

**PCDC - Pressure Case Directional
PCGK - Pressure Case Gamma**



1 : 240

Country	: USA
Field	: Wattenberg
Location	: Lat: 40° 36' 34.92" North Long: 104° 25' 47.60" West
Well	: Ball Ranch AC04-72HN
Company	: Noble Energy
Rig	: H&P 322
LOCATION	Company : Noble Energy
	Rig : H&P 322
Other Services Directional Drilling	Well : Ball Ranch AC04-72HN
	Field : Wattenberg
Other Services Directional Drilling	Country : USA
	API Number : 05-123-35248
Other Services Directional Drilling	Latitude : 40° 36' 34.92" North
	Longitude : 104° 25' 47.60" West
Other Services Directional Drilling	UTM Easting = 3297107.59 ft
	UTM Northing = 1466748.11 ft

Permanent Datum	: Ground Level	Elevation	: 4890.00 ft
Log Measured From	: Drill Floor	24.00 ft	Above Permanent Datum
Drilling Measured From	: Drill Floor	TVD LOG	

Depth Logged	: 880.00 ft	To	7,449.00 ft
Date Logged	: 11-Aug-12	To	11-Aug-12
Total Depth MD	: 7,449.00 ft	TVD	: 6,824.03 ft
Spud Date	: 11-Aug-12	Plot Type	: Final
		Plot Date	: 17-Aug-12
		Unit No.	: 11210425
		Job No.	: CA-XX-0009691519

Run No.	Borehole Record (TVD)		Run No.		Borehole Record (TVD)	
	Size	From	To	Size	From	To
100	8.750 in	880.00 ft	4,809.62 ft			
200	8.750 in	4,809.62 ft	6,824.03 ft			
				Casing Record (TVD)		
				Size	Weight	To
				9.625 in	36.00 lbpf	SURFACE
				7.000 in	24.00 lbpf	SURFACE
						880.00 ft
						6,823.16 ft

WELL INFORMATION

MWD Run Number	100	200
Date run completed	13-Aug-12	16-Aug-12
Rig Bit Number	100	200
Bit Size (in)	8.750	8.750
Tool Nominal OD (in)	6.750	6.750
Log Start Depth (MD, ft)	880.00	4,959.00
Log End Depth (MD, ft)	4,959.00	7,449.00
Drill or Wipe	Drill	Drill
Drill/Wipe Start Date and Time	12-Aug-12 23:00	14-Aug-12 00:30
Drill/Wipe End Date and Time	13-Aug-12 19:00	15-Aug-12 20:00
Min Inc (deg) @ Depth (MD, ft)	.61 @ 1,101.00	.65 @ 5,549.00
Max Inc (deg) @ Depth (MD, ft)	24.63 @ 4,036.00	81.04 @ 7,394.00
Bit TFA(in2) / Bit Type	.75 / PDC	.86 / PDC
Flow Rate (gpm)	550.00	550.00
Max AV (fpm) / CV (fpm) @ MWD	436.8 / 436.8	436.8 / 436.8
Fluid Type	Fresh Water Gel	Fresh Water Gel
Density (ppg) / Viscosity (spqt)	8.60 / 27.00	10.00 / 27.00
Filtrate CL (ppm)	500.00	500.00
pH / Fluid Loss (mptm)	8.30 / N/A	8.60 / N/A
PV (cP) / YP (Ihf2)	1 / 3.00	1 / 3.00
% Solids / % Sand	1.70 / 0.10	1.75 / 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 (degF) / Source	172.78 / PCM	172.78 / PCM		
Rm @ Max Tool Temp (degF)	N/A @ N/A	N/A @ N/A		
Lead MWD Engineer	Robert Ley	Robert Ley		
Customer Representative	Charles Colver	Charles Colver		

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM		
Software Version	5.76	5.76		
Sub Serial Number	202467	202467		
Insert Serial Number	11680784	11680784		
Date and Time Initialized	11-Aug-12 05:31	11-Aug-12 05:31		
Date and Time Read	16-Aug-12 02:14	16-Aug-12 02:06		
ECMB SW Version	N/A	N/A		

Directional Sensor Information

Tool Type	PCDC	PCDC		
Distance From Bit (ft)	55.00	55.00		
Software Version	6.21	6.21		
Sub Serial Number	202467	202467		
Sonde Serial Number	11062060	11062060		
Sensor ID Number	N/A	N/A		
Toolface Offset (deg)	307.06	275.64		

Gamma Ray Sensor Information

Tool Type	PCG	PCG		
Distance From Bit (ft)	48.33	48.17		
Recorded Sample Period (sec)	10	10		
Software Version	8.15	8.15		
Sub Serial Number	202467	202467		
Insert/Sonde Serial Number	11121365	11121365		

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"

PGRC (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
Gap Fill: 3.0 feet

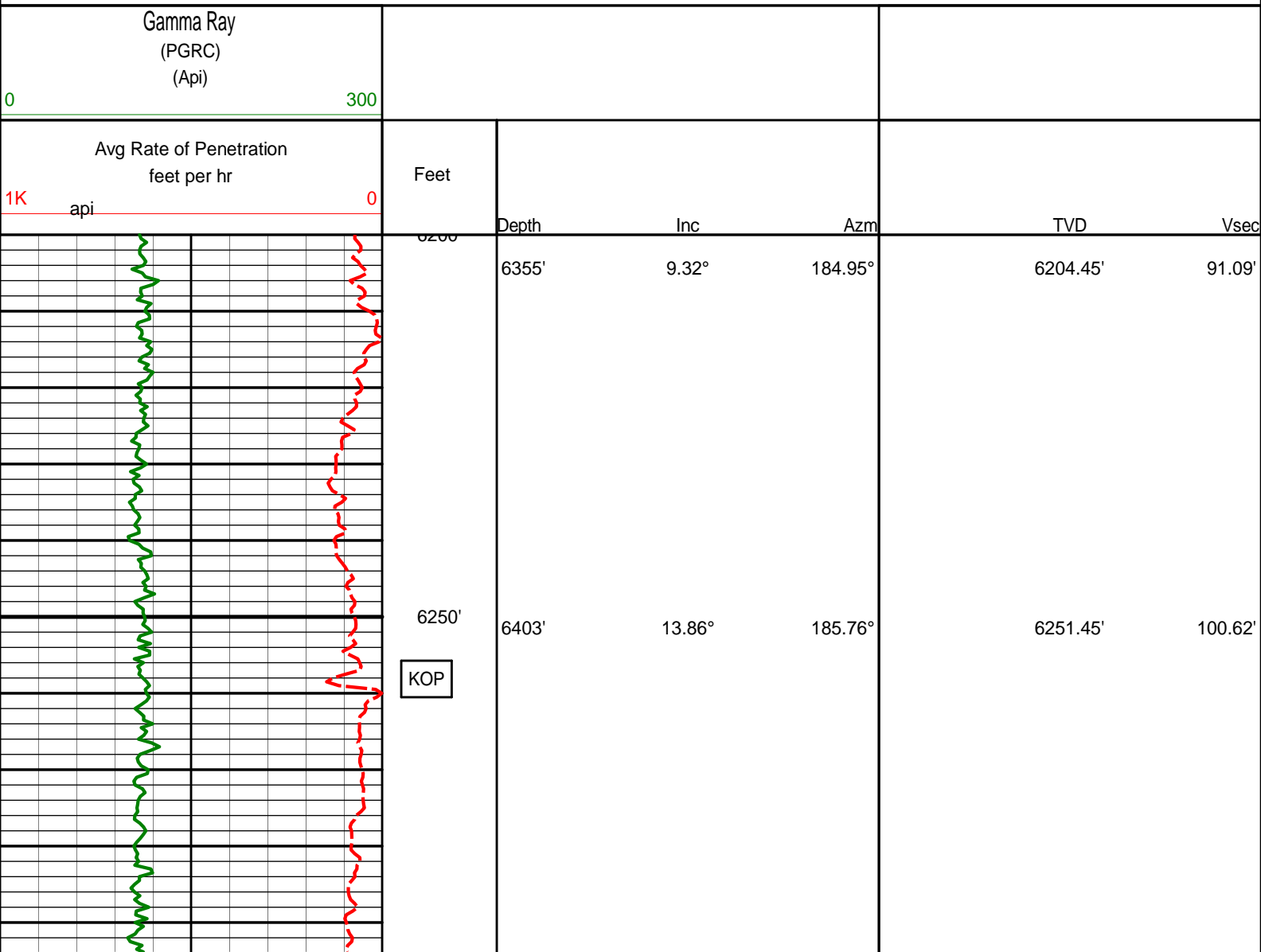
Insite Version 7.3.40 build 25

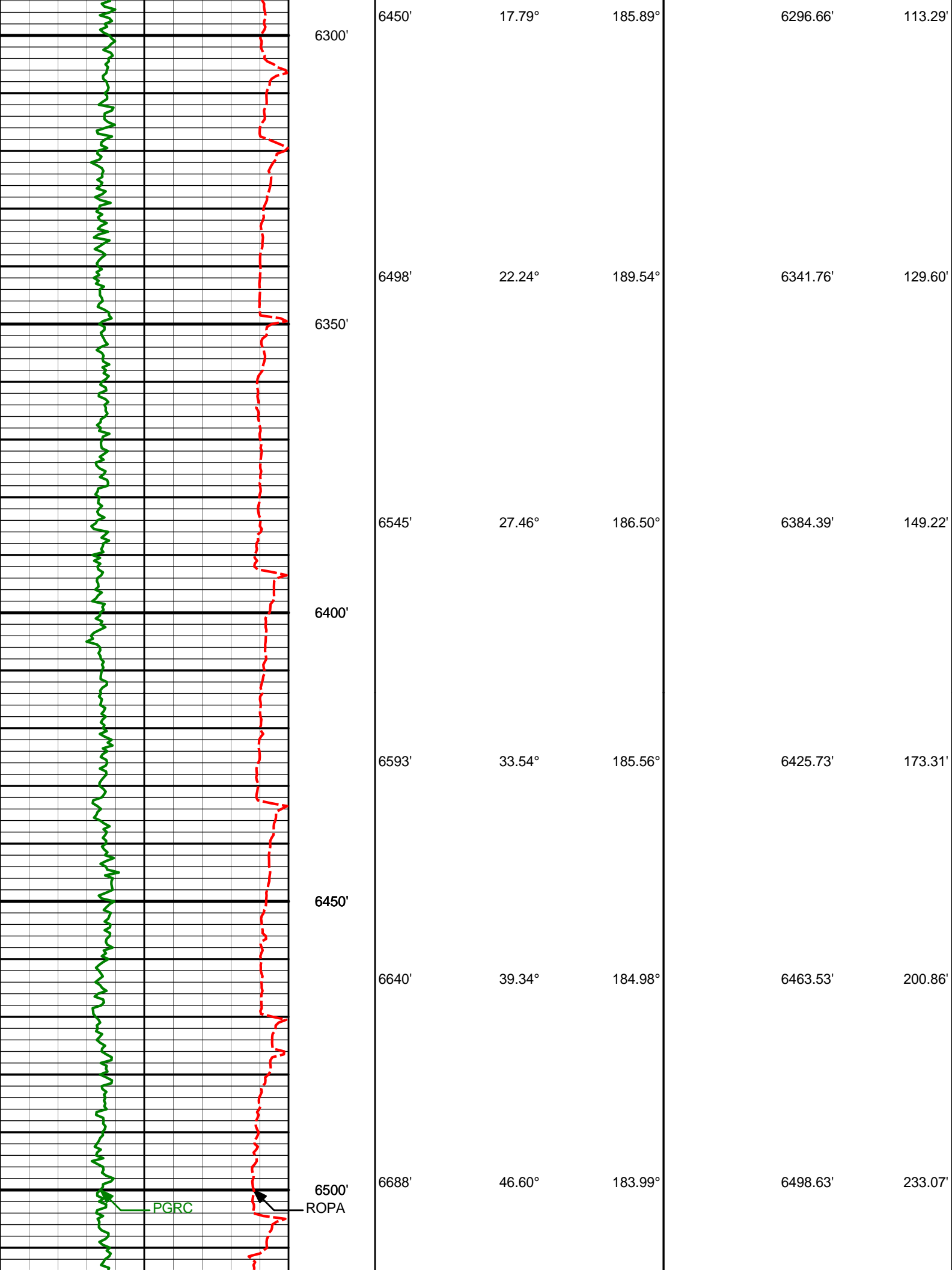
WARRANTY

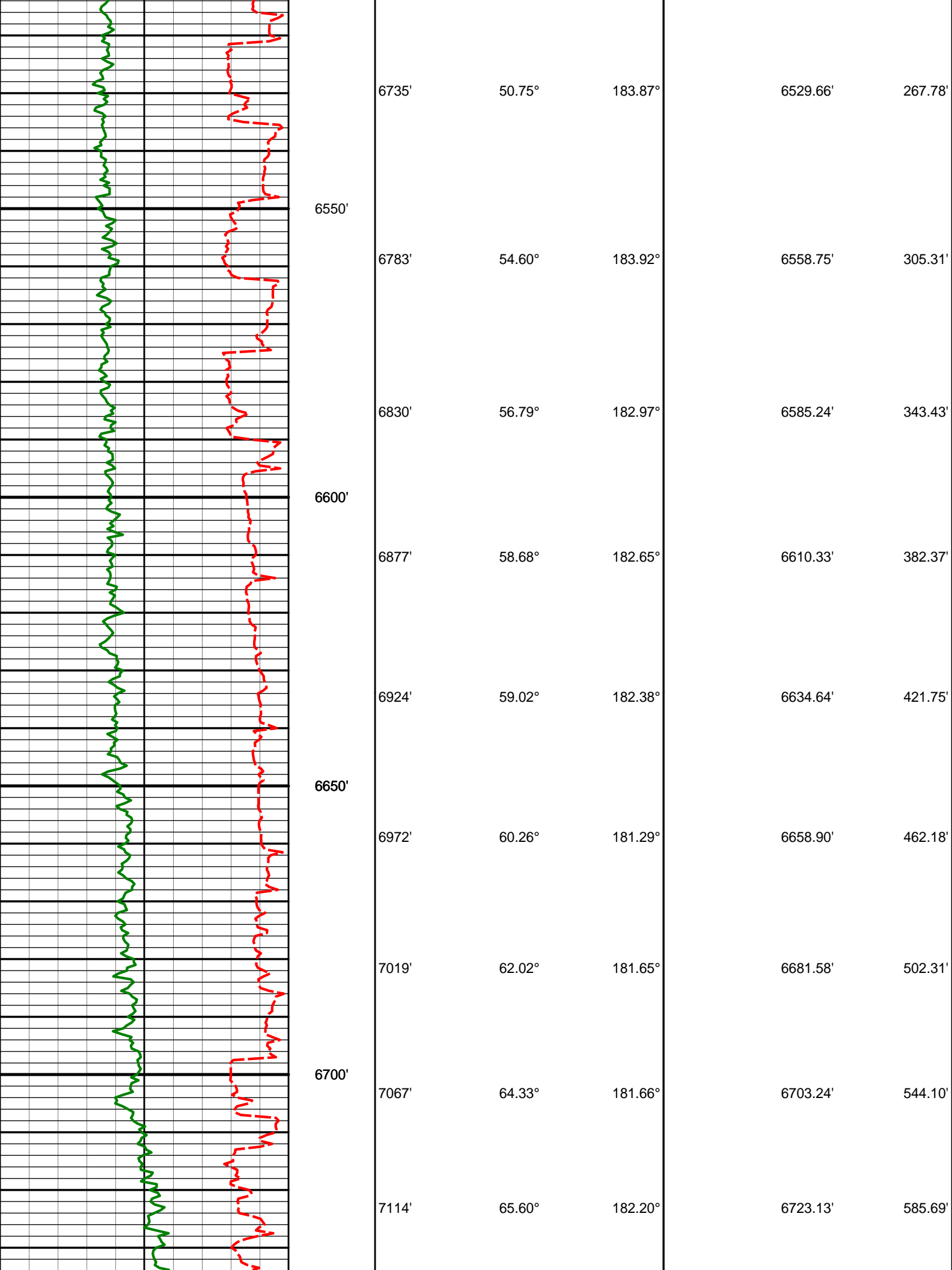
HALLIBURTON WILL USE ITS BEST EFFORTS TO FURNISH CUSTOMERS WITH ACCURATE INFORMATION AND INTERPRETATIONS THAT ARE PART OF, AND INCIDENT TO, THE SERVICES PROVIDED. HOWEVER, HALLIBURTON CANNOT AND DOES NOT WARRANT THE ACCURACY OR CORRECTNESS OF SUCH INFORMATION AND INTERPRETATIONS. UNDER NO CIRCUMSTANCES SHOULD ANY SUCH INFORMATION OR INTERPRETATION BE RELIED UPON AS THE SOLE BASIS FOR ANY DRILLING, COMPLETION, PRODUCTION, OR FINANCIAL DECISION OR ANY PROCEDURE INVOLVING ANY RISK TO THE SAFETY OF ANY DRILLING VENTURE, DRILLING RIG OR ITS CREW OR ANY OTHER THIRD PARTY. THE CUSTOMER HAS FULL RESPONSIBILITY FOR ALL DRILLING, COMPLETION AND PRODUCTION OPERATION. HALLIBURTON MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, WITH RESPECT TO THE SERVICES RENDERED. IN NO EVENT WILL HALLIBURTON BE LIABLE FOR FAILURE TO OBTAIN ANY PARTICULAR RESULTS OR FOR ANY DAMAGES, INCLUDING, BUT NOT LIMITED TO, INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES, RESULTING FROM THE USE OF ANY INFORMATION OR INTERPRETATION PROVIDED BY HALLIBURTON.

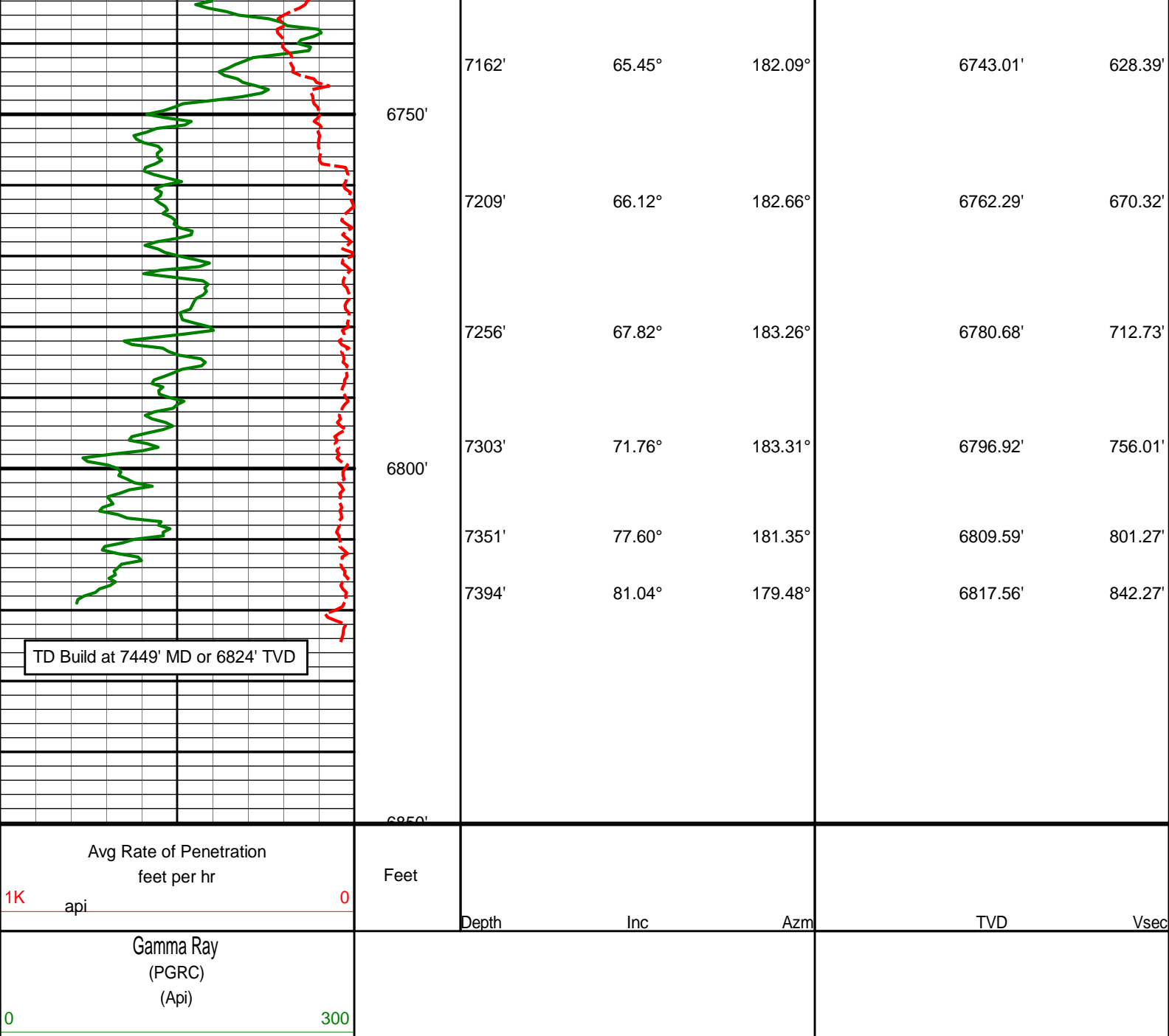
HALLIBURTON

TVD Detail Log 1:240









HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble Energy
 Ball Ranch AC04-72HN
 Wattenberg
 Weld CO
 USA
 CA-XX-0009691519

Measured Depth (feet)	Inclination (degrees)	Direction (degrees)	Vertical Depth (feet)	Latitude (feet)	Departure (feet)	Vertical Section (feet)	Dogleg (deg/100ft)
880.00	0.00	0.00	880.00	0.00 N	0.00 E	0.00	TIE-IN
915.00	0.65	135.51	915.00	0.14 S	0.14 E	0.10	1.85
1008.00	0.68	153.82	1007.99	1.01 S	0.75 E	0.79	0.23
1101.00	0.61	150.89	1100.99	1.93 S	1.23 E	1.57	0.08
1195.00	0.74	210.13	1194.98	2.89 S	1.17 E	2.51	0.72
1288.00	2.87	260.55	1287.93	3.79 S	1.43 W	4.03	2.65

1381.00	4.08	273.22	1380.76	3.99 S	7.03 W	5.60	1.54
1474.00	5.29	273.45	1473.45	3.54 S	14.61 W	7.05	1.30
1568.00	6.95	273.20	1566.91	2.96 S	24.61 W	8.96	1.77
1663.00	9.06	276.90	1660.98	1.75 S	37.77 W	11.04	2.29
1758.00	11.19	276.09	1754.50	0.13 N	54.36 W	13.33	2.25
1852.00	13.49	272.40	1846.32	1.56 N	74.39 W	16.90	2.59
1947.00	15.85	273.84	1938.22	2.89 N	98.41 W	21.55	2.51
2042.00	16.91	272.06	2029.36	4.26 N	125.16 W	26.85	1.23
2137.00	19.36	273.02	2119.64	5.58 N	154.70 W	32.88	2.60
2232.00	18.72	278.04	2209.44	8.55 N	185.52 W	37.64	1.85
2326.00	16.53	276.00	2299.03	12.05 N	213.76 W	41.23	2.41
2421.00	18.07	279.39	2389.73	15.87 N	241.74 W	44.46	1.93
2515.00	18.11	284.13	2479.09	21.81 N	270.29 W	45.76	1.57
2610.00	15.58	282.63	2570.00	28.21 N	297.06 W	46.19	2.70
2705.00	17.23	277.14	2661.14	32.75 N	323.47 W	48.33	2.38
2800.00	19.49	285.66	2751.32	38.78 N	352.70 W	49.73	3.69
2895.00	17.89	285.75	2841.30	47.02 N	382.00 W	48.99	1.69
2990.00	16.59	285.76	2932.04	54.66 N	409.09 W	48.29	1.37
3085.00	17.56	284.98	3022.85	62.05 N	435.98 W	47.79	1.05
3180.00	16.86	283.90	3113.60	69.06 N	463.20 W	47.73	0.81
3275.00	19.71	282.58	3203.79	75.86 N	492.21 W	48.33	3.04
3371.00	19.96	281.99	3294.09	82.79 N	524.04 W	49.49	0.33
3465.00	18.48	282.95	3382.85	89.46 N	554.25 W	50.51	1.61
3561.00	16.25	282.15	3474.47	95.70 N	582.21 W	51.38	2.33
3656.00	16.17	279.92	3565.70	100.77 N	608.24 W	52.90	0.66
3751.00	16.57	281.83	3656.85	105.83 N	634.53 W	54.51	0.71
3846.00	20.42	278.91	3746.92	111.18 N	664.17 W	56.67	4.16
3941.00	22.79	277.78	3835.25	116.24 N	698.78 W	60.33	2.53
4036.00	24.63	283.74	3922.24	123.43 N	736.24 W	62.63	3.18
4131.00	23.53	284.21	4008.97	132.79 N	773.85 W	62.88	1.18
4226.00	21.82	284.65	4096.62	141.91 N	809.32 W	62.82	1.81
4321.00	19.43	280.03	4185.53	149.13 N	841.97 W	63.90	3.05
4416.00	16.90	281.50	4275.79	154.64 N	871.07 W	65.77	2.70
4511.00	13.99	284.91	4367.35	160.34 N	895.70 W	66.34	3.21
4606.00	10.39	280.74	4460.20	164.90 N	915.22 W	66.76	3.89
4701.00	8.23	276.83	4553.94	167.30 N	930.39 W	68.18	2.37
4796.00	8.11	277.05	4647.98	168.93 N	943.80 W	69.92	0.13
4891.00	7.76	283.28	4742.07	171.23 N	956.69 W	70.88	0.98
4978.00	4.73	292.03	4828.54	173.92 N	965.73 W	70.51	3.63
5074.00	1.91	295.29	4924.37	176.09 N	970.84 W	69.68	2.95
5169.00	2.13	172.33	5019.35	175.02 N	972.04 W	71.02	3.74
5264.00	3.59	229.75	5114.24	171.34 N	974.07 W	75.08	3.19
5359.00	1.79	224.78	5209.13	168.37 N	977.38 W	78.77	1.91
5454.00	1.56	205.66	5304.09	166.16 N	978.98 W	81.32	0.63
5549.00	0.65	177.06	5399.08	164.46 N	979.51 W	83.09	1.09
5644.00	0.85	216.04	5494.07	163.35 N	979.90 W	84.26	0.56
5739.00	0.90	150.04	5589.06	162.14 N	979.94 W	85.44	1.00
5834.00	0.81	106.12	5684.05	161.31 N	978.93 W	86.00	0.68
5929.00	1.21	74.34	5779.04	161.40 N	977.32 W	85.52	0.71
6024.00	1.29	83.79	5874.01	161.78 N	975.29 W	84.64	0.23
6119.00	1.32	80.94	5968.99	162.07 N	973.15 W	83.83	0.07
6195.00	1.60	77.24	6044.96	162.44 N	971.25 W	83.00	0.39
6213.00	1.64	73.38	6062.96	162.57 N	970.76 W	82.76	0.65
6260.00	1.86	129.96	6109.94	162.27 N	969.53 W	82.74	3.55
6308.00	5.41	176.25	6157.84	159.51 N	968.78 W	85.23	9.05
6355.00	9.32	184.95	6204.45	153.51 N	968.97 W	91.09	8.62
6403.00	13.86	185.76	6251.45	143.91 N	969.88 W	100.62	9.46
6450.00	17.79	185.89	6296.66	131.16 N	971.18 W	113.29	8.37
6498.00	22.24	189.54	6341.76	114.90 N	973.44 W	129.60	9.61
6545.00	27.46	186.50	6384.39	95.35 N	976.14 W	149.22	11.43
6593.00	33.54	185.56	6425.73	71.14 N	978.69 W	173.31	12.71
6640.00	39.34	184.98	6463.53	43.35 N	981.24 W	200.86	12.36
6688.00	46.60	183.99	6498.63	10.75 N	983.77 W	233.07	15.20
6735.00	50.75	183.87	6529.66	24.45 S	986.19 W	267.78	8.82
6783.00	54.60	183.92	6558.75	62.53 S	988.79 W	305.31	8.03
6830.00	56.79	182.97	6585.24	101.28 S	991.12 W	343.43	4.95
6877.00	58.68	182.65	6610.33	140.97 S	993.06 W	382.37	4.07
6924.00	59.02	182.38	6634.64	181.16 S	994.82 W	421.75	0.87
6972.00	60.26	181.29	6658.90	222.55 S	996.15 W	462.18	3.25
7019.00	62.02	181.65	6681.58	263.70 S	997.20 W	502.31	3.80
7067.00	64.33	181.66	6703.24	306.52 S	998.43 W	544.10	4.81
7114.00	65.60	182.20	6723.13	349.08 S	999.87 W	585.69	2.89
7162.00	65.45	182.09	6743.01	392.73 S	1001.50 W	628.39	0.38
7209.00	66.12	182.66	6762.29	435.56 S	1003.28 W	670.32	1.81
7256.00	67.82	183.26	6780.68	478.75 S	1005.51 W	712.73	3.80

7303.00	71.76	183.31	6796.92	522.78 S	1008.04 W	756.01	8.38
7351.00	77.60	181.35	6809.59	569.01 S	1009.91 W	801.27	12.80
7394.00	81.04	179.48	6817.56	611.26 S	1010.21 W	842.27	9.06

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 194.33 DEGREES (GRID)
A TOTAL CORRECTION OF 7.90 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 7394.00 FEET
IS 1180.75 FEET ALONG 238.82 DEGREES (GRID)**

Date Printed:17 August 2012