

DGR Dual Gamma Ray

1 : 240

Company : Anadarko Petroleum Corp									
Rig : Ensign 132									
Well : Gobbler 2N-23Hz									
Field : Wattenberg									
Country : USA									
API Number : 05-123-36817									
LOCATION					Other Services Directional Drilling				
Latitude : 40° 7' 1.73" North Longitude : 104° 44' 26.75" West		UTM Easting = 3,212,334.45 ft UTM Northing = 1,286,429.34 ft							
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WELL INFORMATION

MWD Run Number	200	300	400		
Date run completed	23-Apr-13	25-Apr-13	29-Apr-13		
Rig Bit Number	3	4	5		
Bit Size (in)	8.750	8.750	6.125		
Tool Nominal OD (in)	6.750	6.750	4.750		
Log Start Depth (MD, ft)	6,875.00	7,194.00	7,690.00		
Log End Depth (MD, ft)	7,194.00	7,690.00	11,928.00		
Drill or Wipe	Drill	Drill	Drill		
Drill/Wipe Start Date and Time	23-Apr-13 07:15	24-Apr-13 09:00	27-Apr-13 07:45		
Drill/Wipe End Date and Time	23-Apr-13 17:50	24-Apr-13 23:00	29-Apr-13 11:30		
Min Inc (deg) @ Depth (MD, ft)	3.54 @ 6,909.00	23.54 @ 7,195.00	86.91 @ 7,905.00		
Max Inc (deg) @ Depth (MD, ft)	19.47 @ 7,148.00	84.35 @ 7,642.00	94.14 @ 10,867.00		
Bit TFA(in2) / Bit Type	.98 / PDC	1.04 / PDC	.98 / PDC		
Flow Rate (gpm)	480.00	522.73	299.10		
Max AV (fpm) / CV (fpm) @ MWD	437.9 / 232.7	466.0 / 280.0	585.0 / 338.0		
Fluid Type	Fresh Water Gel	Fresh Water Gel	Fresh Water Gel		
Density (ppg) / Viscosity (spqt)	9.20 / 34.00	9.75 / 41.00	9.80 / 45.00		
Filtrate CL (ppm)	1,000.00	1,000.00	2,000.00		
pH / Fluid Loss (mptm)	8.20 / 10	9.30 / 5	8.60 / 4		
PV (cP) / YP (lhf2)	10 / 5.00	13 / 12.00	15 / 14.00		
% Solids / % Sand	5.50 / .1	9.00 / 0.25	9.00 / 0.20		
% Oil / Oil:Water Ratio	N/A / N/A	1.00 / N/A	2.00 / N/A		
Rm @ Measured Temp (degF)	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		
Rmc @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A		
Max Tool Temp (degF) / Source	163.20 / PCM	167.97 / PCM	219.06 / HCIM		
Rm @ Max Tool Temp (degF)	N/A @ 163.20	N/A @ 167.97	N/A @ 219.06		
Lead MWD Engineer	Joshua Huckleby	Joshua Huckleby	Joshua Huckleby		
Customer Representative	Sam Taylor	Bob Porter	Sam Taylor		

SENSOR INFORMATION					
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Downhole Processor Information					
Tool Type	PCM	PCM	HCIM		
Software Version	5.76	5.76	88.56		
Sub Serial Number	11341336	11341336	11235113		
Insert Serial Number	10921370	11227484	10951820		
Date and Time Initialized	17-Apr-13 18:43	23-Apr-13 21:36	26-Apr-13 12:39		
Date and Time Read	24-Apr-13 00:19	25-Apr-13 09:44	29-Apr-13 23:47		
ECMB SW Version	N/A	N/A	N/A		

Directional Sensor Information					
Tool Type	PCDC	PCDC	PCDC		
Distance From Bit (ft)	45.88	46.98	41.28		
Software Version	6.21	6.21	6.21		
Sub Serial Number	11341336	11341336	12121221		
Sonde Serial Number	11297583	11478094	11297583		
Sensor ID Number	N/A	N/A	N/A		
Toolface Offset (deg)	78.70	183.73	5.75		

Gamma Ray Sensor Information					
Tool Type	PCG	PCG	DGR		
Distance From Bit (ft)	50.83	51.93	63.27		
Recorded Sample Period (sec)	10	10	8		
Software Version	8.15	8.15	N/A		
Sub Serial Number	11341336	11341336	11235113		
Insert/Sonde Serial Number	11680944	11680968	262542		

Pulser Controller Sensor Information					
Tool Type	PCM	PCM	PCM		
Software Version	5.76	5.76	8.17		
PIC Software Version	1.40	1.40			
Sub/HOC Serial Number	11341336	11341336	11633645		
Insert/Probe/Module SN	10921370	11227484	10921370		
Battery Serial Number	N/A	N/A	N/A		
Valve Insert SN	N/A	N/A	N/A		
DC Insert Serial Number	N/A	N/A	N/A		
Choke Size (32nd)	N/A	N/A	N/A		
Driver Current (amps)	N/A	N/A	N/A		
Driver SMI Current (amps)	N/A	N/A	N/A		
Boot Strap Version	4,130.00	4,130.00			

REMARKS					
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1.All depths are calibrated to the driller's pipe tally and are measured from the rotary table.

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

3. All data presented is recorded (memory data) unless otherwise stated.

4. All main log data was logged while drilling

5. Environmental parameters used to process Gamma Ray are as follows:
□Hole Size: 8.75" 6820-7690, 6.125" 7690-11928
□Mud Density: 9.3 to 10.1 ppg

6. The following smoothing parameters have been applied to the data:
□ROP: 0.5 ft interval, 1.2 ft coercion distance
□All other curves: 0.5 ft interval, 0.6 ft coercion distance

7. Hole was logged from 6820-7690 using a PCGK and from 7690 to 11928 using a DGR tool

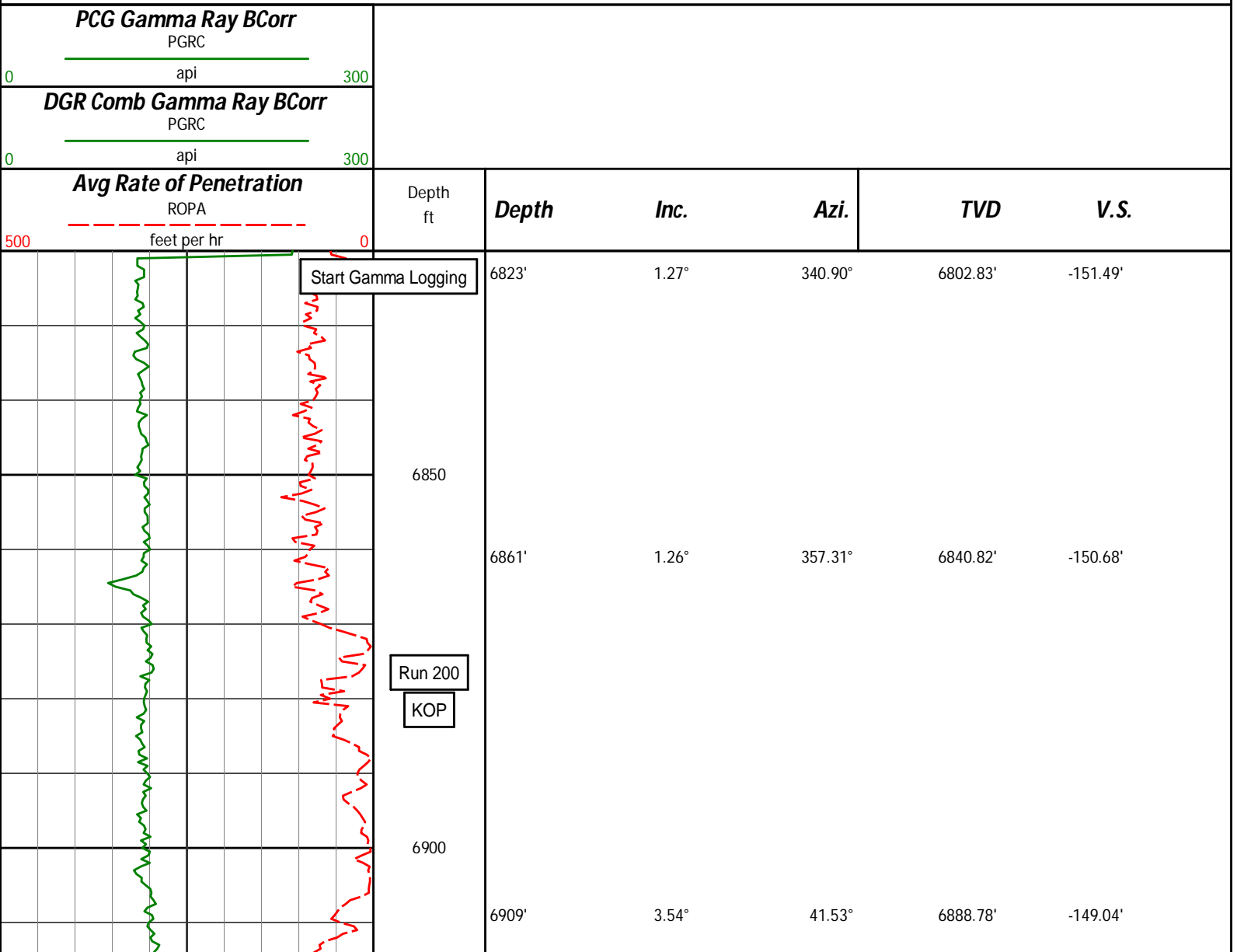
WARRANTY

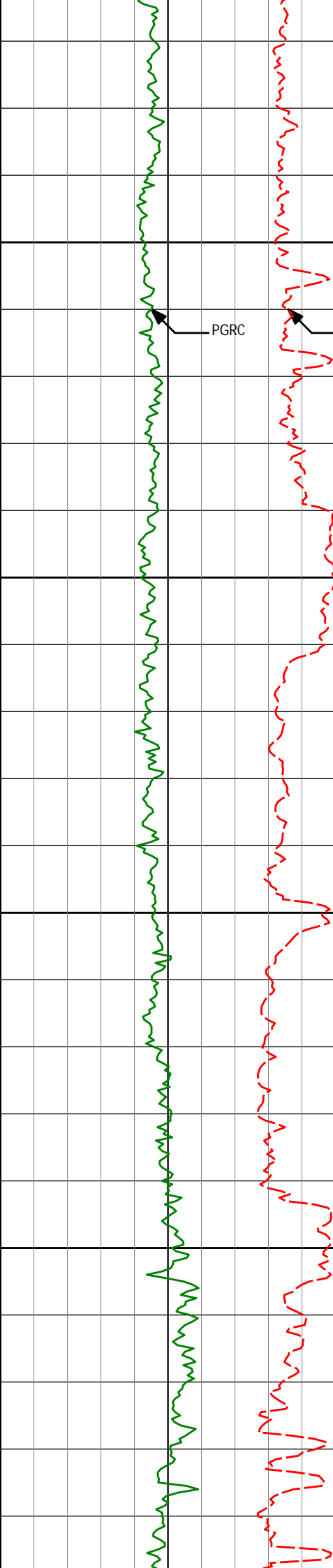
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HALLIBURTON
Sperry Drilling Services
MD Detail Log 1:240

Anadarko Petroleum Corp
Gobbler 2N-23Hz
Ensign 132
2N 66W

Anadarko Petroleum Corp
Gobbler 2N-23Hz
Ensign 132
2N 66W





6950

6956'

6.68°

12.03°

6935.60'

-145.27'

PGRC

ROPA

7000

7004'

9.68°

19.35°

6983.10'

-138.72'

7050

7052'

13.42°

16.15°

7030.12'

-129.54'

7100

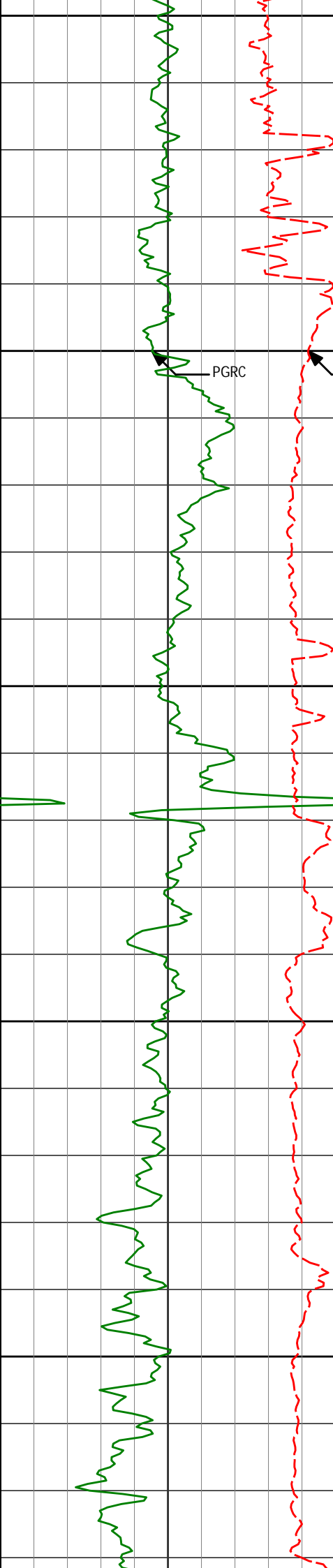
7140'

10.47°

0.31°

7122.14'

102.00'



7150

Run 300

7200
ROPA

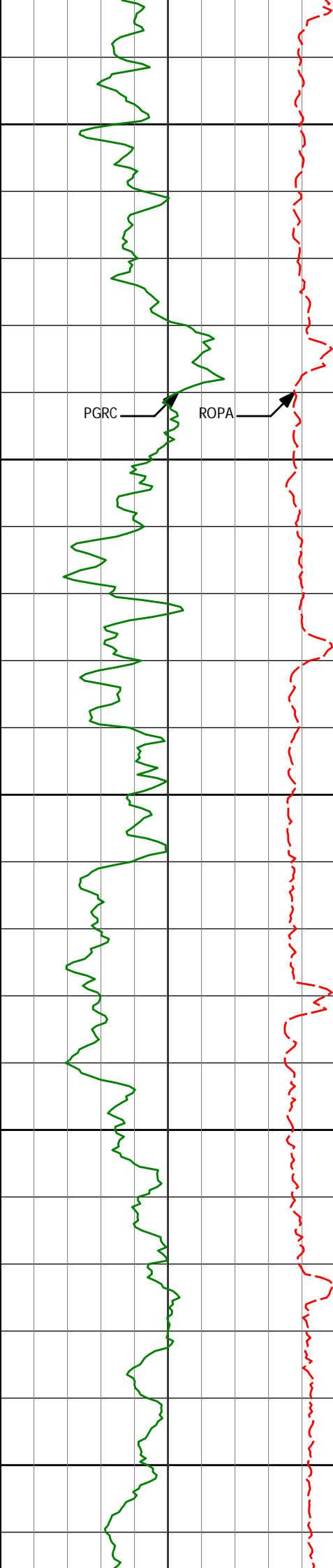
PGRC

7250

7300

7350

7148	19.47	9.31	7122.16	-103.00
7195'	23.54°	11.86°	7165.88'	-86.06'
7243'	28.98°	15.62°	7208.91'	-65.43'
7291'	35.27°	17.74°	7249.55'	-40.97'
7338'	41.19°	17.11°	7286.45'	-13.18'



7400

7450

7500

7550

7600

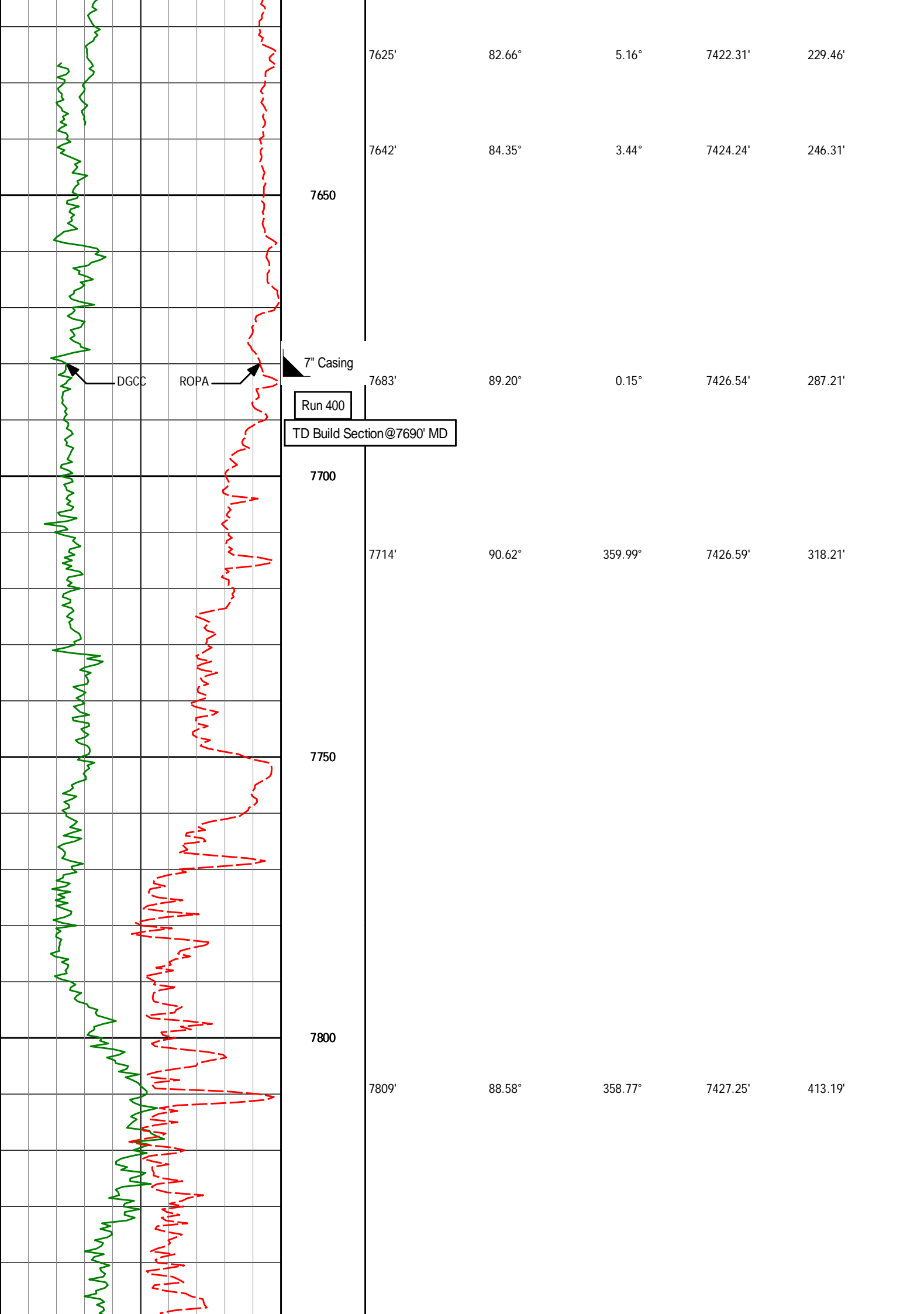
7386'	47.85°	14.11°	7320.66'	19.27'
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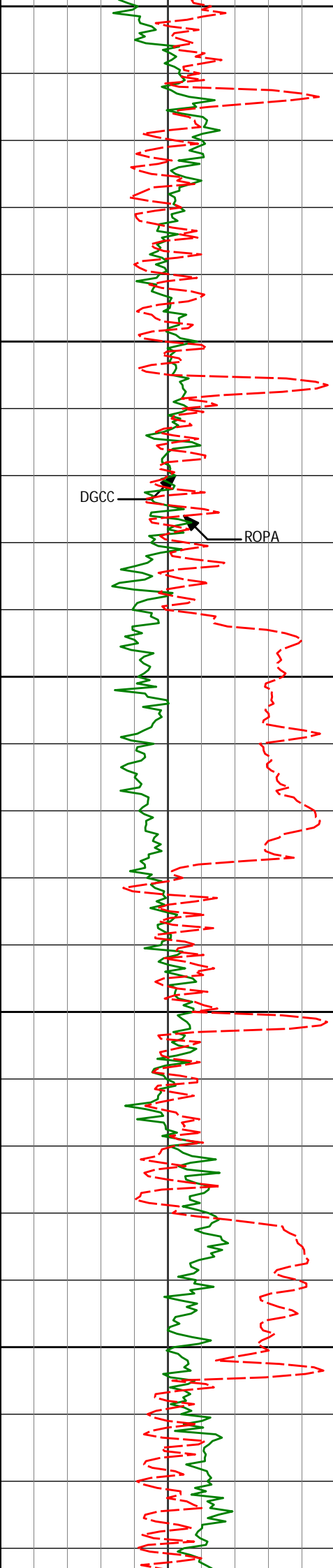
7434'	53.46°	9.60°	7351.09'	55.62'
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7482'	60.91°	7.40°	7377.08'	95.52'
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7530'	67.37°	6.91°	7398.01'	138.38'
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7579'	75.49°	6.19°	7413.60'	184.52'
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7850

7900

7950

8000

8050

7905'

86.91°

358.38°

7431.03'

509.06'

8000'

91.73°

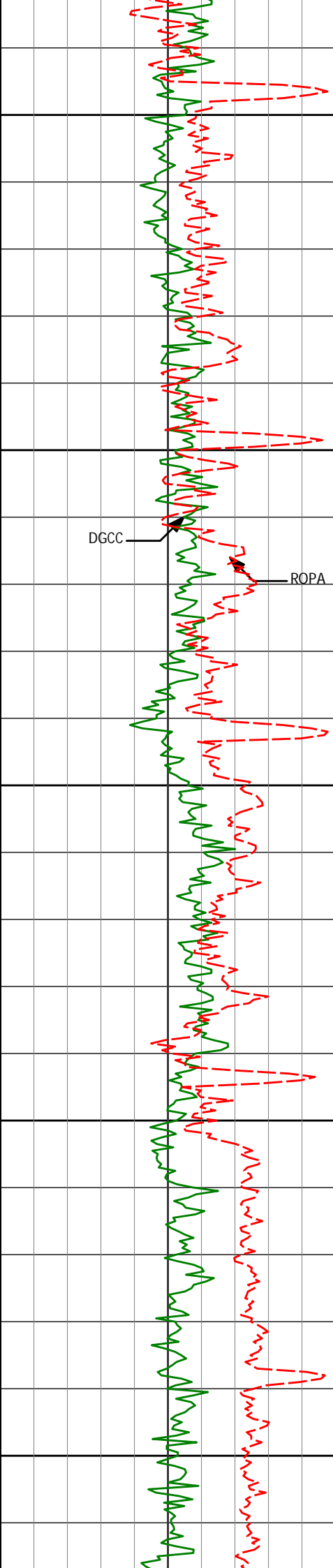
357.19°

7432.16'

603.94'

DGCC

ROPA



8100

8150

8200

8250

8300

DGCC

ROPA

8096'

89.51°

358.97°

7431.12'

699.85'

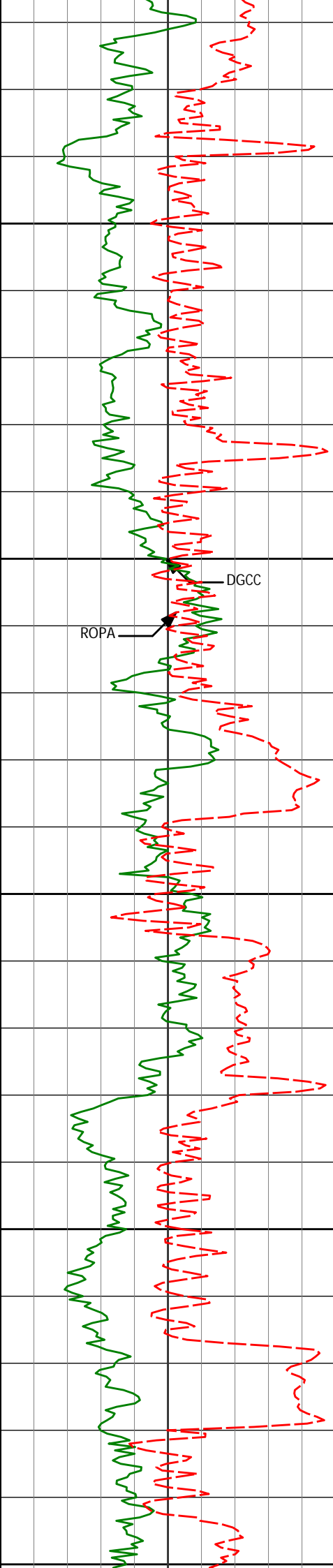
8288'

89.44°

358.21°

7432.88'

891.75'



8350

8384'

88.39°

357.52°

7434.70'

987.65'

8400

ROPA

DGCC

8450

8480'

89.38°

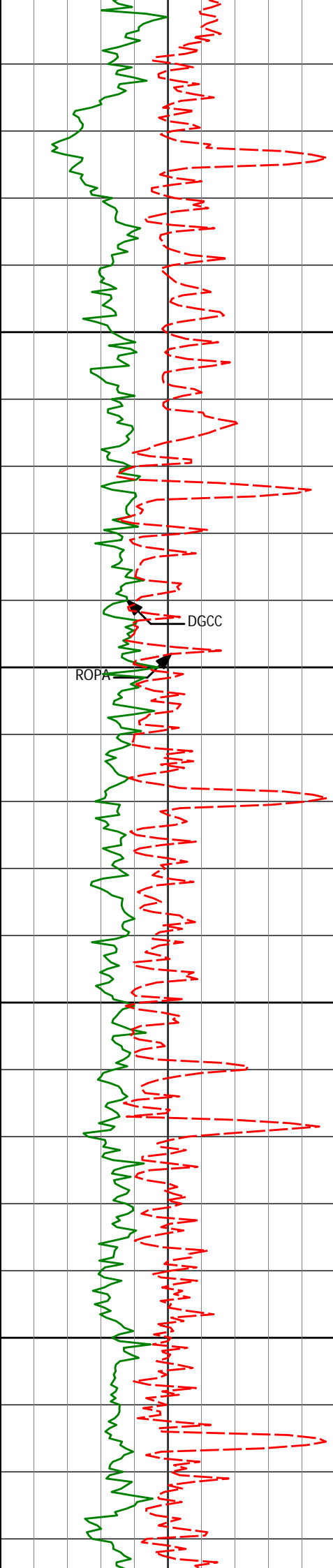
358.19°

7436.57'

1083.54'

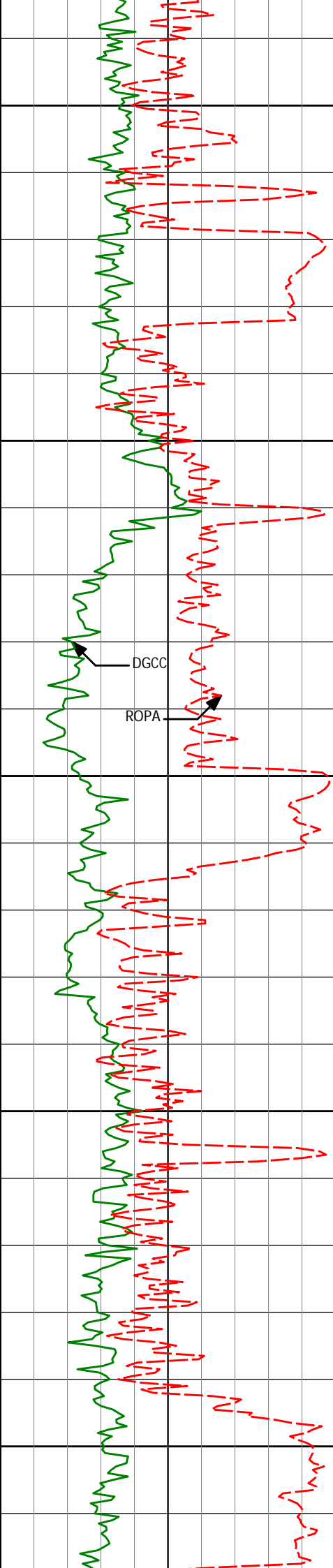
8500

8550



8550
8600
8650
8700
8750

8576'	90.86°	358.67°	7436.36'	1179.48'
8671'	90.06°	357.04°	7435.60'	1274.39'
8766'	89.63°	354.26°	7435.86'	1369.06'



8800

8850

8900

8950

9000

8862'

90.06°

355.20°

7436.12'

1464.61'

DGCC

ROPA

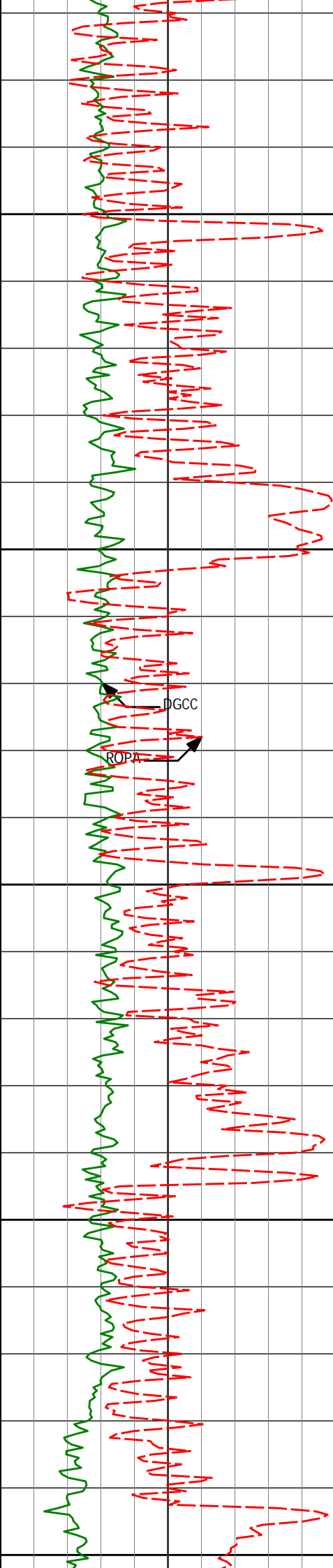
8958'

90.06°

357.58°

7436.02'

1560.38'



9050

9053'

92.04°

1.03°

7434.28'

1655.33'

9100

9150

9148'

91.42°

359.85°

7431.41'

1750.28'

9200

9250

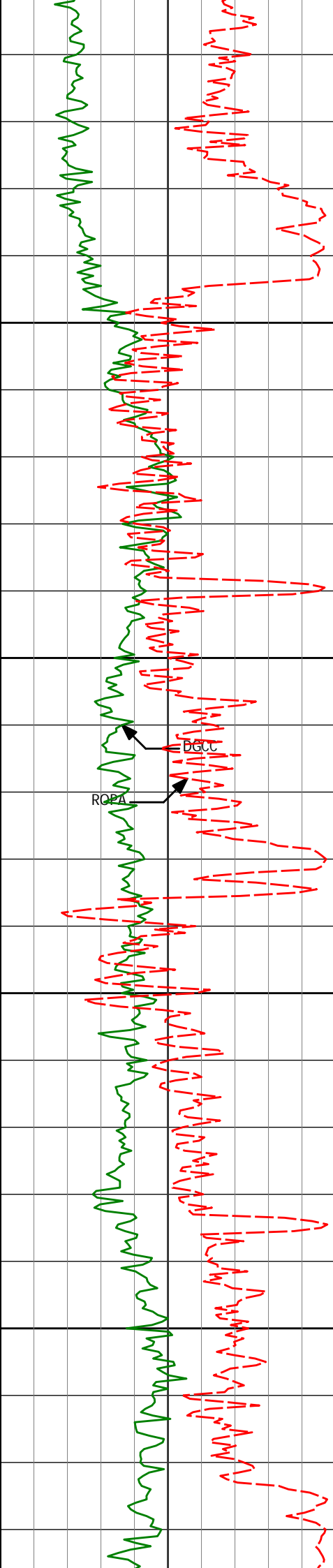
9244'

91.67°

359.38°

7428.82'

1846.24'



9300

9339'

90.62°

0.80°

7426.92'

1941.22'

9350

9400

9435'

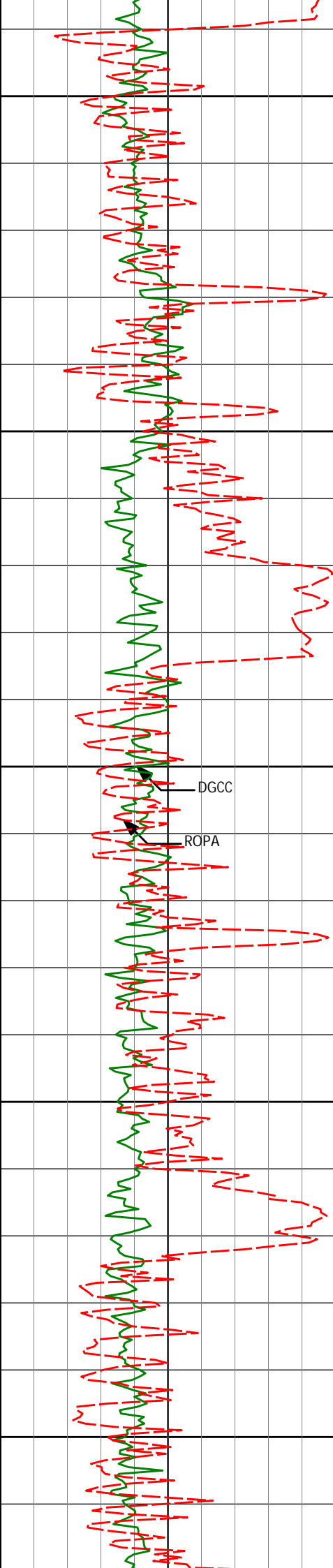
89.57°

359.83°

7426.76'

2037.21'

9450



9500

9530'

89.81°

1.53°

7427.28'

2132.21'

9550

9600

DGCC

ROPA

9626'

91.67°

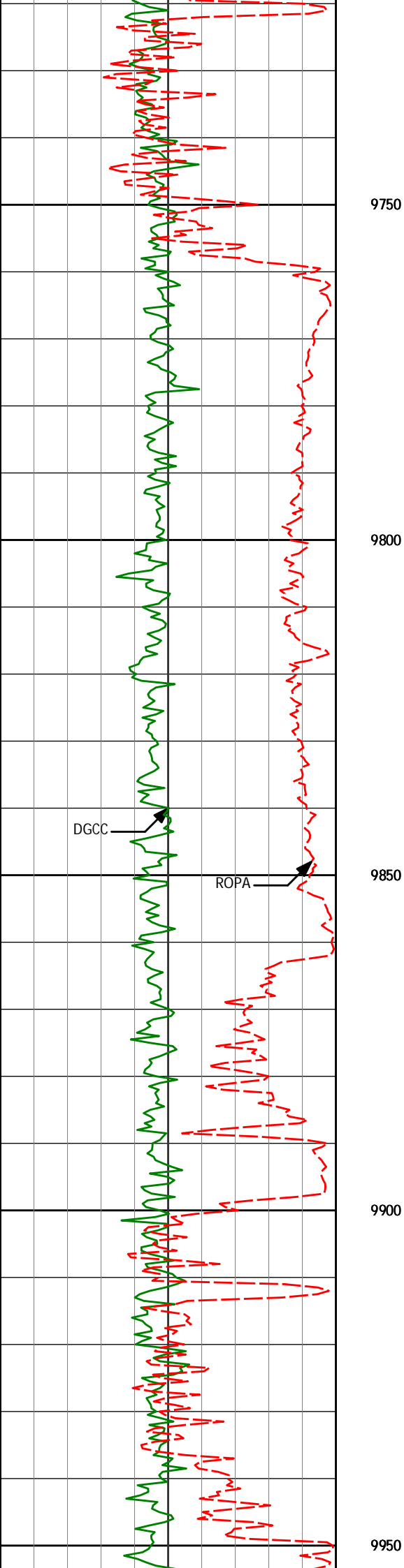
2.77°

7426.04'

2228.14'

9650

9700



9722'	91.42°	3.12°	7423.45'	2324.01'
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9750

9800

9817'	90.49°	1.85°	7421.87'	2418.92'
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DGCC

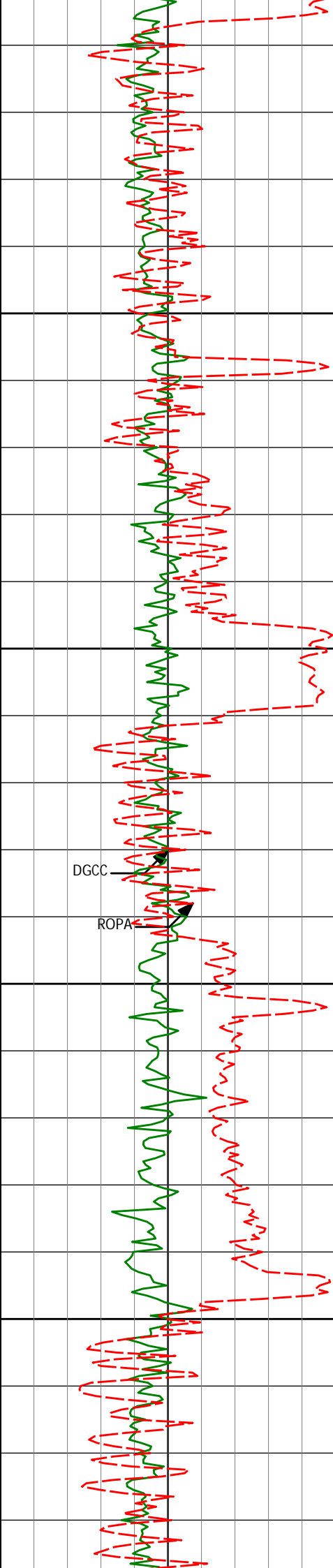
ROPA

9850

9900

9912'	91.91°	2.33°	7419.88'	2513.85'
-------	--------	-------	----------	----------

9950



10000

10008'

90.99°

1.22°

7417.45'

2609.79'

10050

DGCC

ROPA

10100

10104'

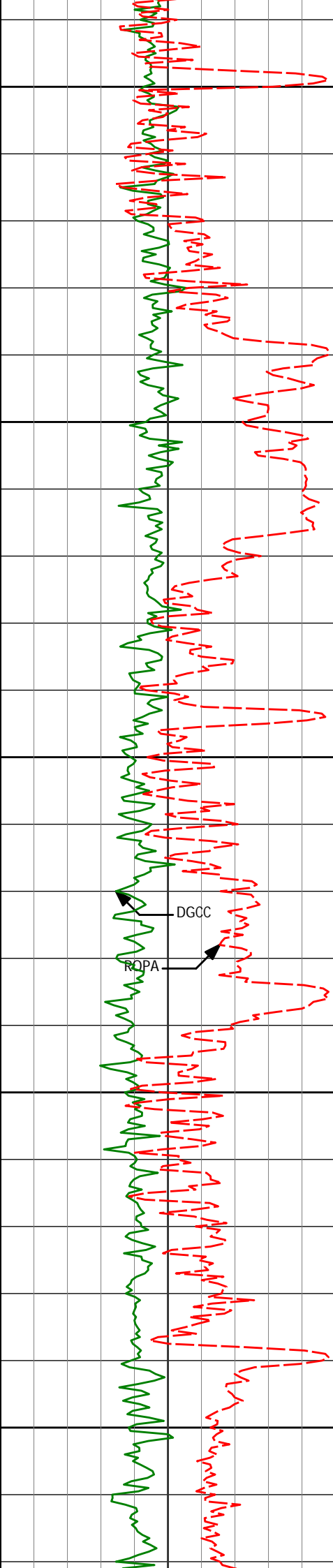
91.98°

2.96°

7414.96'

2705.70'

10150



10200

10250

10300

10350

10400

10199'

10294'

10389'

91.24°

92.22°

91.60°

1.42°

1.25°

1.14°

7412.29'

7409.42'

7406.26'

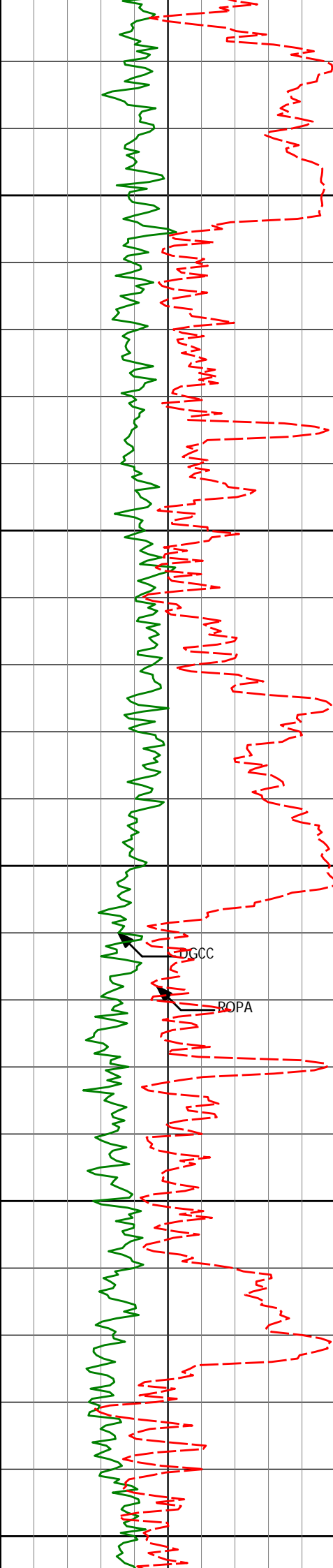
2800.61'

2895.55'

2990.49'

DGCC

RCPA



10450

10500

10550

10600

10650

10485'

92.04°

0.98°

7403.21'

3086.43'

10581'

92.66°

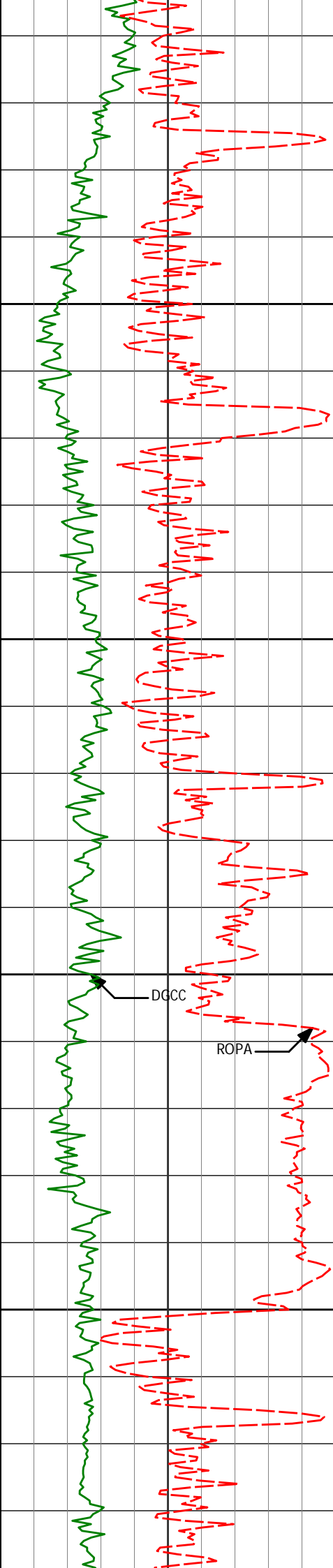
1.36°

7399.27'

3182.34'

DGCC

BOPA



10700

10750

10800

10850

10676'

92.85°

1.31°

7394.70'

3277.21'

10771'

93.40°

1.00°

7389.52'

3372.06'

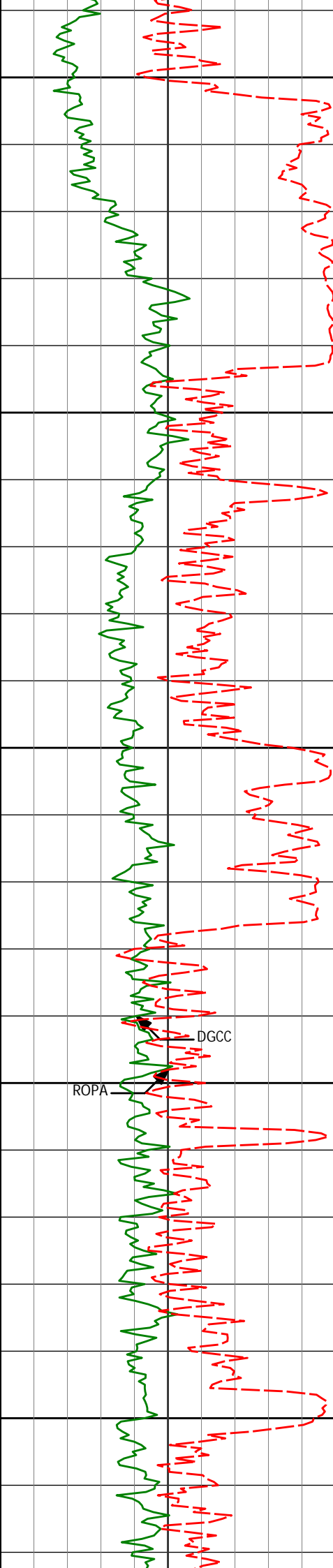
10867'

94.14°

1.22°

7383.21'

3467.84'



10900

10950

11000

11050

11100

10962'

92.04°

359.74°

7378.09'

3562.70'

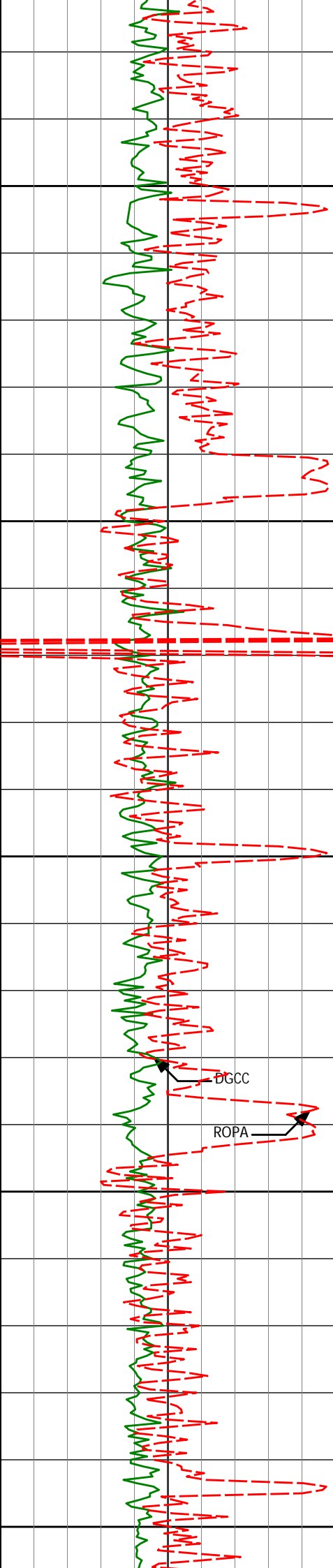
11057'

90.80°

358.80°

7375.74'

3657.65'



11150

11153'

91.05°

358.31°

7374.19'

3753.59'

11200

11250

11249'

90.56°

357.23°

7372.84'

3849.49'

11300

11350

11344'

89.57°

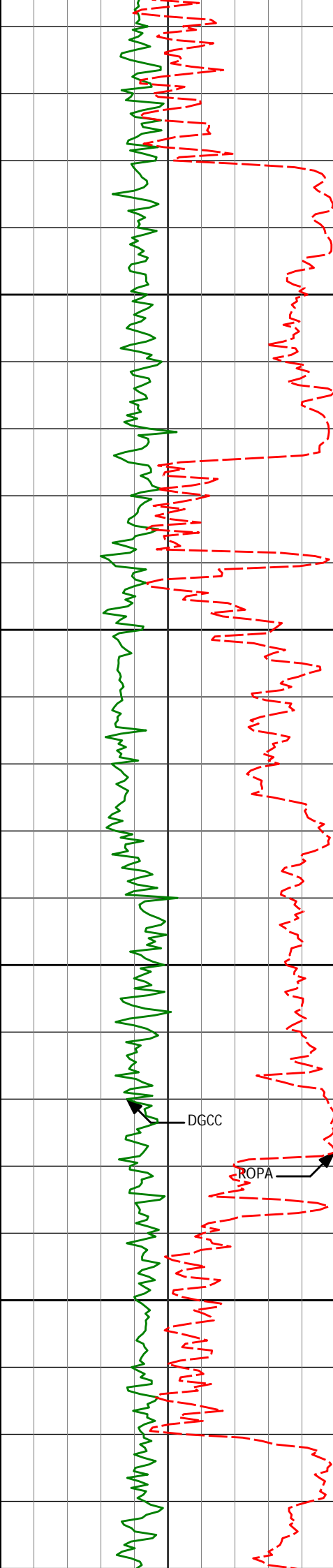
355.70°

7372.73'

3944.27'

DGCC

ROPA



11400

11450

11500

11550

DGCC

ROPA

11439'

90.43°

357.49°

7372.73'

4039.06'

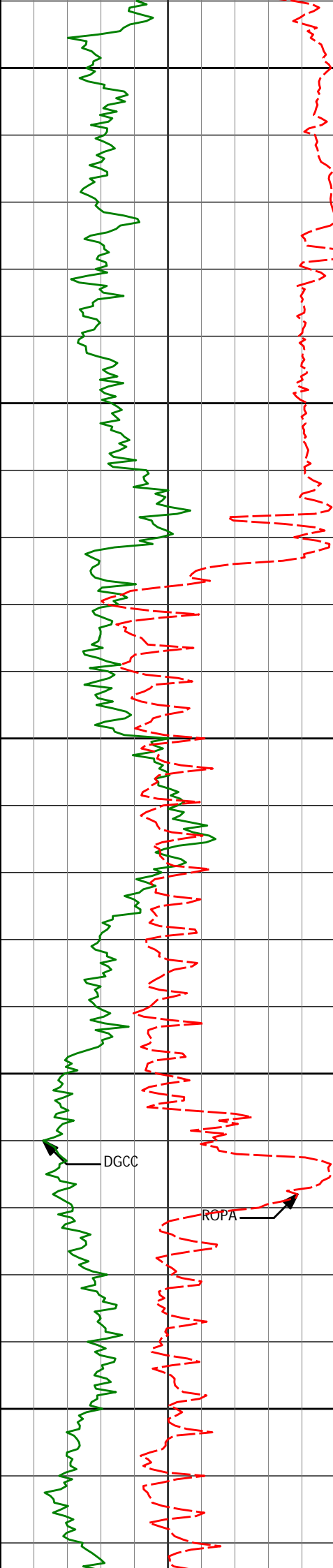
11534'

90.19°

359.65°

7372.22'

4134.01'



11600

11630'

91.24°

358.49°

7371.02'

4229.98'

11650

11700

11727'

91.85°

358.21°

7368.40'

4326.89'

11750

11800

11822'

92.53°

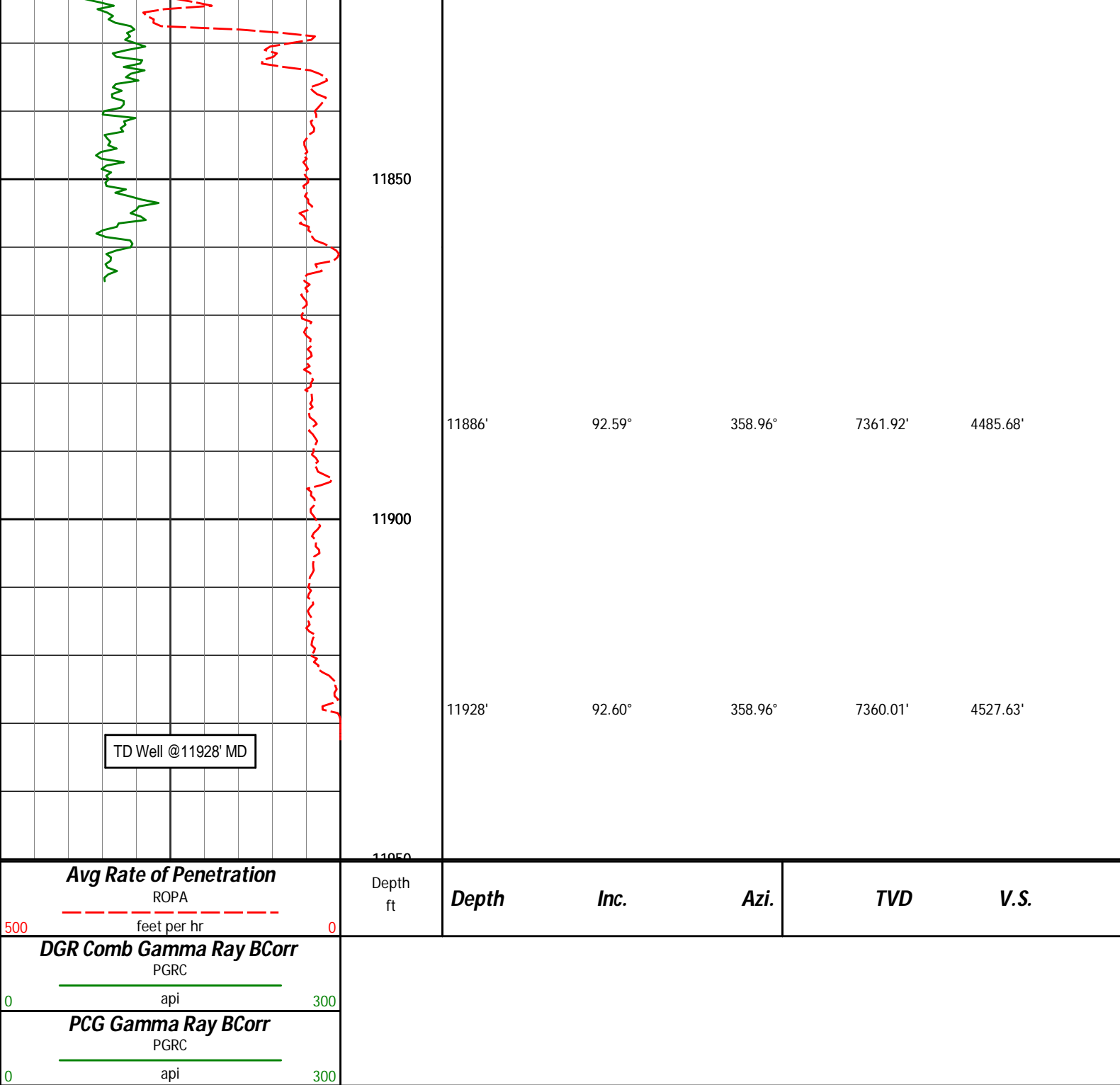
358.71°

7364.77'

4421.77'

DGCC

ROPA



HALLIBURTON

DIRECTIONAL SURVEY REPORT

Anadarko Petroleum Corp
Gobbler 2N-23Hz
Wattenberg
Weld Colorado
USA
CA-XX-0900275970

Measured Depth (feet)	Inclination (degrees)	Direction (degrees)	Vertical Depth (feet)	Latitude (feet)	Departure (feet)	Vertical Section (feet)	Dogleg (deg/100ft)
1001.00	0.18	10.66	1000.99	2.88 N	0.67 E	2.88	TIE-IN
1250.00	0.13	343.36	1249.99	3.54 N	0.66 E	3.54	0.04
1526.00	0.39	311.22	1525.99	4.45 N	0.13 W	4.45	0.10
1802.00	0.59	311.13	1801.98	6.01 N	1.91 W	6.00	0.07
2085.00	1.46	286.82	2084.93	8.01 N	6.46 W	7.97	0.34
2372.00	1.62	322.22	2371.83	12.27 N	12.45 W	12.21	0.33
2467.00	2.26	306.36	2466.78	14.45 N	14.78 W	14.37	0.87

2487.00	2.20	268.36	2488.78	14.43 N	14.78 W	14.37	0.87
2562.00	2.38	279.69	2561.70	15.89 N	18.23 W	15.79	1.13
2658.00	3.09	263.48	2657.59	15.93 N	22.77 W	15.81	1.09
2753.00	4.10	261.28	2752.41	15.12 N	28.67 W	14.97	1.07
2849.00	4.55	245.89	2848.14	13.05 N	35.53 W	12.86	1.29
2944.00	5.86	236.84	2942.74	8.86 N	43.03 W	8.62	1.62
3040.00	6.54	241.63	3038.18	3.58 N	51.95 W	3.30	0.89
3135.00	8.91	239.90	3132.31	2.68 S	63.07 W	-3.02	2.51
3230.00	9.27	242.57	3226.12	9.90 S	76.23 W	-10.31	0.58
3326.00	8.80	233.47	3320.93	17.83 S	88.99 W	-18.31	1.57
3421.00	7.85	235.56	3414.93	25.83 S	100.18 W	-26.37	1.05
3517.00	7.04	239.70	3510.12	32.50 S	110.67 W	-33.10	1.01
3613.00	6.93	235.03	3605.41	38.79 S	120.50 W	-39.44	0.60
3709.00	7.79	231.05	3700.62	46.20 S	130.30 W	-46.90	1.04
3805.00	7.68	231.78	3795.75	54.26 S	140.40 W	-55.02	0.15
3901.00	7.89	236.17	3890.86	61.89 S	150.91 W	-62.71	0.66
3996.00	8.98	235.85	3984.83	69.69 S	162.47 W	-70.57	1.15
4092.00	8.20	236.72	4079.76	77.65 S	174.39 W	-78.59	0.82
4187.00	8.53	231.75	4173.75	85.73 S	185.59 W	-86.73	0.84
4282.00	8.53	231.35	4267.69	94.49 S	196.62 W	-95.55	0.06
4378.00	9.21	232.70	4362.55	103.59 S	208.30 W	-104.72	0.74
4474.00	7.06	220.84	4457.58	112.71 S	218.27 W	-113.89	2.83
4569.00	6.22	219.81	4551.94	121.08 S	225.38 W	-122.30	0.89
4665.00	5.61	222.15	4647.43	128.56 S	231.86 W	-129.81	0.68
4760.00	5.75	225.92	4741.97	135.31 S	238.39 W	-136.60	0.42
4856.00	5.76	233.24	4837.48	141.54 S	245.71 W	-142.87	0.76
4951.00	6.58	216.09	4931.94	148.79 S	252.73 W	-150.16	2.11
5047.00	4.54	209.91	5027.48	156.53 S	257.87 W	-157.92	2.21
5142.00	4.12	195.24	5122.22	163.08 S	260.64 W	-164.49	1.24
5238.00	2.46	191.49	5218.05	168.43 S	261.96 W	-169.85	1.74
5333.00	0.50	189.92	5313.02	170.84 S	262.44 W	-172.25	2.06
5429.00	1.18	23.92	5409.01	170.35 S	262.11 W	-171.76	1.74
5715.00	0.94	4.44	5694.96	165.32 S	260.73 W	-166.72	0.15
6097.00	0.84	34.41	6076.92	159.88 S	258.91 W	-161.28	0.12
6480.00	0.82	42.07	6459.88	155.53 S	255.48 W	-156.91	0.03
6823.00	1.27	340.90	6802.83	150.12 S	255.08 W	-151.49	0.33
6861.00	1.26	357.31	6840.82	149.30 S	255.24 W	-150.68	0.95
6909.00	3.54	41.53	6888.78	147.66 S	254.28 W	-149.04	5.79
6956.00	6.68	12.03	6935.60	143.90 S	252.75 W	-145.27	8.50
7004.00	9.68	19.35	6983.10	137.36 S	250.83 W	-138.72	6.60
7052.00	13.42	16.15	7030.12	128.20 S	247.94 W	-129.54	7.90
7148.00	19.47	9.31	7122.16	101.69 S	242.25 W	-103.00	6.61
7195.00	23.54	11.86	7165.88	84.76 S	239.05 W	-86.06	8.88
7243.00	28.98	15.62	7208.91	64.17 S	233.95 W	-65.43	11.85
7291.00	35.27	17.74	7249.55	39.74 S	226.59 W	-40.97	13.31
7338.00	41.19	17.11	7286.45	12.00 S	217.89 W	-13.18	12.62
7386.00	47.85	14.11	7320.66	20.40 N	208.89 W	19.27	14.55
7434.00	53.46	9.60	7351.09	56.71 N	201.33 W	55.62	13.76
7482.00	60.91	7.40	7377.08	96.58 N	195.40 W	95.52	15.99
7530.00	67.37	6.91	7398.01	139.41 N	190.03 W	138.38	13.49
7579.00	75.49	6.19	7413.60	185.52 N	184.74 W	184.52	16.63
7625.00	82.66	5.16	7422.31	230.44 N	180.29 W	229.46	15.74
7642.00	84.35	3.44	7424.24	247.28 N	179.02 W	246.31	14.14
7683.00	89.20	0.15	7426.54	288.18 N	177.74 W	287.21	14.29
7714.00	90.62	359.99	7426.59	319.17 N	177.70 W	318.21	4.61
7809.00	88.58	358.77	7427.25	414.16 N	178.73 W	413.19	2.50
7905.00	86.91	358.38	7431.03	510.05 N	181.12 W	509.06	1.79
8000.00	91.73	357.19	7432.16	604.94 N	184.79 W	603.94	5.23
8096.00	89.51	358.97	7431.12	700.88 N	188.00 W	699.85	2.96
8288.00	89.44	358.21	7432.88	892.81 N	192.73 W	891.75	0.40
8384.00	88.39	357.52	7434.70	988.72 N	196.30 W	987.65	1.31
8480.00	89.38	358.19	7436.57	1084.63 N	199.90 W	1083.54	1.25
8576.00	90.86	358.67	7436.36	1180.60 N	202.53 W	1179.48	1.62
8671.00	90.06	357.04	7435.60	1275.52 N	206.08 W	1274.39	1.91
8766.00	89.63	354.26	7435.86	1370.24 N	213.29 W	1369.06	2.96
8862.00	90.06	355.20	7436.12	1465.83 N	222.10 W	1464.61	1.08
8958.00	90.06	357.58	7436.02	1561.63 N	228.15 W	1560.38	2.48
9053.00	92.04	1.03	7434.28	1656.59 N	229.30 W	1655.33	4.19
9148.00	91.42	359.85	7431.41	1751.54 N	228.57 W	1750.28	1.40
9244.00	91.67	359.38	7428.82	1847.51 N	229.22 W	1846.24	0.55
9339.00	90.62	0.80	7426.92	1942.48 N	229.07 W	1941.22	1.86
9435.00	89.57	359.83	7426.76	2038.48 N	228.54 W	2037.21	1.49
9530.00	89.81	1.53	7427.28	2133.47 N	227.41 W	2132.21	1.81
9626.00	91.67	2.77	7426.04	2229.39 N	223.81 W	2228.14	2.33
9722.00	91.42	3.12	7423.45	2325.22 N	218.88 W	2324.01	0.45
9817.00	90.49	1.85	7421.87	2420.12 N	214.76 W	2418.92	1.66
9912.00	91.91	2.33	7419.88	2515.03 N	211.30 W	2513.85	1.58
10008.00	90.99	1.22	7417.45	2610.95 N	208.33 W	2609.79	1.50
10104.00	91.98	2.96	7414.96	2706.85 N	204.83 W	2705.70	2.08
10199.00	91.24	1.42	7412.29	2801.74 N	201.20 W	2800.61	1.80

10199.00	91.24	1.42	7412.29	2881.74 N	281.28 W	2888.81	1.88
10294.00	92.22	1.25	7409.42	2896.67 N	198.99 W	2895.55	1.05
10389.00	91.60	1.14	7406.26	2991.60 N	197.01 W	2990.49	0.66
10485.00	92.04	0.98	7403.21	3087.53 N	195.23 W	3086.43	0.49
10581.00	92.66	1.36	7399.27	3183.43 N	193.27 W	3182.34	0.76
10676.00	92.85	1.31	7394.70	3278.29 N	191.06 W	3277.21	0.21
10771.00	93.40	1.00	7389.52	3373.13 N	189.15 W	3372.06	0.66
10867.00	94.14	1.22	7383.21	3468.91 N	187.29 W	3467.84	0.80
10962.00	92.04	359.74	7378.09	3563.76 N	186.50 W	3562.70	2.70
11057.00	90.80	358.80	7375.74	3658.72 N	187.71 W	3657.65	1.64
11153.00	91.05	358.31	7374.19	3754.67 N	190.13 W	3753.59	0.57
11249.00	90.56	357.23	7372.84	3850.59 N	193.87 W	3849.49	1.24
11344.00	89.57	355.70	7372.73	3945.41 N	199.72 W	3944.27	1.92
11439.00	90.43	357.49	7372.73	4040.23 N	205.37 W	4039.06	2.09
11534.00	90.19	359.65	7372.22	4135.20 N	207.74 W	4134.01	2.29
11630.00	91.24	358.49	7371.02	4231.17 N	209.30 W	4229.98	1.63
11727.00	91.85	358.21	7368.40	4328.10 N	212.09 W	4326.89	0.69
11822.00	92.53	358.71	7364.77	4422.99 N	214.64 W	4421.77	0.89
11886.00	92.59	358.96	7361.92	4486.92 N	215.94 W	4485.68	0.40
11928.00	92.60	358.96	7360.01	4528.87 N	216.70 W	4527.63	0.02

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 0.31 DEGREES (TRUE)
A TOTAL CORRECTION OF 8.63 DEG FROM MAGNETIC NORTH TO TRUE NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 11928.00 FEET
IS 4534.05 FEET ALONG 357.26 DEGREES (TRUE)**

**All surveys are magnetic In-Field-Referencing (IFR) corrected.
Final survey is a projection to TD.**