HALLIBURTON | Sperry Drilling

DGR Dual Gamma Ray
SP4 - Slim Phase 4
PCDC - Pressure Case Directional Current

1 : 240

Country	: USA
Field	: Wattenburg
Location	: Lat: 40° 7' 2.68" North Long: 104° 43' 40.93" West
Well	: Wishbone 29N-E24HZ
Company	: Anadarko Petroleum Corporation
Rig	: Xtreme 22

Company	:	**Anadarko Petroleum Corporation**
Rig	:	**Xtreme 22**
Well	:	**Wishbone 29N-E24HZ**
Field	:	**Wattenburg**
Country	:	**USA**
API Number	:	**05-123-37149**

LOCATION

Latitude : **40° 7' 2.68" North**
Longitude : **104° 43' 40.93" West**

UTM Easting = **3,215,893.391 ft**
UTM Northing = **1,286,556.646 ft**

Other Services
Directional Drilling

Permanent Datum : **Ground Level** Elevation : **5084.00 ft**
Log Measured From : **Kelly Bushing** **16.00 ft** Above Permanent Datum
Drilling Measured From : **Kelly Bushing**

TVD LOG

Elev. KB **5100.00 ft**
DF **5099.00 ft**
GL **5084.00 ft**
WD **N/A**

Depth Logged : **1,042.00 ft** To **7,778.00 ft**
Date Logged : **01-Jun-13** To **30-Jun-13**
Total Depth MD : **7,778.00 ft** TVD : **7,404.93 ft**
Spud Date : **01-Jun-13**

Unit No. : **11610117** Job No. : **CA-XX-0900382955**
Plot Type : **Final**
Plot Date : **30-Jun-13**

Run No.	Borehole Record (TVD) Size	From	To
0100	8.750 in	0.00 ft	6850.00 ft
0200	8.750 in	6850.00 ft	7778.00 ft

Run No.	Borehole Record (TVD) Size	From	To

Casing Record (TVD)

Size	Weight	From	To
9.625 in	36.00 lbpf	SURFACE	1,041.97 ft

WELL INFORMATION

MWD Run Number	100	200
Date run completed	03-Jun-13	04-Jun-13
Rig Bit Number	0100	0200
Bit Size (in)	8.750	8.750
Tool Nominal OD (in)	6.860	6.750
Log Start Depth (MD, ft)	1,042.00	6,850.00
Log End Depth (MD, ft)	6,850.00	7,778.00
Drill or Wipe	Drill	Drill
Drill/Wipe Start Date and Time	01-Jun-13 12:45	03-Jun-13 07:40
Drill/Wipe End Date and Time	02-Jun-13 19:00	04-Jun-13 00:34
Min Inc (deg) @ Depth (MD, ft)	.40 @ 1,531.00	3.20 @ 6,876.00
Max Inc (deg) @ Depth (MD, ft)	11.02 @ 3,087.00	90.00 @ 7,778.00
Bit TFA(in2) / Bit Type	1.49 /	1.49 / N/A
Flow Rate (gpm)	613.61	525.33
Max AV (fpm) / CV (fpm) @ MWD	349.2 / 214.2	272.5 / 252.9
Fluid Type	Fresh Water Gel	Fresh Water Gel
Density (ppg) / Viscosity (spqt)	8.70 / 38.00	10.00 / 40.00
Filtrate CL (ppm)	1,500.00	1,700.00
pH / Fluid Loss (mptm)	8.50 / 6	9.00 / 4
PV (cP) / YP (lhf2)	6 / 6.00	9 / 8.00
% Solids / % Sand	2.70 / 0.20	9.00 / 0.25
% 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	172.78 / PCM	172.78 / PCM			
Rm @ Max Tool Temp (degF)	@ 172.78	N/A @ 172.78			
Lead MWD Engineer	Matt Busche	Matt Busche			
Customer Representative	Will Pettijohn	David Cornett			

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM			
Software Version	5.84	5.84			
Sub Serial Number	11305516	11305516			
Insert Serial Number	11400878	11400878			
Date and Time Initialized	31-May-13 10:53	31-May-13 10:53			
Date and Time Read	04-Jun-13 11:42	04-Jun-13 11:35			
ECMB SW Version	N/A	N/A			

Directional Sensor Information

Tool Type	PCDC	PCDC			
Distance From Bit (ft)	50.88	46.55			
Software Version	6.21	6.21			
Sub Serial Number	11305516	11305516			
Sonde Serial Number	11181531	11181531			
Sensor ID Number	N/A	N/A			
Toolface Offset (deg)	170.89	23.70			

Gamma Ray Sensor Information

Tool Type	PCG	PCG			
Distance From Bit (ft)	55.83	51.50			
Recorded Sample Period (sec)	10	10			
Software Version	8.15	8.15			
Sub Serial Number	11305516	11305516			
Insert/Sonde Serial Number	11579809	11579809			

Resistivity Sensor Information

Tool Type					
Distance From Bit (ft)					
Recorded Sample Period (sec)					
Software Version					
Sub Serial Number					
Receiver Insert Serial Number					
Transmitter Insert Serial Number					
Receiver Orientation					

REMARKS

1. Depths are true vertical depths, referenced to the Driller's pipe tally and are measured from the Kelly Bushing, unless otherwise specified.

2. No depth corrections have been made for pipe stretch or compression.

3. Critical annular velocities are calculated using the "Power Law" model for water based fluids and the "Bingham Plastic" model for oil and synthetic based fluids.

4. All data presented is recorded data unless otherwise specified.

5. The following smoothing parameters have been applied to the data:

DGR (Dual Gamma Ray):
Interval Resolution: 0.5 ft
Interval Distance: 0.6 ft
Gap Fill: 3.0 ft

PGRC (Corrected Gamma Ray):
Interval Resolution: 0.5 ft
Interval Distance: 0.6 ft
Gap Fill: 3.0 ft

ROPA (Average Rate Of Penetration):
Interval Resolution: 0.5 ft
Interval Distance: 1.2 ft
Gap Fill: 3.0 ft

Insite version: 7.4.20

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

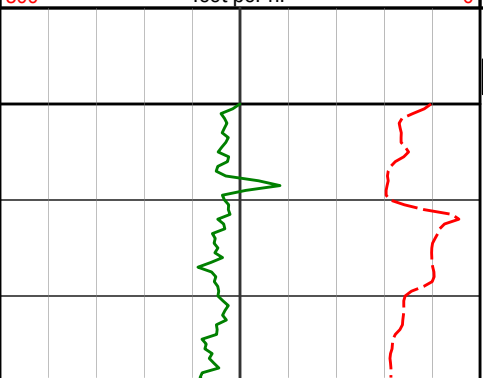
Sperry Drilling Services

MD Detail Log 1:240

Company: Anadarko PC
Well: Wishbone 29N-E24HZ
Rig: Xtreme 22
Township and Range: T2N - R66W

PCG Gamma Ray
PGRC
0 api 300

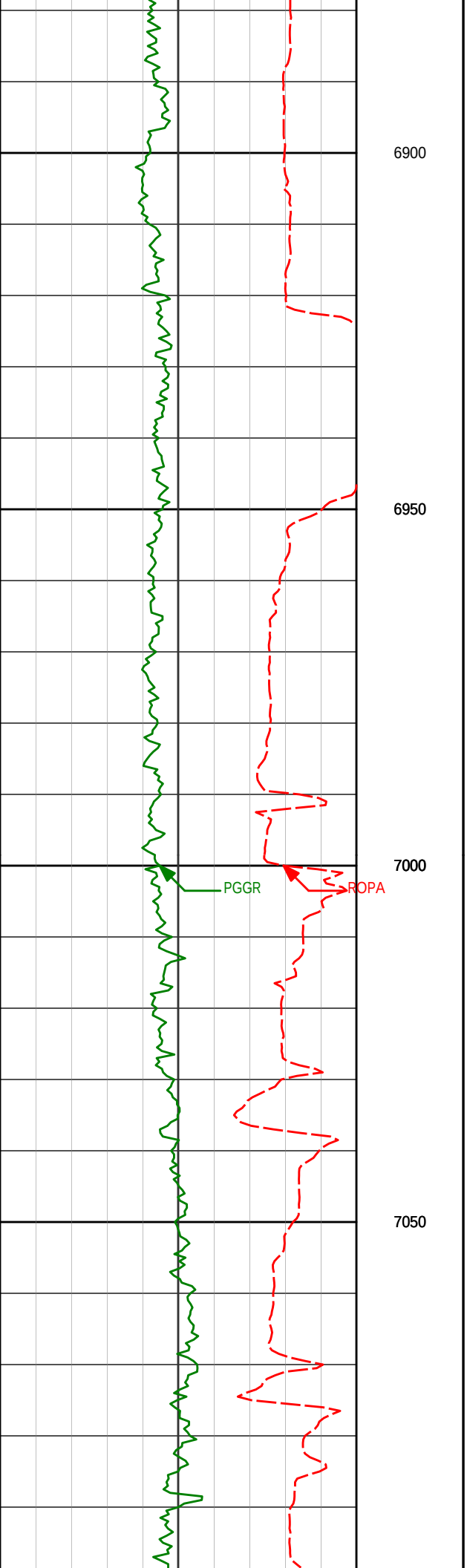
Avg Rate of Penetration
ROPA
500 feet per hr 0



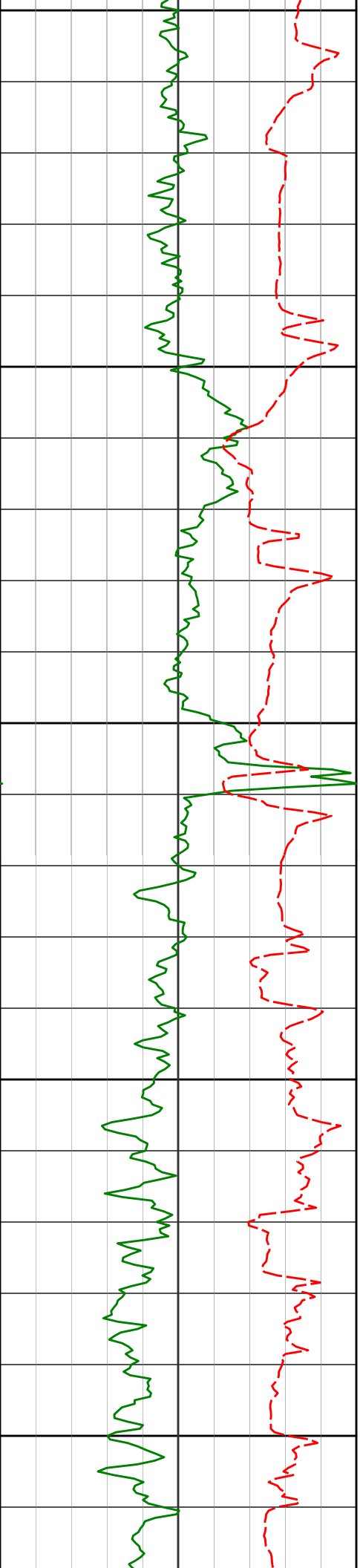
Depth ft

Run 200
6850

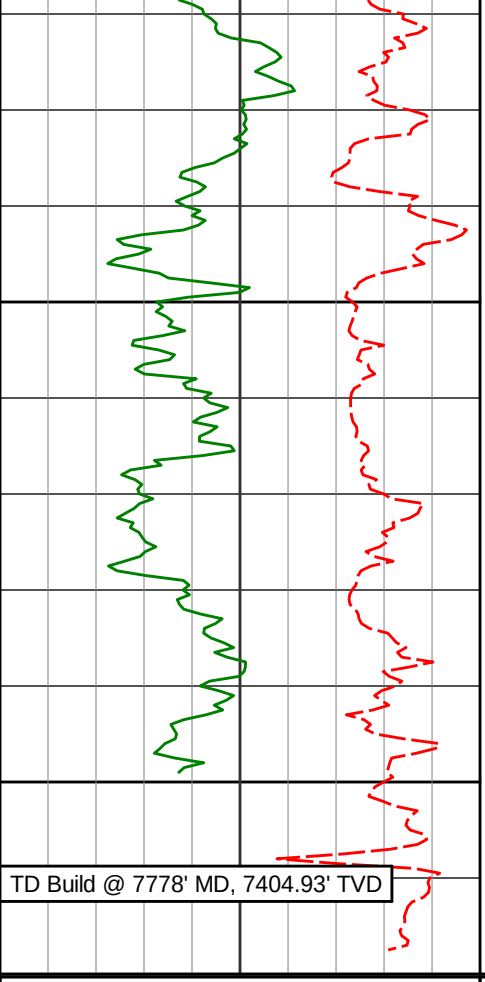
Depth	Inc	Azi	TVD	VS
6876'	3.20°	354.20°	6857.54'	-261.02'



6919'	8.52°	1.95°	6900.31'	-256.64'
6962'	14.65°	3.97°	6942.41'	-248.02'
7004'	19.81°	4.64°	6982.51'	-235.63'
7047'	22.79°	5.87°	7022.57'	-220.08'
7090'	26.01°	7.69°	7061.72'	-202.45'



7133'	31.07°	4.53°	7099.49'	-182.04'
7175'	36.58°	3.73°	7134.36'	-158.74'
7218'	41.92°	2.75°	7167.65'	-131.59'
7261'	47.09°	1.35°	7198.31'	-101.49'
7304'	51.78°	0.76°	7226.27'	-68.84'
7346'	54.82°	2.20°	7251.36'	-35.19'
7389'	58.04°	1.93°	7275.14'	0.61'
7432'	60.16°	1.66°	7297.22'	37.48'
7475'	62.97°	1.91°	7317.69'	75.26'



Depth	Inc	Azi	TVD	VS
7517'	66.21°	1.13°	7335.71'	113.18'
7559'	68.31°	0.58°	7351.95'	151.90'
7603'	69.08°	359.55°	7367.94'	192.89'
7645'	71.33°	0.43°	7382.16'	232.41'
7688'	76.04°	0.67°	7394.24'	273.66'
7729'	82.68°	1.28°	7401.81'	313.92'

Avg Rate of Penetration
ROPA
500 feet per hr 0

PCG Gamma Ray
PGRC
0 api 300

Depth
ft

HALLIBURTON

INSITE

DIRECTIONAL SURVEY REPORT

Anadarko Petroleum Corporation
Wishbone 29N-E24HZ
Wattenburg
Weld Colorado
USA
CA-XX-0900382955

Measured Depth (feet)	Inclination (degrees)	Direction (degrees)	Vertical Depth (feet)	Latitude (feet)	Departure (feet)	Vertical Section (feet)	Dogleg (deg/100ft)
1001.00	0.90	195.46	1000.97	5.08 S	0.05 W	-5.08	TIE-IN
1256.00	0.63	191.93	1255.95	8.39 S	0.88 W	-8.39	0.11
1531.00	0.40	227.85	1530.94	10.53 S	1.90 W	-10.52	0.14
1804.00	0.98	219.82	1803.92	12.97 S	4.11 W	-12.95	0.22
1896.00	0.95	235.32	1895.90	14.01 S	5.24 W	-13.99	0.29
1988.00	2.45	224.90	1987.86	15.83 S	7.26 W	-15.80	1.66
2080.00	3.18	216.33	2079.75	19.29 S	10.16 W	-19.24	0.92
2171.00	4.12	202.25	2170.56	24.35 S	12.89 W	-24.29	1.42
2263.00	5.58	188.92	2262.24	31.83 S	14.84 W	-31.76	1.99
2355.00	6.71	175.36	2353.71	41.60 S	15.10 W	-41.53	1.99
2447.00	8.24	167.59	2444.93	53.40 S	13.24 W	-53.34	1.99
2538.00	7.61	161.49	2535.06	65.48 S	9.93 W	-65.44	1.15
2630.00	9.27	160.77	2626.06	78.26 S	5.55 W	-78.23	1.81
2721.00	10.43	149.00	2715.73	92.24 S	1.10 E	-92.24	2.54
2812.00	9.99	147.99	2805.29	105.99 S	9.53 E	-106.03	0.52

2812.00	9.99	147.99	2805.29	105.99 S	9.53 E	-106.03	0.92
2904.00	9.52	165.91	2895.98	120.14 S	15.61 E	-120.21	3.33
2995.00	10.92	182.08	2985.55	136.06 S	17.13 E	-136.13	3.49
3087.00	11.02	187.40	3075.87	153.48 S	15.68 E	-153.55	1.11
3173.00	10.87	187.66	3160.31	169.67 S	13.54 E	-169.73	0.19
3259.00	10.26	188.99	3244.85	185.27 S	11.26 E	-185.32	0.77
3344.00	8.70	180.17	3328.69	199.17 S	10.06 E	-199.21	2.50
3430.00	6.94	188.33	3413.89	210.81 S	9.29 E	-210.85	2.41
3516.00	6.23	189.92	3499.32	220.55 S	7.73 E	-220.58	0.84
3602.00	4.81	188.84	3584.92	228.72 S	6.37 E	-228.74	1.66
3687.00	4.04	186.51	3669.67	235.21 S	5.48 E	-235.23	0.94
3773.00	3.52	185.31	3755.48	240.85 S	4.90 E	-240.87	0.61
3859.00	2.86	169.01	3841.35	245.58 S	5.06 E	-245.60	1.30
3945.00	1.70	185.38	3927.28	248.95 S	5.35 E	-248.97	1.54
4030.00	2.00	205.05	4012.24	251.55 S	4.60 E	-251.57	0.82
4116.00	1.88	243.00	4098.19	253.56 S	2.71 E	-253.57	1.48
4202.00	2.24	271.58	4184.14	254.15 S	0.23 W	-254.15	1.25
4287.00	1.83	279.77	4269.08	253.88 S	3.23 W	-253.86	0.59
4373.00	1.93	270.04	4355.04	253.64 S	6.03 W	-253.61	0.39
4459.00	1.17	289.75	4441.01	253.34 S	8.30 W	-253.30	1.06
4545.00	1.02	35.36	4527.00	252.42 S	8.69 W	-252.38	2.03
4631.00	1.19	20.97	4612.98	250.97 S	7.93 W	-250.93	0.38
4717.00	1.18	16.59	4698.96	249.29 S	7.35 W	-249.25	0.11
4802.00	1.38	10.44	4783.94	247.44 S	6.92 W	-247.41	0.29
5060.00	0.83	323.99	5041.90	242.86 S	7.46 W	-242.83	0.39
5317.00	0.39	231.42	5298.89	241.90 S	9.24 W	-241.86	0.36
5574.00	1.68	221.08	5555.84	245.28 S	12.40 W	-245.23	0.50
5830.00	1.69	217.41	5811.73	251.10 S	17.15 W	-251.02	0.04
5915.00	1.94	165.53	5896.69	253.49 S	17.55 W	-253.41	1.89
6001.00	1.83	156.82	5982.64	256.17 S	16.64 W	-256.09	0.36
6086.00	1.73	153.66	6067.60	258.56 S	15.54 W	-258.49	0.17
6172.00	0.83	142.13	6153.58	260.21 S	14.58 W	-260.15	1.08
6428.00	0.28	129.44	6409.57	262.07 S	12.96 W	-262.01	0.22
6685.00	0.04	20.45	6666.57	262.39 S	12.44 W	-262.33	0.12
6797.00	0.18	301.57	6778.57	262.25 S	12.57 W	-262.20	0.16
6833.00	0.07	207.69	6814.57	262.24 S	12.63 W	-262.19	0.55
6876.00	3.20	354.20	6857.54	261.07 S	12.76 W	-261.02	7.57
6919.00	8.52	1.95	6900.31	256.69 S	12.77 W	-256.64	12.49
6962.00	14.65	3.97	6942.41	248.08 S	12.29 W	-248.02	14.27
7004.00	19.81	4.64	6982.51	235.68 S	11.35 W	-235.63	12.31
7047.00	22.79	5.87	7022.57	220.12 S	9.90 W	-220.08	7.00
7090.00	26.01	7.69	7061.72	202.49 S	7.79 W	-202.45	7.69
7133.00	31.07	4.53	7099.49	182.07 S	5.65 W	-182.04	12.28
7175.00	36.58	3.73	7134.36	158.76 S	3.98 W	-158.74	13.16
7218.00	41.92	2.75	7167.65	131.60 S	2.46 W	-131.59	12.49
7261.00	47.09	1.35	7198.31	101.49 S	1.40 W	-101.49	12.24
7304.00	51.78	0.76	7226.27	68.84 S	0.80 W	-68.84	10.95
7346.00	54.82	2.20	7251.36	35.19 S	0.07 E	-35.19	7.74
7389.00	58.04	1.93	7275.14	0.61 N	1.36 E	0.61	7.51
7432.00	60.16	1.66	7297.22	37.49 N	2.51 E	37.48	4.95
7475.00	62.97	1.91	7317.69	75.28 N	3.69 E	75.26	6.56
7517.00	66.21	1.13	7335.71	113.20 N	4.70 E	113.18	7.89
7559.00	68.31	0.58	7351.95	151.93 N	5.27 E	151.90	5.15
7603.00	69.08	359.55	7367.94	192.92 N	5.31 E	192.89	2.79
7645.00	71.33	0.43	7382.16	232.43 N	5.31 E	232.41	5.71
7688.00	76.04	0.67	7394.24	273.69 N	5.70 E	273.66	10.97
7729.00	82.68	1.28	7401.81	313.95 N	6.39 E	313.92	16.25

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 359.75 DEGREES (TRUE)
A TOTAL CORRECTION OF 8.57 DEG FROM MAGNETIC NORTH TO TRUE NORTH HAS BEEN APPLIED

HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 7729.00 FEET
IS 314.02 FEET ALONG 1.17 DEGREES (TRUE)

Directional Surveys Tied on to Suface Casing@ 1001'. Final survey is a straight line projection to bit.

Date Printed:30 June 2013