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° 42' 56.99" North**
Long: 103° 51' 56.16" West
Well : **Brecken LD28-734**
Company : **Noble Energy**
Rig : **H&P 273**

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Well : **Brecken LD28-734**
Field : **Wattenberg**
Country : **USA**
API Number : **05-123-41565**

LOCATION
Latitude : **40° 42' 56.99" North**
Longitude : **103° 51' 56.16" West**
UTM Easting = **3,453,050.950 usft**
UTM Northing = **1,507,796.120 usft**

Other Services
Directional Drilling

Permanent Datum : **Ground Level**
Elevation : **4831.00 ft**
Log Measured From : **Drill Floor** **24.00 ft** Above Permanent Datum
Drilling Measured From : **Drill Floor**

TVD LOG

Elev. KB **N/A**
DF **4855.00 ft**
GL **4831.00 ft**
WD **N/A**

Depth Logged : **1,144.98 ft** To **5,864.12 ft**
Date Logged : **13-Aug-15** To **14-Aug-15**
Total Depth MD : **6,243.00 ft** TVD : **5,864.12 ft**
Spud Date : **12-Aug-15**

Unit No. : **11703717**
Job No. : **CA-XX-0902606365**
Plot Type : **Final**
Plot Date : **15-Aug-15**

Run No.	Borehole Record (TVD)			Size	Casing Record (TVD)		
	Size	From	To		Weight	From	To
2	8.750 in	1,144.98 ft	5,864.12 ft	7.000 in	26.00 lbpf	SURFACE	5,863.42 ft

WELL INFORMATION

MWD Run Number	100																											
Date run completed	14-Aug-15																											
Rig Bit Number	2																											
Bit Size (in)	8.750																											
Tool Nominal OD (in)	6.750																											
Log Start Depth (TVD, ft)	1,144.98																											
Log End Depth (TVD, ft)	5,864.12																											
Drill or Wipe	Drill																											
Drill/Wipe Start Date and Time	13-Aug-15 05:30																											
Drill/Wipe End Date and Time	14-Aug-15 05:45																											
Min Inc (deg) @ Depth (TVD, ft)	0.10 @ 5,193.01																											
Max Inc (deg) @ Depth (TVD, ft)	83.61 @ 5,858.92																											
Bit TFA(in2) / Bit Type	0.98 / PDC																											
Flow Rate (gpm)	586.63																											
Max AV (fpm) / CV (fpm) @ MWD	N/A / N/A																											
Fluid Type	Fresh Water Gel																											
Density (ppg) / Viscosity (spqt)	10.30 / 39.00																											
Filtrate CL (ppm)	900.00																											
pH / Fluid Loss (mptm)	8.70 / 0																											
PV (cP) / YP (lhf2)	15 / 12.00																											
% Solids / % Sand	12.3 / .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	171.20 / PCM				
Rm @ Max Tool Temp (degF)	N/A @ N/A				
Lead MWD Engineer	Paul Kock				
Customer Representative	Dave Neilsen				

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM				
Software Version	5.93				
Sub Serial Number	11404289				
Insert Serial Number	11145577				
Date and Time Initialized	12-Aug-15 21:17				
Date and Time Read	14-Aug-15 10:29				
ECMB SW Version	N/A				

Directional Sensor Information

Tool Type	PCDC				
Distance From Bit (ft)	56.00				
Software Version	6.33				
Sub Serial Number	11404289				
Sonde Serial Number	11062074				
Sensor ID Number	N/A				
Toolface Offset (deg)	284.40				

Gamma Ray Sensor Information

Tool Type	PCG				
Distance From Bit (ft)	44.09				
Recorded Sample Period (sec)	10				
Software Version	8.15				
Sub Serial Number	11404289				
Insert/Sonde Serial Number	11292594				

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.

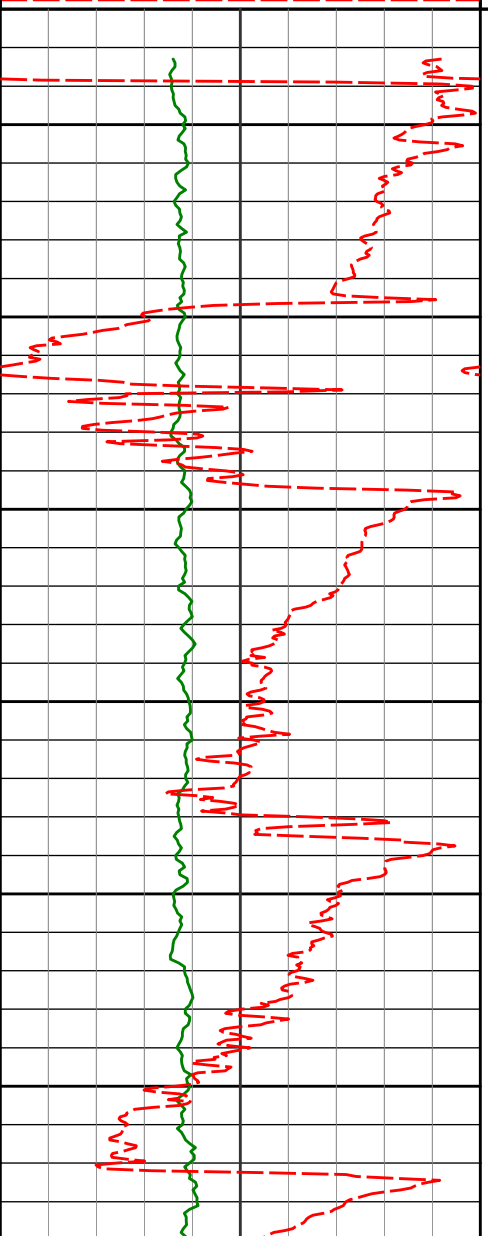
5. INSITE version 8.3.0.

WARRANTY

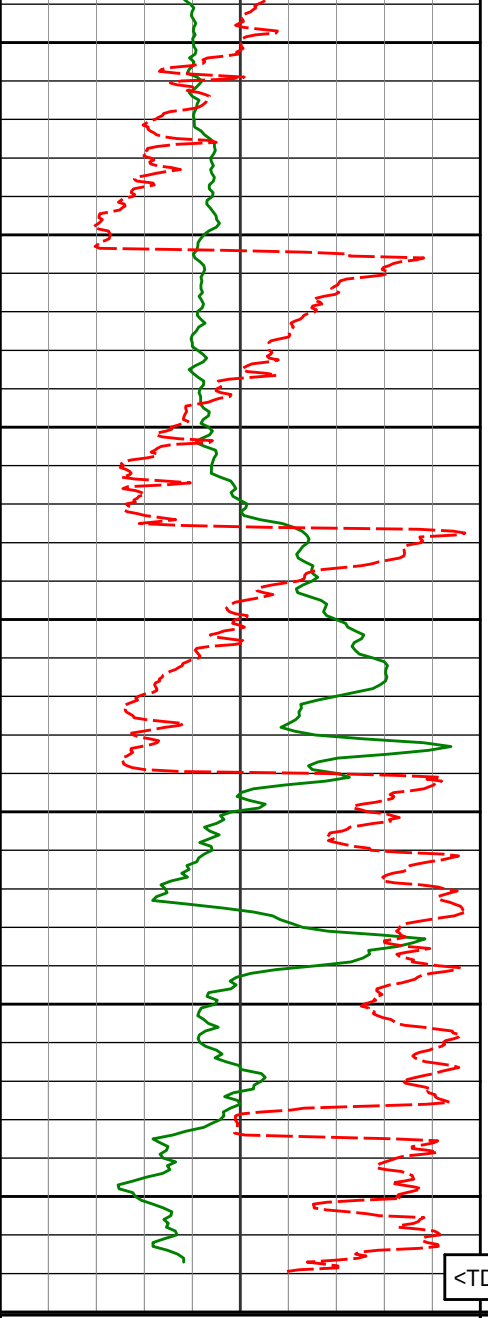
TVD Detail 1:600 Scale

Gamma CG Cor
PGRC
0 api 300

Avg Rate of Penetration
ROP Avg
500 feet per hr 0



Depth TVD ft	Depth	Inc	Azi	TVD	V.S.	Temp
<KOP>						
5250						154.34°F
						154.34°F
	5315'	5.69°	20.06°	5287.85'	-301.70'	
5300						154.34°F
						154.34°F
5350						
						154.34°F
	5410'	10.39°	28.92°	5381.90'	-289.66'	
5400						158.56°F
						158.56°F
5450						
						158.56°F
	5504'	19.96°	25.33°	5472.52'	-267.49'	
5500						158.56°F
						158.56°F



Depth	Inc	Azi	TVD	V.S.	Temp
5599'	29.32°	16.85°	5558.80'	-230.23'	158.56°F
					162.78°F
					162.78°F
5694'	38.15°	4.41°	5637.82'	-178.39'	162.78°F
					162.78°F
5789'	48.30°	0.08°	5706.97'	-113.45'	162.78°F
					167.00°F
5883'	58.84°	358.87°	5762.71'	-37.96'	112.16°F
					167.00°F
5978'	67.76°	355.67°	5805.36'	46.61'	
					171.22°F
6073'	73.81°	353.71°	5836.62'	135.72'	
					171.22°F
6187'	83.61°	356.73°	5858.92'	246.78'	

Avg Rate of Penetration
ROP Avg
500 feet per hr 0

Gamma CG Cor
PGRC
0 api 300

Depth
TVD
ft

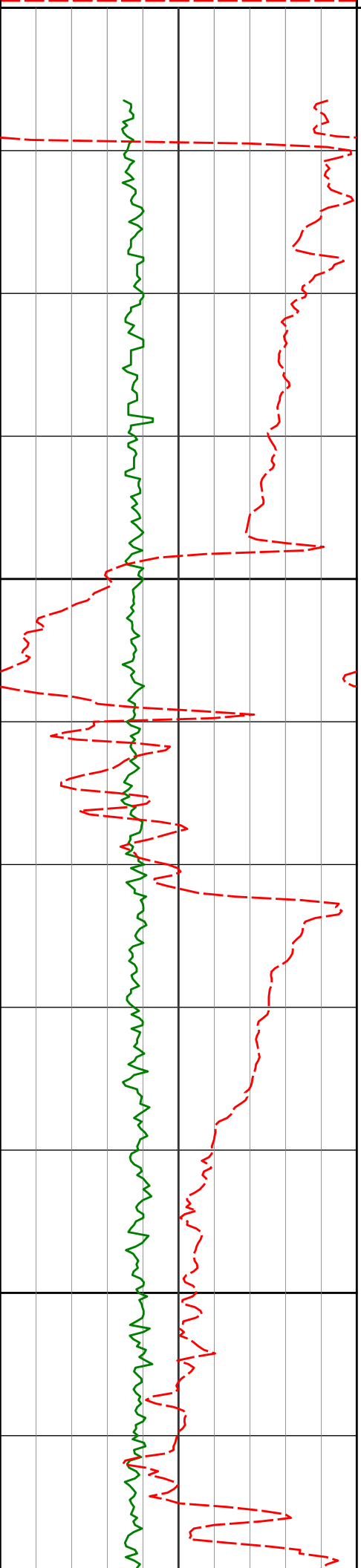
TVD Detail 1:240 Scale

Gamma Ray Cor
PGRC
0 api 300

Avg Rate of Penetration
ROP Avg
500 feet per hr 0

Depth
TVD
ft

Depth	Inc	Azi	TVD	V.S.	Temp



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5410'	10.39°	28.92°	5381.90'	-289.66'	
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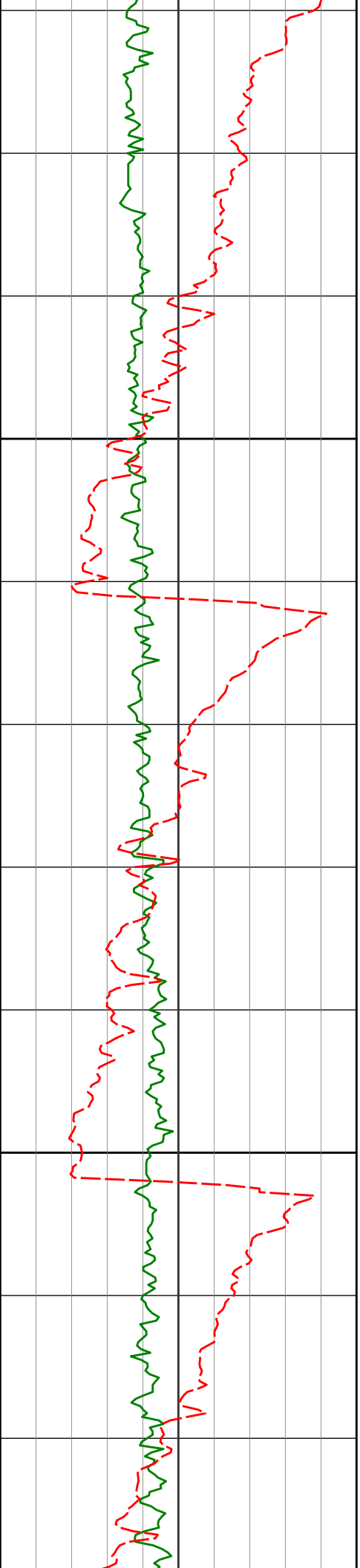

					158.56°F
5504'	19.96°	25.33°	5472.52'	-267.49'	
					158.56°F
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5599'	29.32°	16.85°	5558.80'	-230.23'	
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5600					
					162.78°F
5694'	38.15°	4.41°	5637.82'	-178.39'	
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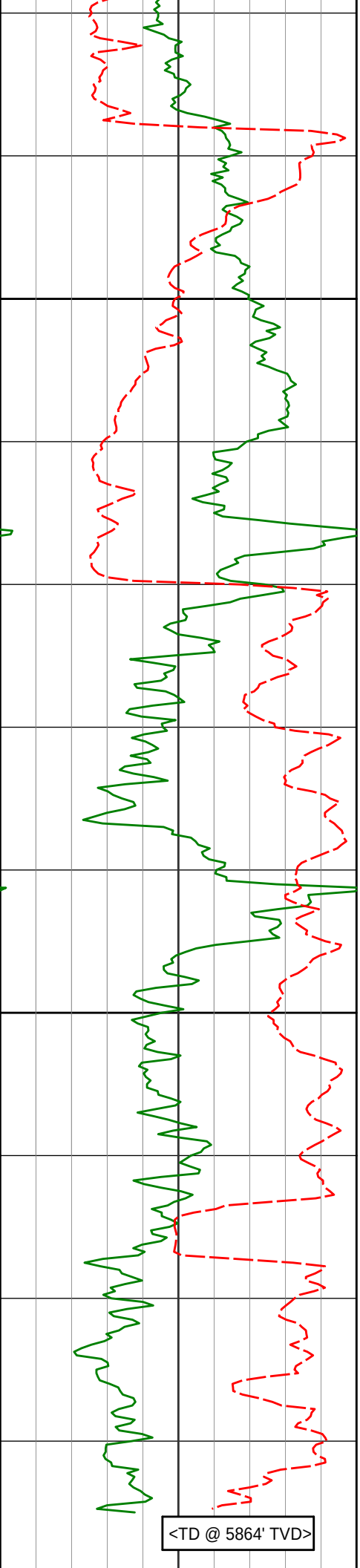

						162.78°F
5700						162.78°F
	5789'	48.30°	0.08°	5706.97'	-113.45'	
						167.00°F
	5883'	58.84°	358.87°	5762.71'	-37.96'	112.16°F
						167.00°F
5800						
	5978'	67.76°	355.67°	5805.36'	46.61'	
						171.22°F
	6073'	73.81°	353.71°	5836.62'	135.72'	
						171.22°F
	6187'	83.61°	356.73°	5858.92'	246.78'	

Avg Rate of Penetration	Depth						
ROP Avg	TVD	Depth	Inc	Azi	TVD	V.S.	Temp
500 feet per hr 0	ft						
Gamma Ray Cor							
PGRC							
0 api 300							

DIRECTIONAL SURVEY REPORT

Noble Energy
Brecken LD28-734
Wattenberg
Weld Colorado
USA
CA-XX-0902606365

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
89.42	0.38	133.49	89.42	0.20 S	0.21 E	-0.20	0.42
180.20	0.22	81.35	180.20	0.38 S	0.60 E	-0.37	0.33
270.98	0.23	44.98	270.98	0.23 S	0.90 E	-0.21	0.15
361.76	0.16	83.59	361.76	0.09 S	1.16 E	-0.06	0.16
452.54	0.47	92.15	452.54	0.09 S	1.66 E	-0.05	0.35
543.32	0.41	85.64	543.31	0.07 S	2.36 E	-0.03	0.09
634.10	0.45	99.12	634.09	0.11 S	3.03 E	-0.05	0.12
724.88	0.38	94.29	724.87	0.19 S	3.68 E	-0.12	0.08
815.66	0.53	95.98	815.65	0.25 S	4.40 E	-0.17	0.17
906.44	0.32	86.00	906.42	0.28 S	5.08 E	-0.18	0.24
997.22	0.54	93.07	997.20	0.28 S	5.76 E	-0.18	0.24
1088.00	0.41	89.67	1087.98	0.30 S	6.51 E	-0.18	0.14
1198.00	0.36	335.37	1197.98	0.01 N	6.76 E	0.14	0.59
1290.00	0.41	323.99	1289.97	0.54 N	6.45 E	0.66	0.10
1381.00	0.48	328.23	1380.97	1.12 N	6.06 E	1.23	0.09
1472.00	0.39	336.30	1471.97	1.73 N	5.74 E	1.84	0.11
1564.00	0.25	345.84	1563.97	2.21 N	5.56 E	2.32	0.17
1747.00	0.62	63.71	1746.96	3.04 N	6.35 E	3.15	0.34
1838.00	2.75	177.01	1837.93	1.07 N	6.91 E	1.20	3.35
1930.00	3.87	188.23	1929.77	4.21 S	6.58 E	-4.09	1.40
2021.00	5.14	180.08	2020.49	11.33 S	6.13 E	-11.21	1.55
2113.00	5.71	161.72	2112.09	19.80 S	7.56 E	-19.65	1.97
2205.00	6.86	145.21	2203.54	28.65 S	12.13 E	-28.42	2.32
2297.00	8.16	152.73	2294.75	38.97 S	18.26 E	-38.62	1.77
2389.00	7.54	148.61	2385.89	49.93 S	24.40 E	-49.46	0.91
2480.00	8.71	159.42	2475.98	61.48 S	29.93 E	-60.91	2.11
2572.00	10.04	157.82	2566.75	75.43 S	35.41 E	-74.76	1.47
2663.00	9.56	157.16	2656.42	89.74 S	41.34 E	-88.96	0.55
2758.00	9.56	157.66	2750.10	104.31 S	47.40 E	-103.41	0.09
2853.00	10.07	158.92	2843.71	119.36 S	53.39 E	-118.34	0.58
2947.00	11.29	143.78	2936.10	134.46 S	61.78 E	-133.28	3.24
3042.00	10.01	143.27	3029.46	148.58 S	72.21 E	-147.21	1.35
3137.00	9.05	143.32	3123.14	161.19 S	81.62 E	-159.64	1.01
3232.00	9.69	141.99	3216.88	173.48 S	91.00 E	-171.76	0.71
3326.00	9.80	143.89	3309.52	186.18 S	100.59 E	-184.27	0.36
3421.00	10.21	144.29	3403.08	199.55 S	110.27 E	-197.45	0.44
3516.00	9.44	140.04	3496.68	212.36 S	120.19 E	-210.08	1.11
3611.00	9.33	140.96	3590.41	224.31 S	130.04 E	-221.84	0.20
3705.00	8.04	136.45	3683.33	234.99 S	139.37 E	-232.35	1.55
3800.00	7.07	136.00	3777.51	244.01 S	148.01 E	-241.21	1.02
3989.00	6.67	145.36	3965.15	261.42 S	162.33 E	-258.34	0.63
4084.00	5.83	144.28	4059.59	269.88 S	168.29 E	-266.69	0.90
4179.00	6.29	148.61	4154.06	278.24 S	173.82 E	-274.94	0.68
4273.00	6.61	153.36	4247.46	287.47 S	178.92 E	-284.07	0.66
4368.00	5.69	149.30	4341.92	296.40 S	183.78 E	-292.92	1.07
4463.00	4.65	146.90	4436.53	303.68 S	188.29 E	-300.11	1.12
4557.00	4.17	147.66	4530.25	309.76 S	192.20 E	-306.12	0.51
4652.00	1.74	132.65	4625.12	313.66 S	195.11 E	-309.96	2.66

4747.00	1.27	67.75	4720.09	314.24 S	197.15 E	-310.50	1.75
4842.00	1.05	53.39	4815.07	313.32 S	198.82 E	-309.56	0.38
4936.00	1.15	58.15	4909.05	312.32 S	200.30 E	-308.52	0.14
5031.00	1.15	60.83	5004.03	311.35 S	201.94 E	-307.52	0.06
5126.00	0.96	62.73	5099.02	310.52 S	203.48 E	-306.67	0.21
5220.00	0.10	28.91	5193.01	310.09 S	204.22 E	-306.22	0.93
5315.00	5.69	20.06	5287.85	305.59 S	205.87 E	-301.70	5.89
5410.00	10.39	28.92	5381.90	293.67 S	211.63 E	-289.66	5.10
5504.00	19.96	25.33	5472.52	271.70 S	222.62 E	-267.49	10.23
5599.00	29.32	16.85	5558.80	234.68 S	236.33 E	-230.23	10.51
5694.00	38.15	4.41	5637.82	183.01 S	245.36 E	-178.39	11.76
5789.00	48.30	0.08	5706.97	118.10 S	247.67 E	-113.45	11.13
5883.00	58.84	358.87	5762.71	42.58 S	246.93 E	-37.96	11.25
5978.00	67.76	355.67	5805.36	42.09 N	242.79 E	46.61	9.87
6073.00	73.81	353.71	5836.62	131.36 N	234.47 E	135.72	6.65
6187.00	83.61	356.73	5858.92	242.62 N	225.21 E	246.78	8.98

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 1.07 DEGREES (GRID)
A TOTAL CORRECTION OF 6.96 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED

HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 6187.00 FEET
IS 331.04 FEET ALONG 42.87 DEGREES (GRID)

Tied in to VES surveys at 1088 ft MD.

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