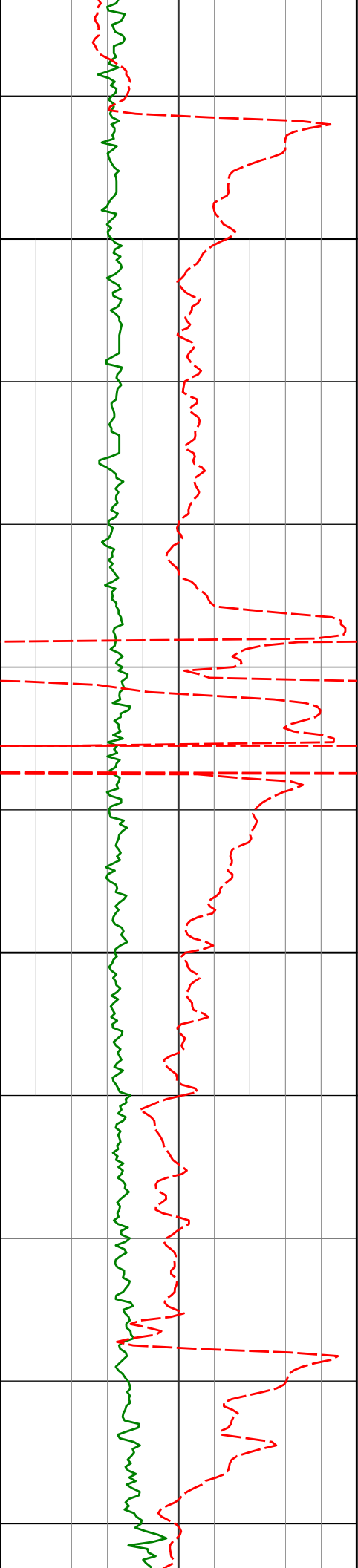
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TVD Detail 1:600 Scale







6200

6300

6268'

6363'

6411'

19.98°

26.68°

29.98°

75.53°

80.50°

81.05°

6219.33'

6306.53'

6348.77'

48.96'

86.43'

109.20'

150.13°F

150.13°F

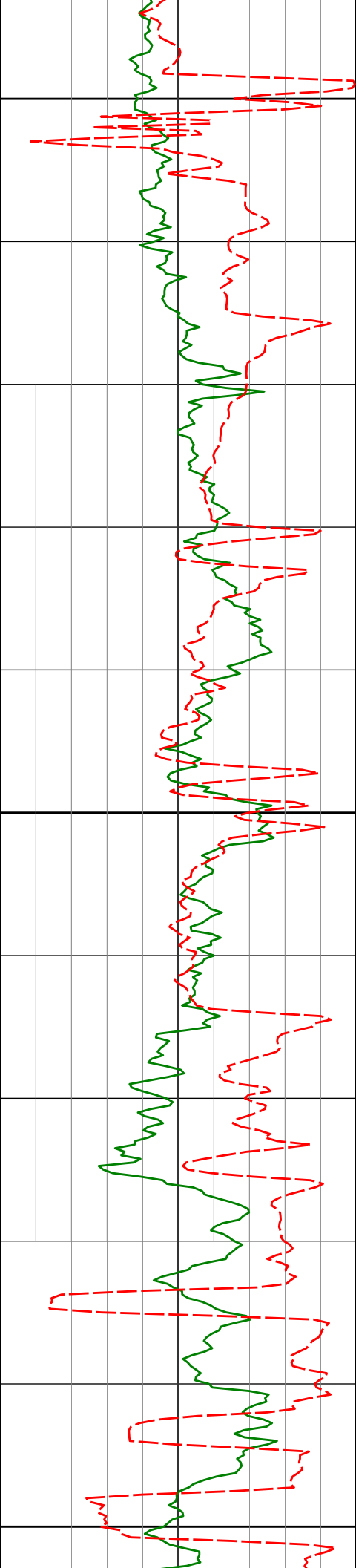
150.13°F

154.34°F

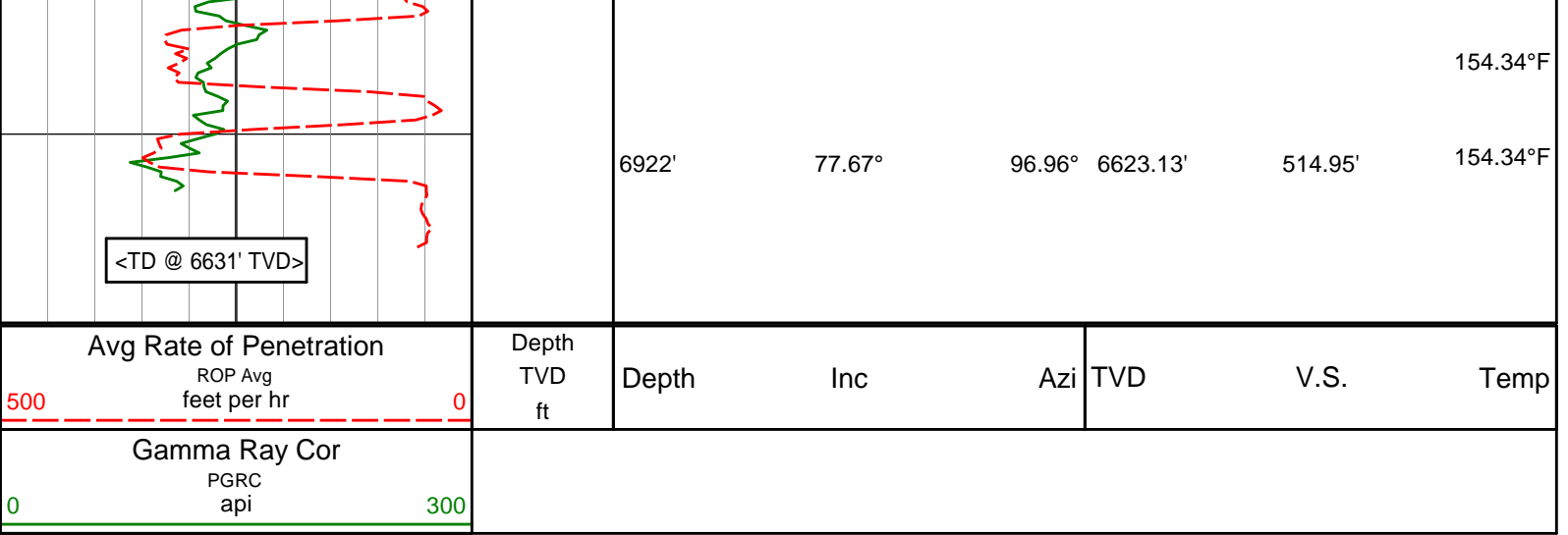
154.34°F

154.34°F

154.34°F



<Run 200> 6400	6457'	33.10°	81.60°	6387.97'	133.26'	
	6505'	38.40°	82.57°	6426.91'	161.29'	145.91°F
	6552'	44.05°	84.02°	6462.25'	192.24'	150.13°F
	6600'	49.39°	87.48°	6495.15'	227.10'	150.13°F
6500						
	6646'	55.50°	88.66°	6523.18'	263.37'	150.13°F
						150.13°F
	6694'	60.45°	89.64°	6548.62'	303.76'	150.13°F
	6741'	65.78°	91.03°	6569.87'	345.26'	154.34°F
	6789'	70.64°	91.68°	6587.68'	389.26'	158.56°F
6600	6836'	73.89°	91.60°	6602.00'	433.44'	154.34°F



HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble Energy
Aggie State AA17-635
Wattenberg
Weld Colorado
USA
CA-XX-0902101511

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
364.00	0.60	192.44	363.99	1.86 S	0.41 W	-0.65	0.16
729.00	0.50	192.04	728.98	5.28 S	1.15 W	-1.85	0.03
1007.00	0.40	211.30	1006.97	7.30 S	1.91 W	-2.87	0.06
1100.00	0.49	196.17	1099.97	7.96 S	2.19 W	-3.23	0.16
1192.00	0.59	175.38	1191.96	8.81 S	2.26 W	-3.42	0.24
1470.00	0.65	195.13	1469.95	11.76 S	2.56 W	-4.10	0.08
1561.00	0.66	185.43	1560.94	12.78 S	2.74 W	-4.42	0.12
1653.00	0.56	184.70	1652.93	13.75 S	2.83 W	-4.64	0.11
1746.00	3.10	353.47	1745.90	11.71 S	3.15 W	-4.68	3.93
1838.00	5.44	346.85	1837.63	4.99 S	4.43 W	-5.05	2.60
1930.00	6.66	336.03	1929.12	4.13 N	7.59 W	-6.97	1.81
2022.00	7.99	342.94	2020.37	15.12 N	11.63 W	-9.52	1.73
2114.00	8.83	350.66	2111.38	28.20 N	14.65 W	-10.77	1.53
2207.00	7.88	348.31	2203.40	41.49 N	17.10 W	-11.43	1.09
2300.00	9.10	352.16	2295.38	55.02 N	19.40 W	-11.90	1.45
2392.00	7.43	345.84	2386.42	67.99 N	21.85 W	-12.60	2.06
2487.00	9.33	354.00	2480.40	81.61 N	24.15 W	-13.08	2.35
2581.00	8.13	352.44	2573.31	95.78 N	25.83 W	-12.85	1.30
2676.00	10.52	354.60	2667.05	111.07 N	27.53 W	-12.49	2.54
2866.00	10.85	351.07	2853.76	146.01 N	31.93 W	-12.21	0.39
2960.00	10.26	348.94	2946.17	162.96 N	34.91 W	-12.91	0.75
3054.00	10.14	347.98	3038.68	179.27 N	38.24 W	-14.04	0.22
3149.00	9.48	343.51	3132.30	194.95 N	42.21 W	-15.88	1.06
3243.00	6.99	341.85	3225.32	207.81 N	46.18 W	-18.11	2.66
3338.00	7.83	349.81	3319.53	219.68 N	49.13 W	-19.45	1.39
3433.00	7.56	359.69	3413.68	232.29 N	50.31 W	-18.94	1.42
3528.00	8.01	6.56	3507.80	245.12 N	49.59 W	-16.51	1.09
3622.00	9.79	8.54	3600.67	259.53 N	47.65 W	-12.68	1.92
3717.00	11.50	1.11	3694.03	276.99 N	46.27 W	-8.98	2.30
3812.00	12.71	350.27	3786.93	296.76 N	47.85 W	-7.92	2.71
3907.00	13.44	350.79	3879.47	317.96 N	51.39 W	-8.60	0.78
4001.00	12.75	351.38	3971.02	339.00 N	54.69 W	-9.07	0.75
4094.00	11.86	350.73	4061.89	358.58 N	57.77 W	-9.52	0.97
4189.00	10.49	349.85	4155.08	376.73 N	60.86 W	-10.17	1.45

4284.00	9.41	352.99	4248.65	392.95 N	63.33 W	-10.46	1.27
4378.00	8.20	348.06	4341.54	407.13 N	65.66 W	-10.88	1.52
4472.00	7.50	346.90	4434.66	419.67 N	68.44 W	-11.96	0.76
4566.00	6.54	347.22	4527.96	430.86 N	71.01 W	-13.02	1.02
4660.00	7.79	3.56	4621.23	442.44 N	71.80 W	-12.26	2.53
4755.00	6.68	1.95	4715.47	454.39 N	71.21 W	-10.09	1.19
4849.00	7.17	344.53	4808.80	465.51 N	72.59 W	-9.98	2.28
4944.00	5.76	348.55	4903.19	475.90 N	75.12 W	-11.10	1.56
5038.00	5.61	345.57	4996.73	484.97 N	77.20 W	-11.95	0.35
5132.00	4.66	346.88	5090.35	493.14 N	79.21 W	-12.86	1.02
5227.00	1.50	351.03	5185.20	498.13 N	80.28 W	-13.26	3.33
5321.00	2.11	8.65	5279.15	501.05 N	80.21 W	-12.80	0.87
5605.00	2.29	9.27	5562.95	511.82 N	78.51 W	-9.68	0.06
5700.00	1.63	89.30	5657.90	513.71 N	76.86 W	-7.79	2.71
5889.00	2.19	12.05	5846.83	517.28 N	73.41 W	-3.90	1.28
5984.00	2.03	3.20	5941.76	520.73 N	72.94 W	-2.97	0.38
6079.00	7.00	82.67	6036.49	523.15 N	67.10 W	3.14	7.29
6174.00	14.93	73.12	6129.69	527.45 N	49.62 W	21.04	8.54
6268.00	19.98	75.53	6219.33	534.99 N	22.46 W	48.96	5.43
6363.00	26.68	80.50	6306.53	542.57 N	14.33 E	86.43	7.34
6411.00	29.98	81.05	6348.77	546.22 N	36.82 E	109.20	6.90
6457.00	33.10	81.60	6387.97	549.84 N	60.60 E	133.26	6.81
6505.00	38.40	82.57	6426.91	553.68 N	88.37 E	161.29	11.10
6552.00	44.05	84.02	6462.25	557.28 N	119.12 E	192.24	12.19
6600.00	49.39	87.48	6495.15	559.82 N	153.95 E	227.10	12.30
6646.00	55.50	88.66	6523.18	561.03 N	190.38 E	263.37	13.44
6694.00	60.45	89.64	6548.62	561.63 N	231.05 E	303.76	10.46
6741.00	65.78	91.03	6569.87	561.37 N	272.96 E	345.26	11.64
6789.00	70.64	91.68	6587.68	560.31 N	317.50 E	389.26	10.20
6836.00	73.89	91.60	6602.00	559.03 N	362.24 E	433.44	6.92
6922.00	77.67	96.96	6623.13	552.78 N	445.32 E	514.95	7.47
6976.00	84.65	92.50	6631.43	548.40 N	498.46 E	567.02	15.28

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 82.35 DEGREES (GRID)
A TOTAL CORRECTION OF 7.44 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 6976.00 FEET
IS 741.08 FEET ALONG 42.27 DEGREES (GRID)**

Surface surveys at 364 ft and 729 ft have had azimuths corrected to grid north, but were not taken by Halliburton.

Last survey is a projection from 6922 ft MD to TD at 6976 ft MD.