HALLIBURTON | Sperry Drilling

PCGK : Pressure Case Gamma
PCDC: Pressure Case Directional

Powered by INSITE™

1 : 600 / 1 : 240

Company	: **Noble Energy**
Rig	: **H&P 315**
Well	: **Holman B15-65HNM**
Field	: **Wattenberg**
Country	: **USA**
API Number	: **05-123-37200**

Country : **USA**
Field : **Wattenberg**
Location : **Lat: 40°24' 1.80" North Long: 104°31' 6.74" West**
Well : **Holman B15-65HNM**
Company : **Noble Energy**
Rig : **H&P 315**

LOCATION
Latitude : **40°24' 1.80" North**
Longitude : **104°31' 6.74" West**
UTM Easting = **3,273,339.177 ft**
UTM Northing = **1,390,255.224 ft**

Other Services
Directional Drilling

Permanent Datum : **Ground Level** Elevation : **4584.00 ft**
Log Measured From : **Drill Floor** **24.00 ft** Above Permanent Datum
Drilling Measured From : **Drill Floor**

MD LOG

Elev. KB **N/A**
DF **4608.00 ft**
GL **4584.00 ft**
WD **N/A**

Depth Logged : **649.00 ft** To **8,339.00 ft**
Date Logged : **03-Sep-13** To **08-Sep-13**
Total Depth MD : **8,339.00 ft** TVD : **6,582.99 ft**
Spud Date : **02-Sep-13**

Unit No. : **11610113** Job No. : **CA-XX-0900697468**

Plot Type : **Final**
Plot Date : **11-Sep-13**

Run No.	Borehole Record (MD) Size	From	To
2	8.750 in	649.00 ft	5,973.00 ft
3	8.750 in	5,973.00 ft	6,777.00 ft
4	8.750 in	6,777.00 ft	6,977.00 ft
5	6.125 in	6,977.00 ft	8,339.00 ft

Run No.	Borehole Record (MD) Size	From	To

Casing Record (MD)

Size	Weight	From	To
7.000 in	26.00 lbpf	SURFACE	6,973.00 ft

WELL INFORMATION

MWD Run Number	100	200	300	400
Date run completed	04-Sep-13	05-Sep-13	06-Sep-13	10-Sep-13
Rig Bit Number	2	3	4	5
Bit Size (in)	8.750	8.750	8.750	6.125
Tool Nominal OD (in)	6.750	6.750	6.750	4.750
Log Start Depth (MD, ft)	649.00	5,973.00	6,777.00	6,977.00
Log End Depth (MD, ft)	5,973.00	6,777.00	6,977.00	8,339.00
Drill or Wipe	Drill	Drill	Drill	Drill
Drill/Wipe Start Date and Time	03-Sep-13 14:30	05-Sep-13 02:15	06-Sep-13 04:00	07-Sep-13 20:10
Drill/Wipe End Date and Time	04-Sep-13 16:45	05-Sep-13 15:45	06-Sep-13 07:30	08-Sep-13 06:10
Min Inc (deg) @ Depth (MD, ft)	.16 @ 1,086.00	14.04 @ 6,057.00	67.83 @ 6,768.00	89.97 @ 7,354.00
Max Inc (deg) @ Depth (MD, ft)	12.58 @ 5,916.00	63.76 @ 6,721.00	86.46 @ 6,923.00	92.22 @ 8,276.00
Bit TFA(in2) / Bit Type	.77 / PDC	.75 / PDC	.75 / PDC	.75 / PDC
Flow Rate (gpm)	510.90	568.25	550.00	271.30
Max AV (fpm) / CV (fpm) @ MWD	N/A / N/A	N/A / N/A	N/A / N/A	N/A / N/A
Fluid Type	Fresh Water Gel	Fresh Water Gel	Fresh Water Gel	Native/Spud Mud
Density (ppg) / Viscosity (spqt)	9.00 / 39.00	10.40 / 32.00	10.60 / 35.00	10.80 / 40.00
Filtrate CL (ppm)	2,000.00	1,800.00	1,800.00	2,500.00
pH / Fluid Loss (mptm)	8.70 / 0	9.50 / 11	9.30 / 0	9.10 / 11
PV (cP) / YP (lhf2)	3 / 7.00	8 / 4.00	12 / 8.00	11 / 11.00
% Solids / % Sand	3.3 / .2	5.2 / .2	10.7 / .2	4.7 / 0.15
% Oil / Oil:Water Ratio	N/A / N/A	N/A / N/A	N/A / N/A	N/A / N/A
Rm @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A	N/A @ N/A
Rmf @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A	N/A @ N/A
Rmc @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A	N/A @ N/A

Max Tool Temp (degF) / Source	158.60 / PCM	172.78 / PCM	175.21 / PCM	220.77 / PCM	
Rm @ Max Tool Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A	N/A @ N/A	
Lead MWD Engineer	Paul Kock	Paul Kock	Paul Kock	Paul Kock	
Customer Representative	Bryant Dear	Bryant Dear	Martin Suarez	Martin Suarez	

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM	PCM	PCM	
Software Version	5.84	5.84	5.84	5.84	
Sub Serial Number	11254959	11254959	11254959	11730099	
Insert Serial Number	10744813	10744813	11400840	10744813	
Date and Time Initialized	02-Sep-13 22:38	02-Sep-13 22:38	05-Sep-13 18:59	06-Sep-13 18:41	
Date and Time Read	05-Sep-13 22:20	05-Sep-13 22:26	06-Sep-13 16:28	10-Sep-13 21:25	
ECMB SW Version	N/A	N/A	N/A	N/A	

Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC	PCDC	
Distance From Bit (ft)	54.66	52.33	52.32	61.01	
Software Version	6.21	6.21	6.21	6.21	
Sub Serial Number	11254959	11254959	11254959	11730099	
Sonde Serial Number	11478007	11478007	12177539	11478007	
Sensor ID Number	N/A	N/A	N/A	N/A	
Toolface Offset (deg)	196.31	91.60	236.10	94.74	

Gamma Ray Sensor Information

Tool Type	PCG	PCG	PCG	PCG	
Distance From Bit (ft)	49.66	47.33	47.32	56.03	
Recorded Sample Period (sec)	10	10	10	10	
Software Version	8.15	8.15	8.15	8.15	
Sub Serial Number	11254959	11254959	11254959	11730099	
Insert/Sonde Serial Number	11681026	11681026	12035849	11681026	

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 2" (1:600) logs - 1 ft. interval, 3 ft. coercion distance.
- All 5" (1:240) logs - .5 ft. interval, .6 ft. coercion distance.

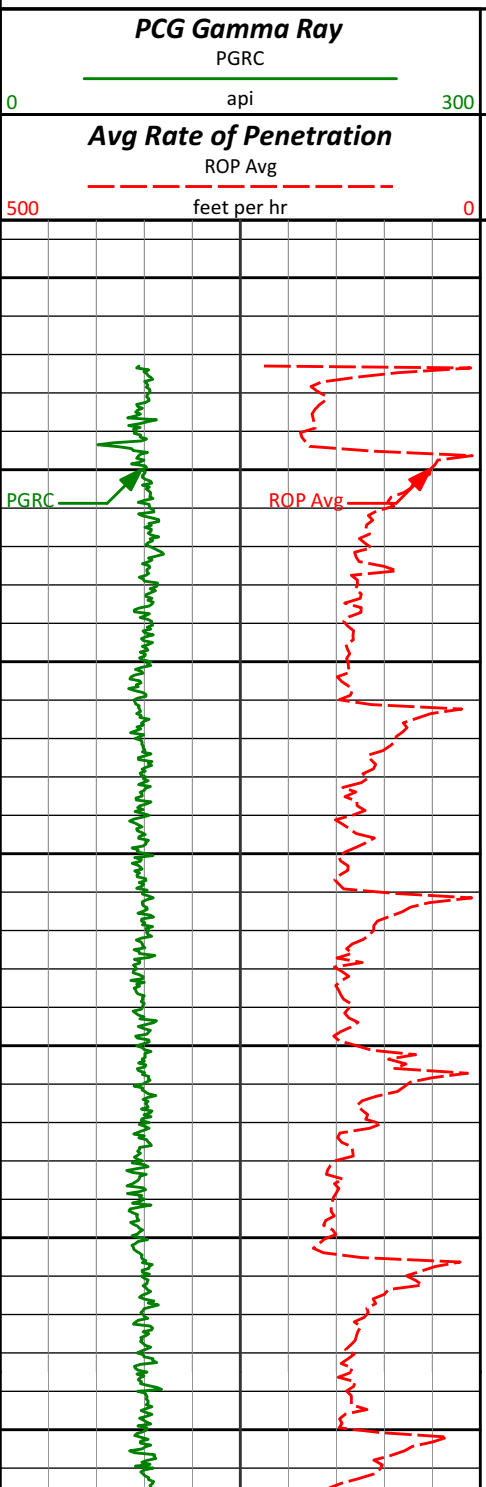
5. INSITE version 7.4.2

WARRANTY

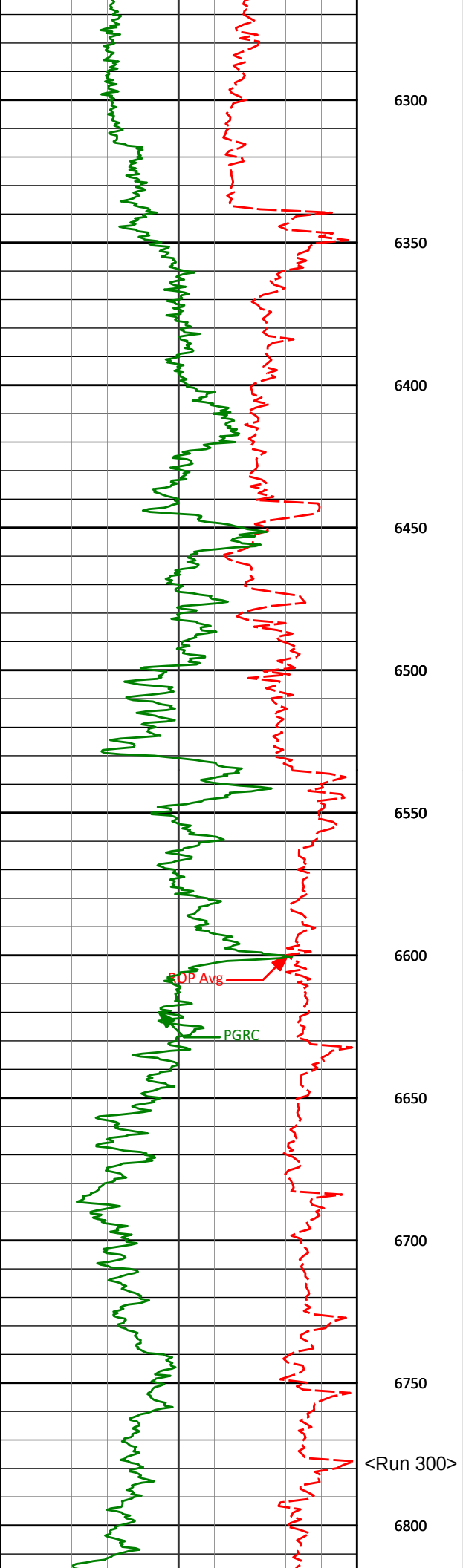
HALLIBURTON
Sperry Drilling Services

MD Main Log 1:600

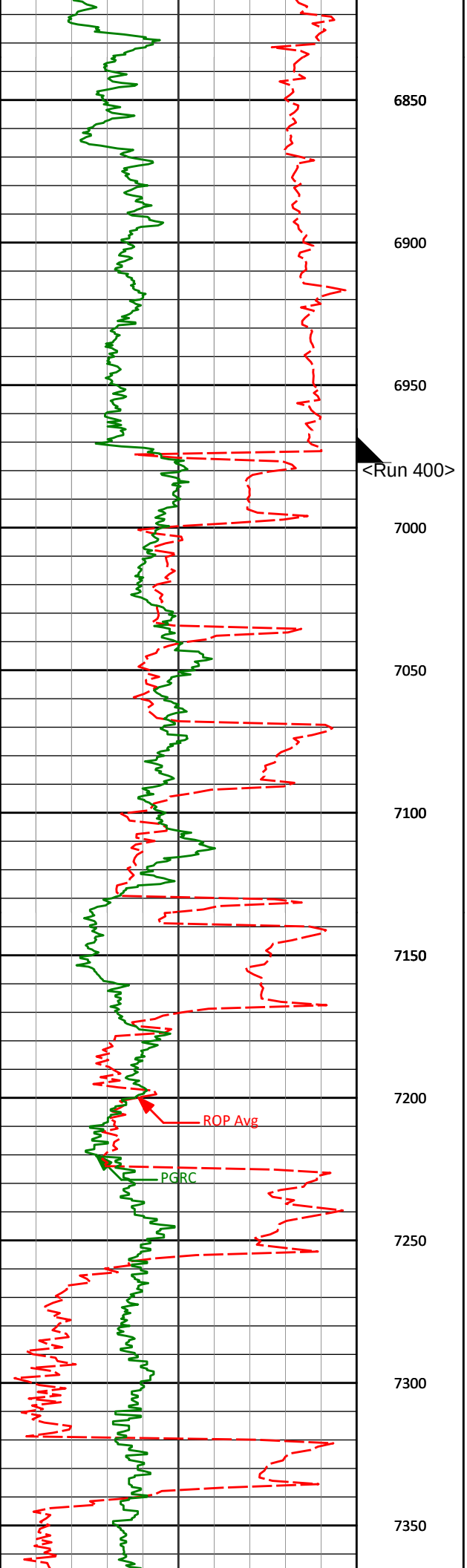
Noble Energy, Inc
Holman B15-65HNM
H&P 315
T5N R64W



Depth ft	Depth	Inc.	Azi.	TVD	V.S.
5950	5942'	12.38°	189.22°	5922.09'	21.98'
<Run 200>					
<KOP> 6000					
6050	6057'	14.04°	215.62°	6034.15'	33.62'
6100	6104'	17.33°	217.02°	6079.39'	41.82'
6150	6152'	17.37°	230.97°	6125.23'	52.35'
6200	6199'	18.71°	246.37°	6169.94'	65.18'
6250	6247'	22.30°	253.03°	6214.90'	81.29'



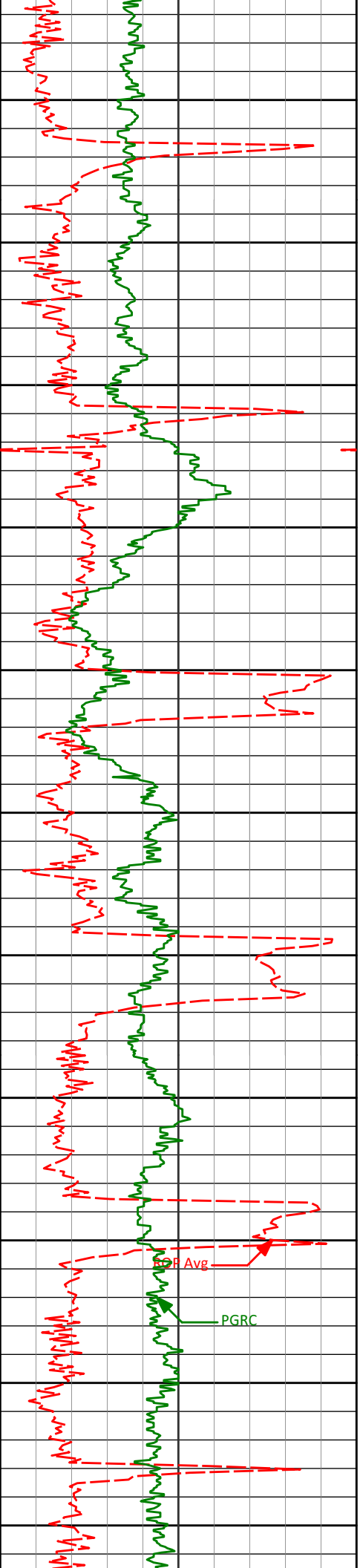
6294'	25.75°	250.01°	6257.82'	99.79'
6342'	29.58°	248.14°	6300.33'	121.07'
6389'	34.61°	247.74°	6340.13'	144.77'
6437'	39.99°	246.51°	6378.30'	172.25'
6484'	45.05°	243.79°	6412.93'	201.86'
6532'	**49.60°**	**244.79°**	**6445.46'**	**234.59'**
6579'	52.90°	248.65°	6474.88'	269.14'
6627'	55.47°	252.02°	6502.97'	306.57'
6673'	59.17°	253.88°	6527.81'	344.25'
6721'	63.76°	254.47°	6550.73'	385.48'
6768'	67.83°	253.99°	6570.00'	427.41'



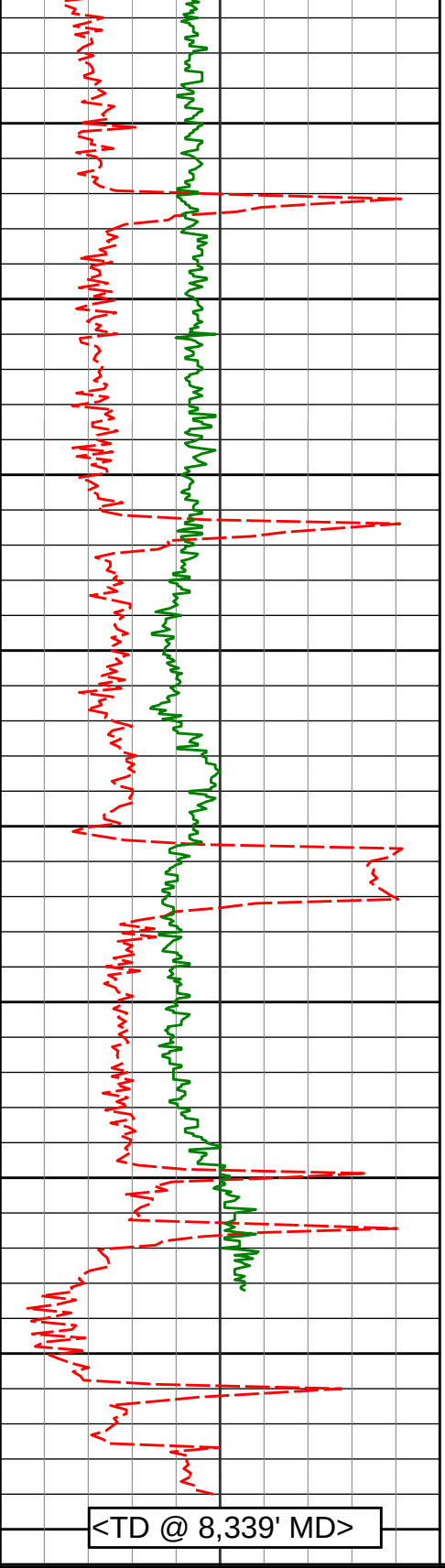
6816'	73.58°	254.80°	6585.85'	471.74'
6863'	79.32°	255.15°	6596.86'	516.53'
6923'	86.46°	257.31°	6604.28'	575.13'

<7" casing set at 6973' MD>

7006'	91.08°	262.19°	6606.06'	657.54'
7069'	92.00°	263.72°	6604.37'	720.41'
7164'	91.82°	269.36°	6601.20'	815.32'
7259'	90.86°	270.86°	6598.98'	910.07'
7354'	89.97°	272.40°	6598.29'	1004.64'



7446'	90.83°	273.13°	6597.65'	1096.03'
7539'	91.72°	273.04°	6595.58'	1188.34'
7632'	91.42°	272.04°	6593.03'	1280.74'
7725'	90.65°	271.84°	6591.35'	1373.26'
7817'	90.34°	271.46°	6590.56'	1464.84'
7909'	90.59°	271.05°	6589.81'	1556.48'



Depth ft	Depth	Inc.	Azi.	TVD	V.S.
7950					
8000	8001'	90.18°	269.67°	6589.19'	1648.23'
8050					
8100	8094'	90.46°	268.98°	6588.67'	1741.09'
8150					
8200	8186'	90.71°	270.44°	6587.73'	1832.91'
8250					
8300	8276'	92.22°	271.06°	6585.43'	1922.60'
8350					

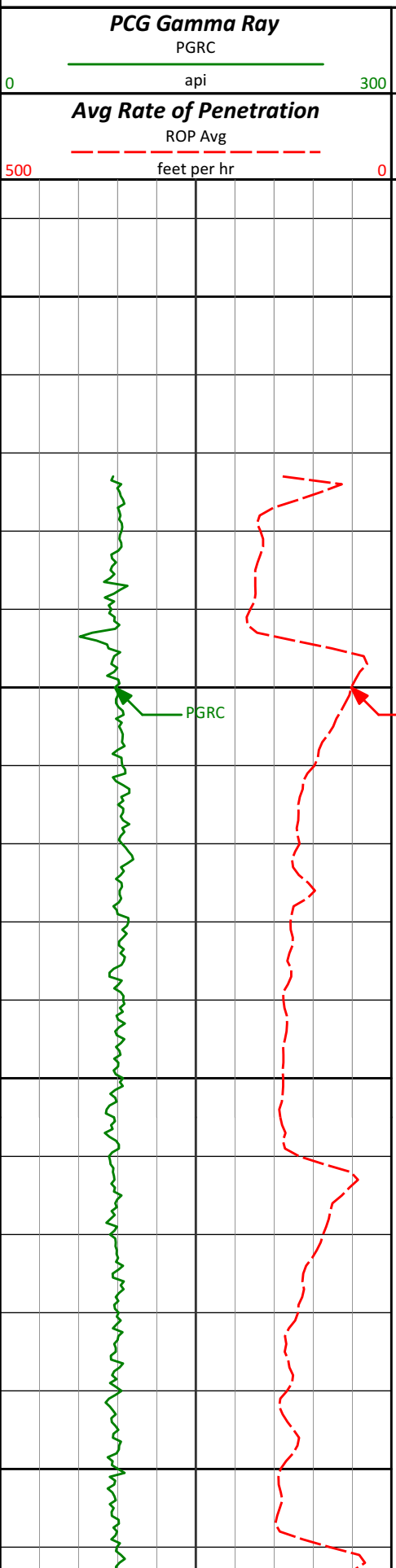
Avg Rate of Penetration
ROP Avg
500 feet per hr 0

PCG Gamma Ray
PGRC
0 api 300

HALLIBURTON
Sperry Drilling Services
MD Detail Log 1:240

MD Detail Log 1:240

Noble Energy, Inc
Holman B15-65HNM
H&P 315
T5N R64W



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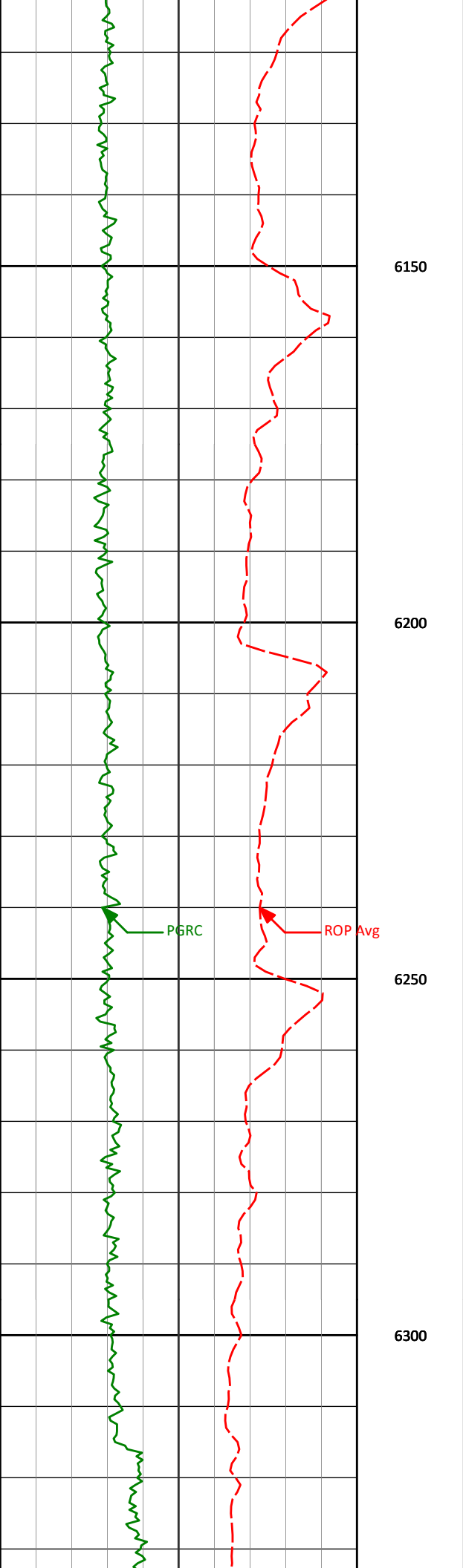

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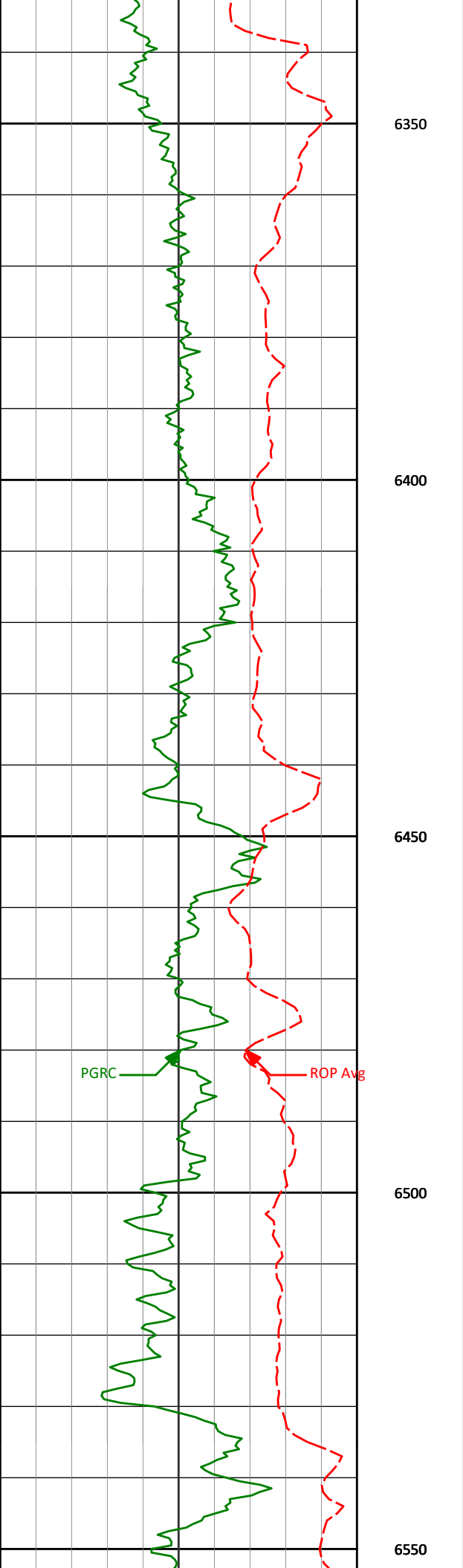

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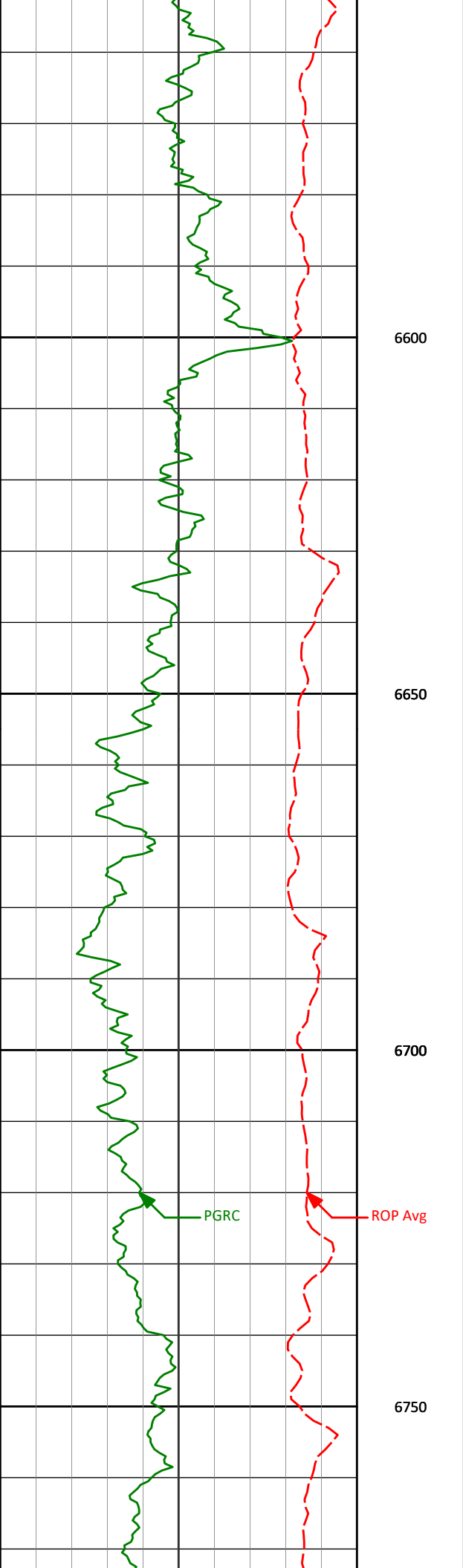
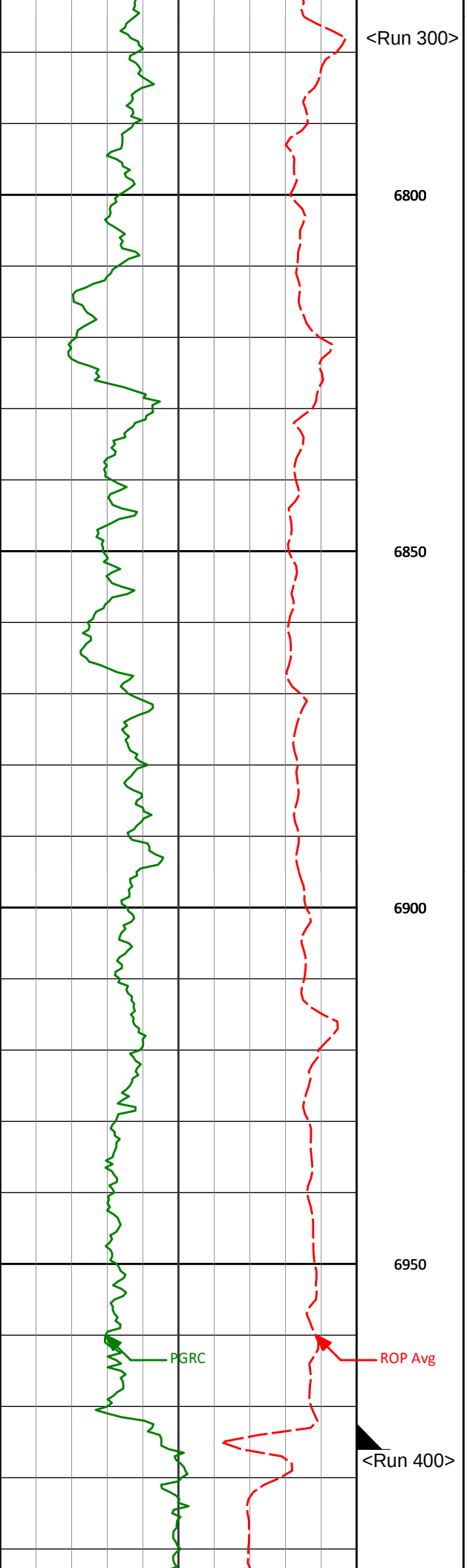


6579'	52.90°	248.65°	6474.88'	269.14'
6627'	55.47°	252.02°	6502.97'	306.57'
6673'	59.17°	253.88°	6527.81'	344.25'
6721'	63.76°	254.47°	6550.73'	385.48'
6768'	67.83°	253.99°	6570.00'	427.41'



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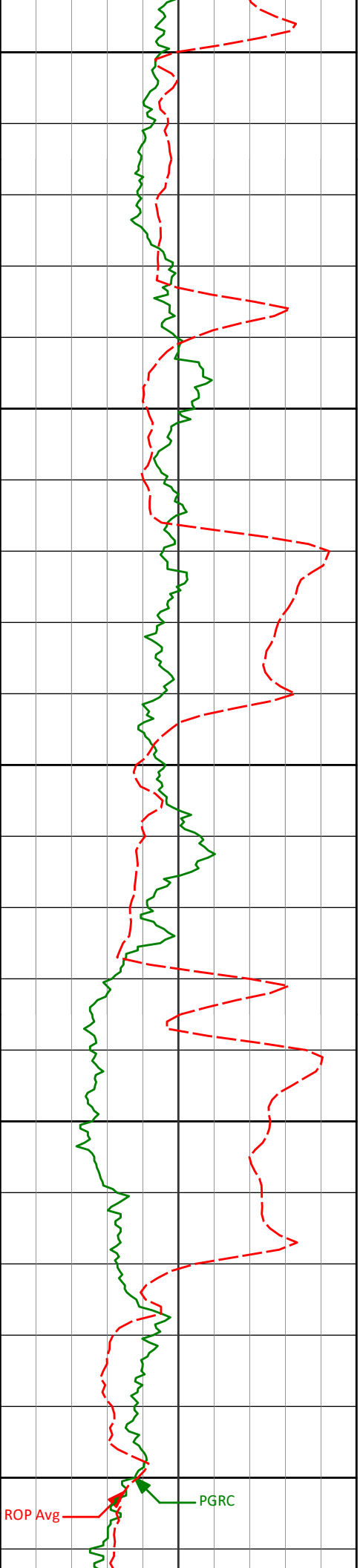

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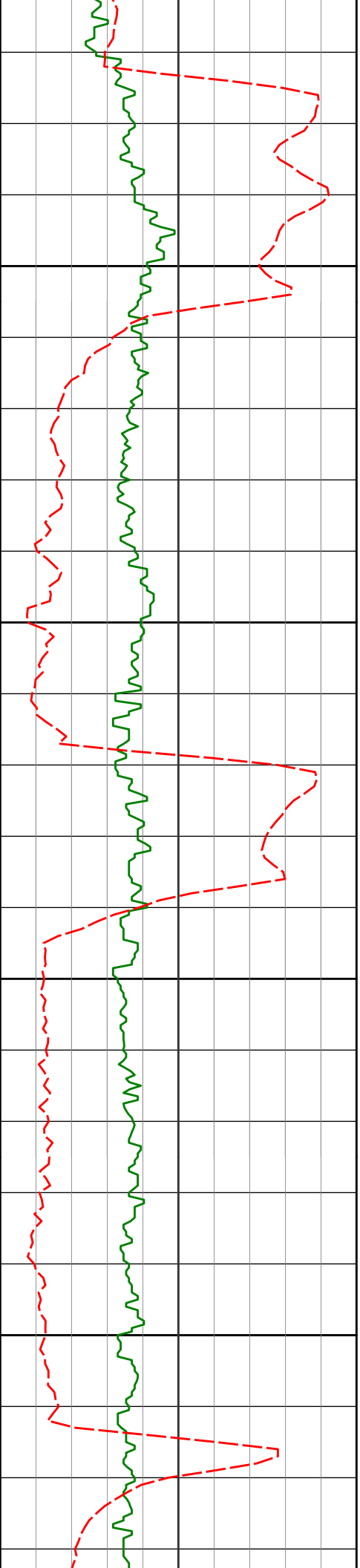
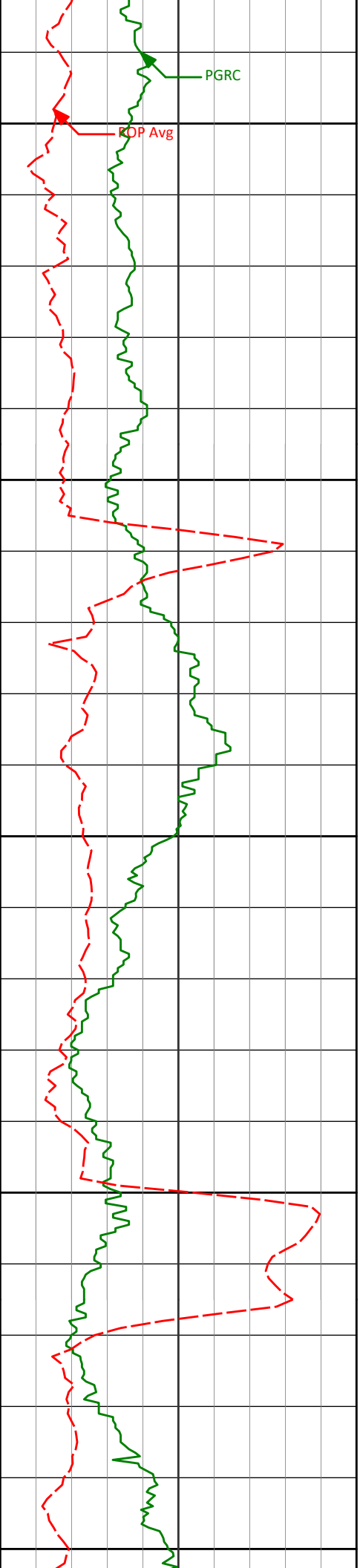


7259'	90.86°	270.86°	6598.98'	910.07'
7354'	89.97°	272.40°	6598.29'	1004.64'



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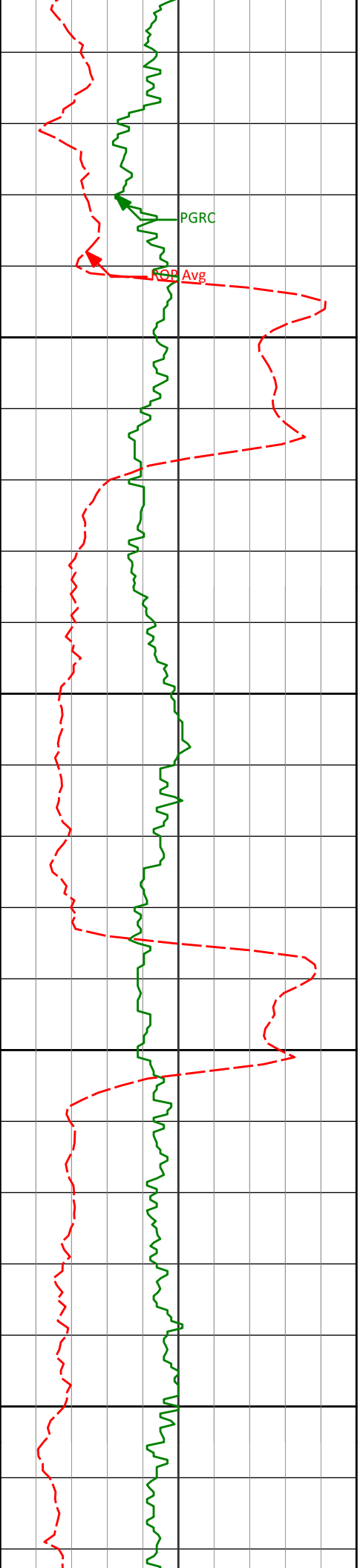
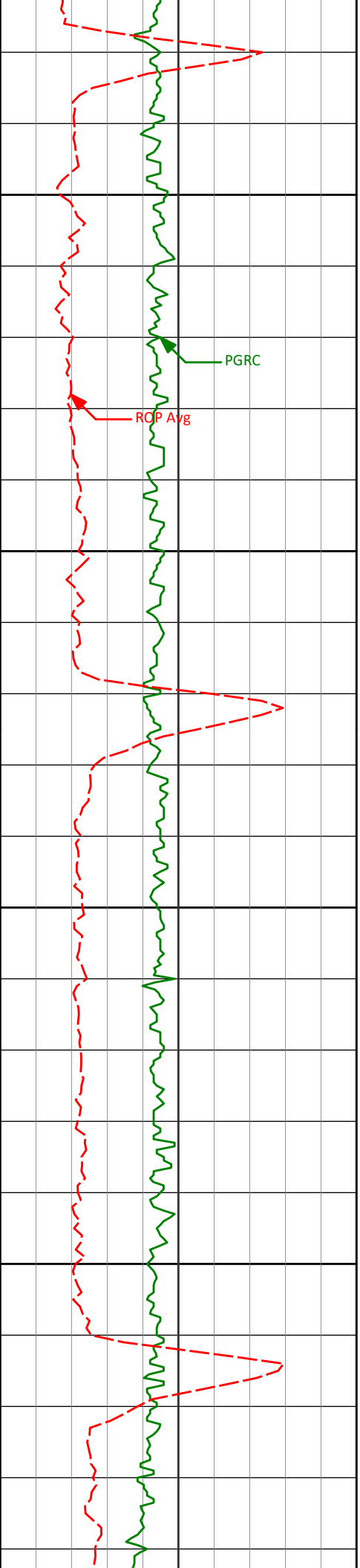
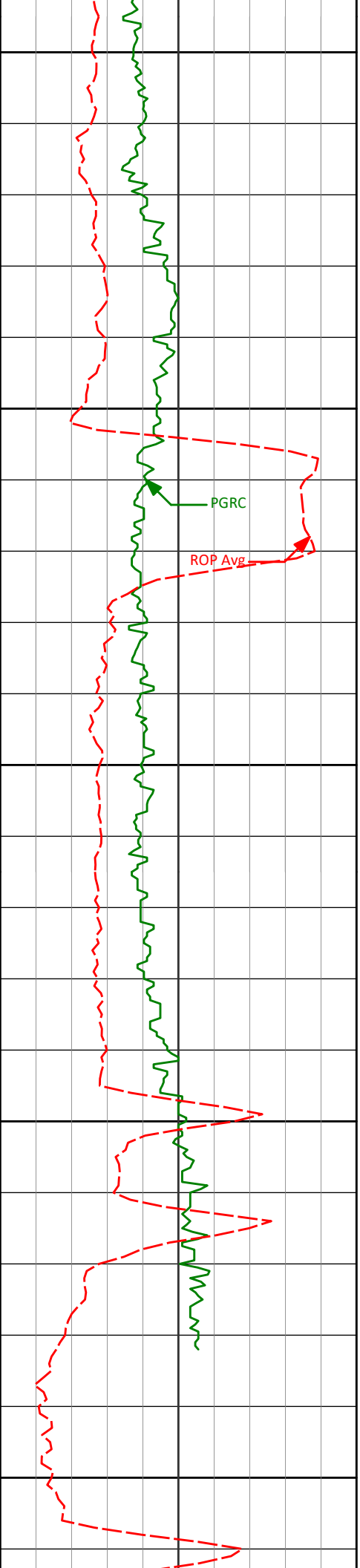


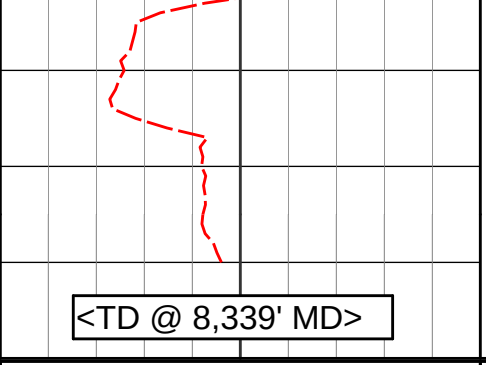
7725'	90.65°	271.84°	6591.35'	1373.26'
7817'	90.34°	271.46°	6590.56'	1464.84'



7909'	90.59°	271.05°	6589.81'	1556.48'
8001'	90.18°	269.67°	6589.19'	1648.23'



8094'	90.46°	268.98°	6588.67'	1741.09'
8186'	90.71°	270.44°	6587.73'	1832.91'
8276'	92.22°	271.06°	6585.43'	1922.60'



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

HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble Energy
Holman B15-65HNM
Wattenberg
Weld Colorado
USA
CA-XX-0900697468

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
304.00	0.50	222.23	304.00	0.98 S	0.89 W	0.95	0.16
612.00	0.50	268.53	611.99	2.01 S	3.14 W	3.26	0.13
715.00	0.54	308.98	714.98	1.72 S	3.96 W	4.07	0.35
900.00	0.74	271.88	899.97	1.13 S	5.84 W	5.90	0.24
993.00	0.58	255.72	992.96	1.23 S	6.89 W	6.96	0.26
1086.00	0.16	131.80	1085.96	1.43 S	7.25 W	7.33	0.73
1178.00	0.48	22.33	1177.96	1.16 S	7.01 W	7.07	0.60
1271.00	0.94	310.80	1270.96	0.30 S	7.44 W	7.44	0.98
1363.00	0.35	81.95	1362.95	0.23 N	7.73 W	7.70	1.30
1456.00	0.44	273.14	1455.95	0.29 N	7.81 W	7.77	0.85
1551.00	1.70	138.01	1550.94	0.74 S	7.23 W	7.26	2.14
1646.00	1.44	138.65	1645.90	2.68 S	5.50 W	5.66	0.27
1741.00	2.14	141.40	1740.86	4.96 S	3.60 W	3.92	0.74
1836.00	2.44	145.35	1835.78	8.01 S	1.35 W	1.87	0.36
1931.00	1.81	109.92	1930.72	10.19 S	1.21 E	-0.54	1.50
2026.00	1.45	43.77	2025.69	9.83 S	3.46 E	-2.80	1.90
2310.00	0.77	350.16	2309.64	5.35 S	5.62 E	-5.25	0.41
2595.00	1.16	39.82	2594.60	1.25 S	7.14 E	-7.04	0.31
2880.00	1.38	314.99	2879.55	3.39 N	6.56 E	-6.77	0.60
3164.00	1.28	212.56	3163.51	3.14 N	2.43 E	-2.63	0.73
3449.00	1.51	159.63	3448.43	3.07 S	2.02 E	-1.82	0.44
3734.00	2.20	179.46	3733.29	12.06 S	3.38 E	-2.58	0.33
4019.00	2.87	201.36	4018.01	24.17 S	0.84 E	0.76	0.41
4304.00	1.87	210.46	4302.77	34.83 S	4.12 W	6.41	0.37
4399.00	1.33	210.20	4397.73	37.12 S	5.46 W	7.90	0.57
4494.00	2.82	176.96	4492.67	40.40 S	5.89 W	8.55	1.95
4589.00	3.93	169.72	4587.50	45.94 S	5.19 W	8.21	1.25
4684.00	5.27	169.66	4682.19	53.44 S	3.82 W	7.35	1.41
4779.00	6.49	164.48	4776.69	62.90 S	1.60 W	5.76	1.40
4874.00	7.61	171.83	4870.97	74.30 S	0.73 E	4.19	1.51
4969.00	8.71	171.35	4965.01	87.64 S	2.70 E	3.10	1.16
5063.00	8.33	171.68	5057.97	101.41 S	4.76 E	1.95	0.41
5158.00	8.91	170.91	5151.90	115.49 S	6.92 E	0.73	0.62
5253.00	9.46	179.33	5245.69	130.56 S	8.17 E	0.48	1.53

5348.00	9.11	175.14	5339.44	145.86 S	8.90 E	0.76	0.80
5443.00	9.44	178.69	5433.20	161.14 S	9.71 E	0.96	0.70
5538.00	10.74	189.81	5526.74	177.66 S	8.38 E	3.38	2.46
5633.00	11.08	191.55	5620.02	195.32 S	5.05 E	7.87	0.50
5728.00	12.11	190.87	5713.08	214.05 S	1.34 E	12.81	1.09
5822.00	12.43	186.21	5804.94	233.79 S	1.61 W	17.06	1.11
5916.00	12.58	187.39	5896.71	254.00 S	4.02 W	20.80	0.32
5942.00	12.38	189.22	5922.09	259.56 S	4.83 W	21.98	1.70
6057.00	14.04	215.62	6034.15	283.09 S	14.94 W	33.62	5.39
6104.00	17.33	217.02	6079.39	293.32 S	22.48 W	41.82	7.05
6152.00	17.37	230.97	6125.23	303.54 S	32.36 W	52.35	8.65
6199.00	18.71	246.37	6169.94	310.99 S	44.72 W	65.18	10.51
6247.00	22.30	253.03	6214.90	316.73 S	60.49 W	81.29	8.91
6294.00	25.75	250.01	6257.82	322.83 S	78.62 W	99.79	7.79
6342.00	29.58	248.14	6300.33	330.81 S	99.42 W	121.07	8.18
6389.00	34.61	247.74	6340.13	340.19 S	122.56 W	144.77	10.71
6437.00	39.99	246.51	6378.30	351.51 S	149.34 W	172.25	11.31
6484.00	45.05	243.79	6412.93	364.88 S	178.13 W	201.86	11.45
6532.00	49.60	244.79	6445.46	380.18 S	209.92 W	234.59	9.60
6579.00	52.90	248.65	6474.88	394.63 S	243.59 W	269.14	9.50
6627.00	55.47	252.02	6502.97	407.71 S	280.24 W	306.57	7.81
6673.00	59.17	253.88	6527.81	419.05 S	317.25 W	344.25	8.73
6721.00	63.76	254.47	6550.73	430.54 S	357.81 W	385.48	9.62
6768.00	67.83	253.99	6570.00	442.19 S	399.05 W	427.41	8.71
6816.00	73.58	254.80	6585.85	454.37 S	442.67 W	471.74	12.08
6863.00	79.32	255.15	6596.86	466.20 S	486.78 W	516.53	12.23
6923.00	86.46	257.31	6604.28	480.36 S	544.57 W	575.13	12.42
7006.00	91.08	262.19	6606.06	495.11 S	626.18 W	657.54	8.09
7069.00	92.00	263.72	6604.37	502.84 S	688.68 W	720.41	2.83
7164.00	91.82	269.36	6601.20	508.56 S	783.42 W	815.32	5.94
7259.00	90.86	270.86	6598.98	508.38 S	878.39 W	910.07	1.87
7354.00	89.97	272.40	6598.29	505.68 S	973.34 W	1004.64	1.87
7446.00	90.83	273.13	6597.65	501.24 S	1065.23 W	1096.03	1.23
7539.00	91.72	273.04	6595.58	496.24 S	1158.07 W	1188.34	0.96
7632.00	91.42	272.04	6593.03	492.12 S	1250.94 W	1280.74	1.12
7725.00	90.65	271.84	6591.35	488.97 S	1343.87 W	1373.26	0.86
7817.00	90.34	271.46	6590.56	486.32 S	1435.83 W	1464.84	0.53
7909.00	90.59	271.05	6589.81	484.31 S	1527.81 W	1556.48	0.52
8001.00	90.18	269.67	6589.19	483.73 S	1619.80 W	1648.23	1.56
8094.00	90.46	268.98	6588.67	484.82 S	1712.79 W	1741.09	0.80
8186.00	90.71	270.44	6587.73	485.29 S	1804.78 W	1832.91	1.61
8276.00	92.22	271.06	6585.43	484.11 S	1894.74 W	1922.60	1.81
8339.00	92.22	271.06	6582.99	482.95 S	1957.69 W	1985.33	0.00

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 266.21 DEGREES (GRID)
A TOTAL CORRECTION OF 7.83 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED

HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 8339.00 FEET
IS 2016.38 FEET ALONG 256.14 DEGREES (GRID)

Surface surveys at 304 ft and 612 ft have had azimuths corrected to grid north, but were not taken by Halliburton.

Last survey is a projection from 8276 ft MD to TD at 8339 ft MD.

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