HALLIBURTON | Sperry Drilling

PCGK: Pressure Case Gamma
PCDC: Pressure Case Directional

Powered by INSITE™

1 : 600 / 1 : 240

Country : USA
Field : Wattenberg
Location : Lat: 40° 26' 31.56" North Long: 104° 28' 17.83" West
Well : Wells Ranch State A36-655
Company : Noble Energy
Rig : H&P 273

Company : **Noble Energy**
Rig : **H&P 273**
Well : **Wells Ranch State A36-655**
Field : **Wattenberg**
Country : **USA**
API Number : **05-123-41516**

LOCATION
Latitude : **40° 26' 31.56" North**
Longitude : **104° 28' 17.83" West**
UTM Easting = **3,286,230.200 ft**
UTM Northing = **1,405,557.110 ft**

Other Services
Directional Drilling

Permanent Datum : **Ground Level** Elevation : **4656.00 ft**
Log Measured From : **Drill Floor** **24.00 ft** Above Permanent Datum
Drilling Measured From : **Drill Floor**

TVD LOG

Elev. KB **N/A**
DF **4680.00 ft**
GL **4656.00 ft**
WD **N/A**

Depth Logged : **849.99 ft** To **6,629.22 ft**
Date Logged : **24-Jun-15** To **25-Jun-15**
Total Depth MD : **7,032.00 ft** TVD : **6,629.22 ft**
Spud Date : **23-Jun-15**

Unit No. : **11703717** Job No. : **CA-XX-0902510729**
Plot Type : **Final**
Plot Date : **26-Jun-15**

Run No.	Borehole Record (TVD)			Size	Casing Record (TVD)		
	Size	From	To		Weight	From	To
2	8.750 in	849.99 ft	6629.22 ft	13.000 in	36.00 lbpf	SURFACE	839.99 ft
				9.000 in	24.00 lbpf	SURFACE	6,627.65 ft

WELL INFORMATION

MWD Run Number	100
Date run completed	25-Jun-15
Rig Bit Number	2
Bit Size (in)	8.750
Tool Nominal OD (in)	6.750
Log Start Depth (TVD, ft)	849.99
Log End Depth (TVD, ft)	6,627.98
Drill or Wipe	Drill
Drill/Wipe Start Date and Time	24-Jun-15 07:00
Drill/Wipe End Date and Time	25-Jun-15 13:00
Min Inc (deg) @ Depth (TVD, ft)	0.42 @ 919.99
Max Inc (deg) @ Depth (TVD, ft)	80.88 @ 6,622.59
Bit TFA(in2) / Bit Type	0.91 / PDC
Flow Rate (gpm)	566.51
Max AV (fpm) / CV (fpm) @ MWD	550.0 / 550.0
Fluid Type	Native/Spud Mud
Density (ppg) / Viscosity (spqt)	10.00 / 33.00
Filtrate CL (ppm)	15,000.00
pH / Fluid Loss (mptm)	9.50 / 0
PV (cP) / YP (lhf2)	10 / 6.00
% Solids / % Sand	6 / 0.2
% 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	180.09 / PCM				
Rm @ Max Tool Temp (degF)	N/A @ N/A				
Lead MWD Engineer	Adams Sampson				
Customer Representative	Charles Collbra				

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM				
Software Version	5.93				
Sub Serial Number	11404289				
Insert Serial Number	11400868				
Date and Time Initialized	23-Jun-15 13:51				
Date and Time Read	26-Jun-15 06:43				
ECMB SW Version	N/A				

Directional Sensor Information

Tool Type	PCDC				
Distance From Bit (ft)	54.00				
Software Version	6.21				
Sub Serial Number	11404289				
Sonde Serial Number	12177556				
Sensor ID Number	N/A				
Toolface Offset (deg)	117.61				

Gamma Ray Sensor Information

Tool Type	PCG				
Distance From Bit (ft)	42.21				
Recorded Sample Period (sec)	10				
Software Version	8.15				
Sub Serial Number	11404289				
Insert/Sonde Serial Number	11681025				

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

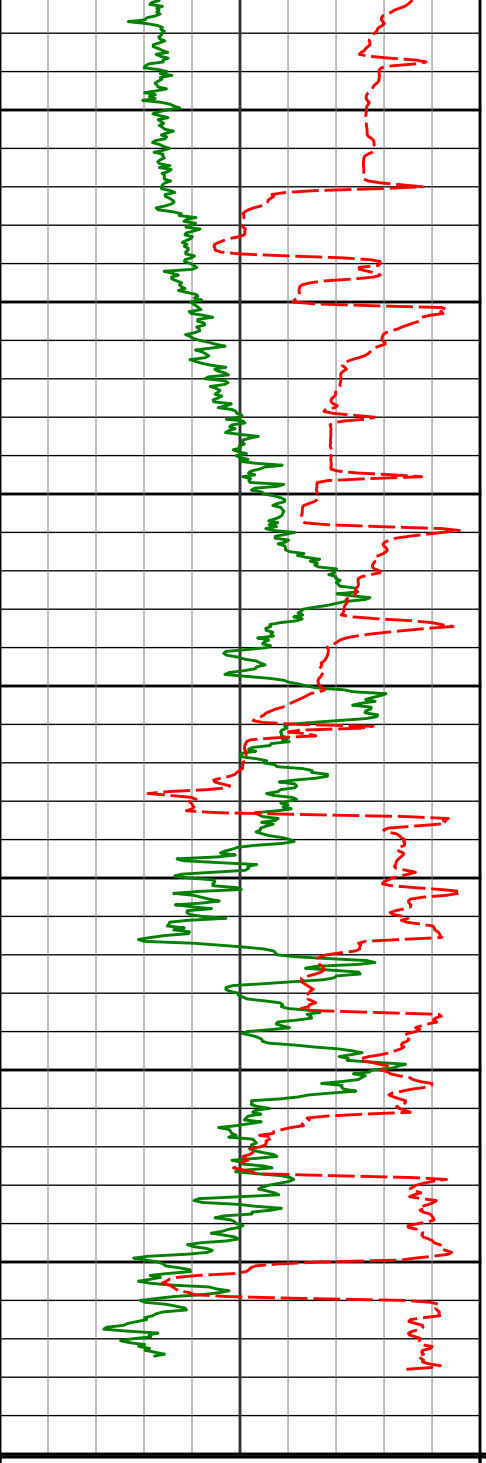
TVD Detail 1:600 Scale

PGRC
PGRC
0 api 300

Avg Rate of Penetration
ROP Avg
500 feet per hr 0

PGRC
ROPA

Depth TVD ft	Depth	Inc	Azi	TVD	V.S.	Temp
<KOP>						162.78°F
6000	6067'	3.99°	280.43°	6003.94'	-268.90'	162.78°F
6050						
6100	6162'	13.41°	264.49°	6097.75'	-254.70'	162.78°F
6150						
6200	6256'	23.91°	265.67°	6186.69'	-224.94'	162.78°F
6250						
	6351'	30.56°	268.50°	6271.11'	-181.71'	162.78°F



Depth	Inc	Azi	TVD	V.S.	Temp
6351'	30.50°	268.50°	6271.11'	-181.71'	162.78°F
6446'	36.29°	270.09°	6350.37'	-129.50'	162.78°F
6541'	46.23°	270.96°	6421.69'	-66.98'	162.78°F
6635'	53.22°	273.02°	6482.43'	4.67'	167.00°F
6730'	59.61°	272.04°	6534.95'	83.77'	171.22°F
6825'	66.89°	268.62°	6577.69'	168.44'	171.22°F
6920'	73.60°	266.58°	6609.79'	257.41'	175.44°F
					179.66°F

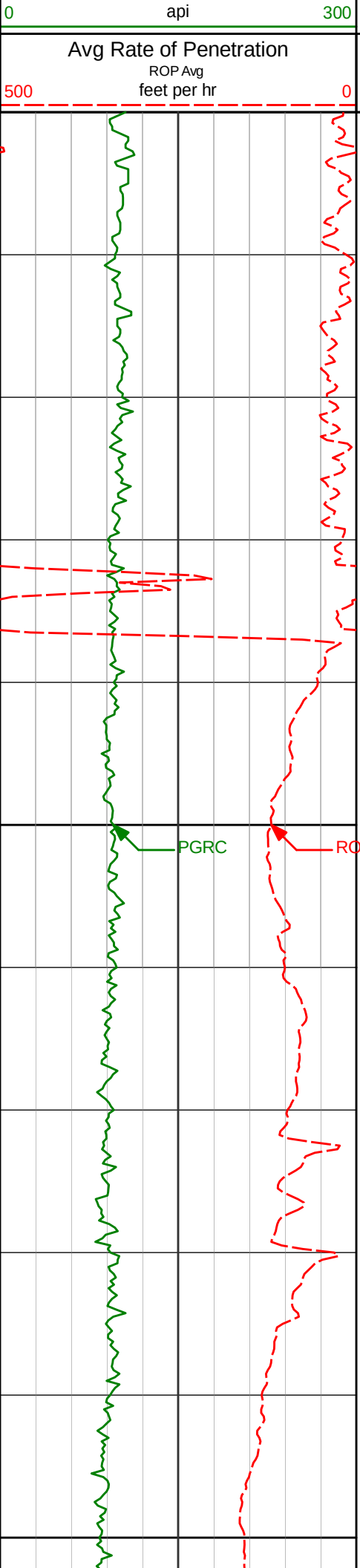
Avg Rate of Penetration
ROP Avg
500 feet per hr 0

Depth
TVD
ft

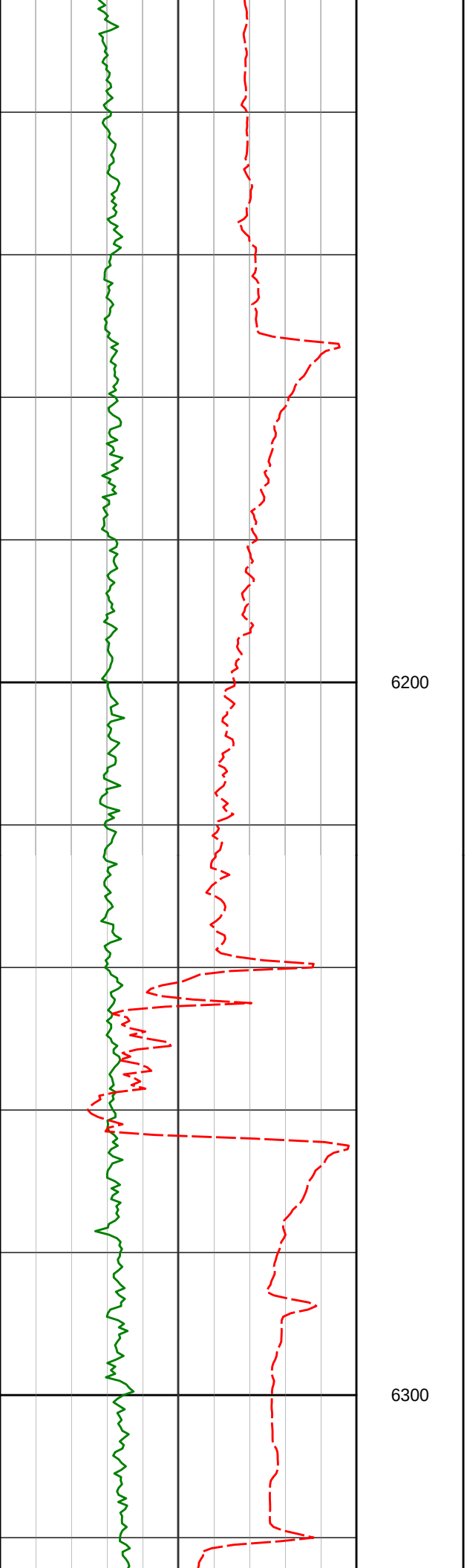
PGRC
PGRC
0 api 300

TVD Detail 1:240 Scale

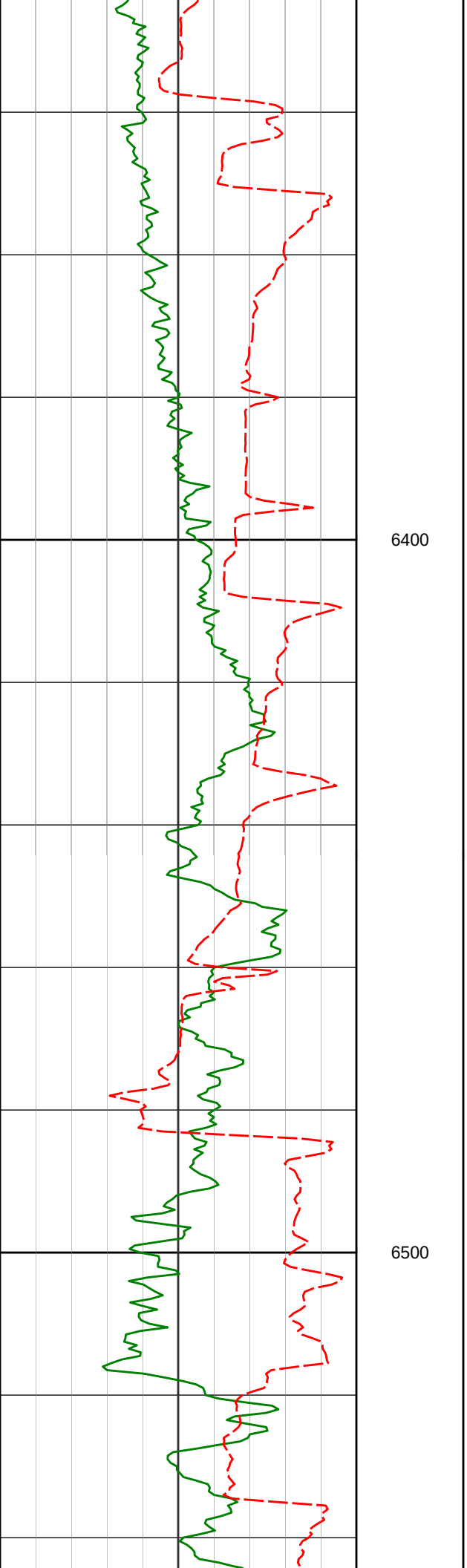
PGRC
PGRC



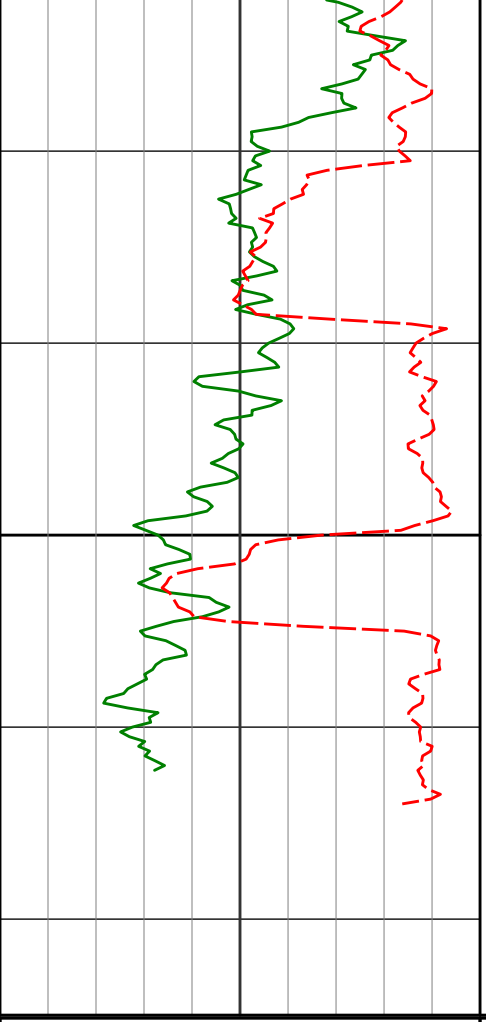
Depth TVD ft	Depth	Inc	Azi	TVD	V.S.	Temp
						162.78°F
	5972'	1.18°	6.38°	5909.03'	-272.12'	
<KOP>						
						162.78°F
6000						162.78°F
	6067'	3.99°	280.43°	6003.94'	-268.90'	
						162.78°F
6100	6162'	13.41°	264.49°	6097.75'	-254.70'	



6256'	23.91°	265.67°	6186.69'	-224.94'	162.78°F
6200					
					162.78°F
					162.78°F
6351'	30.56°	268.50°	6271.11'	-181.71'	162.78°F
6300					162.78°F



6446'	36.29°	270.09°	6350.37'	-129.50'	162.78°F
					162.78°F
6541'	46.23°	270.96°	6421.69'	-66.98'	162.78°F
6635'	53.22°	273.02°	6482.43'	4.67'	167.00°F
6730'	59.61°	272.04°	6534.95'	83.77'	171.22°F



Depth	Inc	Azi	TVD	V.S.	Temp
6825'	66.89°	268.62°	6577.69'	168.44'	171.22°F
6920'	73.60°	266.58°	6609.79'	257.41'	175.44°F
					179.66°F

Avg Rate of Penetration
ROP Avg
500 feet per hr 0

Depth
TVD
ft

6600

PGRC
PGRC
0 api 300

HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble Energy
Wells Ranch State A36-655
Wattenberg
Weld Colorado
USA
CA-XX-0902510729

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	0.14	198.52	300.00	0.35 S	0.12 W	0.10	0.05
600.00	0.25	198.52	600.00	1.32 S	0.44 W	0.37	0.04
850.00	0.39	198.52	849.99	2.64 S	0.88 W	0.75	0.06
920.00	0.42	198.52	919.99	3.11 S	1.04 W	0.88	0.04
1109.00	0.95	166.76	1108.98	5.29 S	0.90 W	0.64	0.33
1200.00	0.62	89.50	1199.97	6.02 S	0.23 W	-0.07	1.11
1292.00	2.68	44.03	1291.93	4.47 S	1.76 E	-1.98	2.48
1382.00	4.00	49.19	1381.78	0.90 S	5.60 E	-5.64	1.51
1474.00	6.27	37.90	1473.40	5.16 N	11.11 E	-10.84	2.69
1565.00	7.73	36.31	1563.72	14.01 N	17.79 E	-17.06	1.62
1657.00	9.87	29.07	1654.64	25.89 N	25.28 E	-23.95	2.62
1749.00	10.82	31.67	1745.14	40.13 N	33.65 E	-31.59	1.15

1841.00	9.92	27.03	1835.64	54.54 N	41.78 E	-38.99	1.33
1932.00	10.77	23.45	1925.16	69.32 N	48.73 E	-45.18	1.17
2023.00	10.24	18.26	2014.64	84.80 N	54.65 E	-50.32	1.19
2115.00	10.35	29.58	2105.17	99.76 N	61.29 E	-56.20	2.20
2207.00	10.96	23.14	2195.58	115.00 N	68.81 E	-62.94	1.45
2299.00	9.81	15.65	2286.07	130.60 N	74.36 E	-67.71	1.93
2391.00	11.09	28.33	2376.56	145.94 N	80.68 E	-73.24	2.85
2482.00	10.38	20.42	2465.97	161.33 N	87.69 E	-79.48	1.80
2574.00	11.10	29.93	2556.37	176.77 N	95.00 E	-86.00	2.08
2666.00	10.43	24.13	2646.75	192.04 N	102.83 E	-93.05	1.39
2757.00	10.38	22.62	2736.25	207.12 N	109.34 E	-98.80	0.30
2849.00	11.65	32.46	2826.56	222.61 N	117.52 E	-106.18	2.46
2941.00	10.81	27.40	2916.81	238.11 N	126.47 E	-114.35	1.40
3036.00	10.54	26.01	3010.16	253.82 N	134.38 E	-121.46	0.40
3131.00	9.67	21.70	3103.69	269.04 N	141.14 E	-127.44	1.21
3225.00	10.47	27.26	3196.24	283.97 N	147.97 E	-133.52	1.34
3320.00	8.58	17.75	3289.93	298.39 N	154.08 E	-138.90	2.58
3415.00	10.68	25.22	3383.59	313.11 N	160.00 E	-144.06	2.57
3510.00	11.95	22.55	3476.75	330.16 N	167.52 E	-150.72	1.44
3604.00	11.55	18.64	3568.78	348.06 N	174.26 E	-156.55	0.95
3699.00	11.77	18.21	3661.82	366.27 N	180.33 E	-161.70	0.25
3794.00	12.51	27.19	3754.70	384.63 N	188.06 E	-168.50	2.13
3889.00	12.72	24.97	3847.41	403.26 N	197.17 E	-176.66	0.56
3983.00	12.64	23.91	3939.12	422.05 N	205.71 E	-184.25	0.26
4078.00	10.70	29.76	4032.15	439.22 N	214.31 E	-191.97	2.39
4173.00	10.02	27.73	4125.60	454.19 N	222.53 E	-199.43	0.82
4268.00	9.18	28.82	4219.27	468.14 N	230.03 E	-206.22	0.90
4362.00	10.81	26.77	4311.84	482.58 N	237.61 E	-213.07	1.77
4457.00	10.35	26.78	4405.23	498.15 N	245.47 E	-220.13	0.48
4552.00	9.43	27.83	4498.81	512.66 N	252.95 E	-226.87	0.99
4647.00	8.30	26.53	4592.68	525.67 N	259.64 E	-232.91	1.21
4741.00	10.18	25.56	4685.45	539.23 N	266.26 E	-238.83	2.01
4836.00	8.61	24.97	4779.18	553.25 N	272.88 E	-244.74	1.65
4931.00	10.29	23.08	4872.88	567.51 N	279.21 E	-250.34	1.79
5025.00	9.48	22.24	4965.49	582.39 N	285.43 E	-255.81	0.88
5120.00	8.57	19.30	5059.31	596.31 N	290.73 E	-260.40	1.07
5215.00	7.02	17.42	5153.43	608.52 N	294.81 E	-263.86	1.65
5309.00	5.62	17.10	5246.86	618.41 N	297.88 E	-266.43	1.49
5404.00	4.27	19.23	5341.50	626.20 N	300.42 E	-268.57	1.43
5499.00	3.27	15.24	5436.30	632.15 N	302.29 E	-270.15	1.10
5594.00	2.53	13.89	5531.17	636.80 N	303.51 E	-271.13	0.78
5688.00	1.79	16.76	5625.11	640.22 N	304.43 E	-271.88	0.79
5783.00	1.46	7.85	5720.07	642.84 N	305.02 E	-272.34	0.44
5877.00	1.13	351.01	5814.04	644.94 N	305.04 E	-272.25	0.53
5972.00	1.18	6.38	5909.03	646.84 N	305.01 E	-272.12	0.33
6067.00	3.99	280.43	6003.94	648.41 N	301.86 E	-268.90	4.30
6162.00	13.41	264.49	6097.75	647.95 N	287.62 E	-254.70	10.14
6256.00	23.91	265.67	6186.69	645.46 N	257.69 E	-224.94	11.18
6351.00	30.56	268.50	6271.11	643.37 N	214.31 E	-181.71	7.13
6446.00	36.29	270.09	6350.37	642.78 N	162.01 E	-129.50	6.10
6541.00	46.23	270.96	6421.69	643.40 N	99.44 E	-66.98	10.48
6635.00	53.22	273.02	6482.43	645.95 N	27.82 E	4.67	7.62
6730.00	59.61	272.04	6534.95	649.41 N	51.21 W	83.77	6.78
6825.00	66.89	268.62	6577.69	649.82 N	135.96 W	168.44	8.30
6920.00	73.60	266.58	6609.79	646.05 N	225.24 W	257.41	7.35
6978.00	80.88	266.50	6622.59	642.64 N	281.66 W	313.60	12.55

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 272.88 DEGREES (GRID)
A TOTAL CORRECTION OF 7.74 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED

HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 6978.00 FEET
IS 701.66 FEET ALONG 336.33 DEGREES (GRID)

Surveys at 300' and 600 and 850' are extrapolation surveys

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