

Country	: USA
Field	: Wattenberg
Location	: Lat: 40° 26' 40.38" North Long: 104° 23' 38.76" West
Well	: Wells Ranch AA35-66-1AHNC
Company	: Noble Energy
Rig	: H&P 322
LOCATION	<div>Company : Noble Energy</div> <div>Rig : H&P 322</div> <div>Well : Wells Ranch AA35-66-1AHNC</div> <div>Field : Wattenberg</div> <div>Country : USA</div> <div>API Number : 05-123-38660</div>
UTM Easting = 3307794.219 ft UTM Northing = 1406709.236 ft	Other Services Directional Drilling

WELL INFORMATION

MWD Run Number	100	200			
Date run completed	20-Mar-14	21-Mar-14			
Rig Bit Number	2	3			
Bit Size (in)	8.750	8.750			
Tool Nominal OD (in)	6.750	6.750			
Log Start Depth (TVD, ft)	669.99	5,979.65			
Log End Depth (TVD, ft)	5,979.65	6,645.92			
Drill or Wipe	Drill	Drill			
Drill/Wipe Start Date and Time	20-Mar-14 05:05	21-Mar-14 01:54			
Drill/Wipe End Date and Time	20-Mar-14 17:27	21-Mar-14 10:15			
Min Inc (deg) @ Depth (TVD, ft)	0.15 @ 5,256.67	0.79 @ 5,971.66			
Max Inc (deg) @ Depth (TVD, ft)	9.65 @ 2,225.42	81.93 @ 6,641.31			
Bit TFA(in2) / Bit Type	0.91 / PDC	0.98 / PDC			
Flow Rate (gpm)	596.00	587.00			
Max AV (fpm) / CV (fpm) @ MWD	356.1 / 356.1	356.1 / 356.1			
Fluid Type	Fresh Water Gel	Fresh Water Gel			
Density (ppg) / Viscosity (spqt)	8.80 / 28.00	10.50 / 36.50			
Filtrate CL (ppm)	2,000.00	2,100.00			
pH / Fluid Loss (mptm)	8.70 / N/A	10.00 / N/A			
PV (cP) / YP (lbf2)	1 / 3.50	9 / 9.00			
% Solids / % Sand	3.9 / .25	9.7 / .5			
% Oil / Oil:Water Ratio	N/A / N/A	N/A / N/A			
Rm @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A			
Rmf @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A			
Rmc @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A			
Max Tool Temp (in F) / S	122.00 / PCM	122.00 / PCM			

Max Tool Temp (degF) / Source	160.83 / PCM	160.83 / PCM			
Rm @ Max Tool Temp (degF)	N/A @ N/A	N/A @ N/A			
Lead MWD Engineer	Robert Ley	Robert Ley			
Customer Representative	Charles Collver	Charles Collver			

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM			
Software Version	5.84	5.84			
Sub Serial Number	11404289	11404289			
Insert Serial Number	11620293	11620293			
Date and Time Initialized	19-Mar-14 19:27	19-Mar-14 19:27			
Date and Time Read	21-Mar-14 16:35	21-Mar-14 16:17			
ECMB SW Version	N/A	N/A			

Directional Sensor Information

Tool Type	PCDC	PCDC			
Distance From Bit (ft)	59.00	56.00			
Software Version	6.21	6.21			
Sub Serial Number	11404289	11404289			
Sonde Serial Number	11168934	11168934			
Sensor ID Number	N/A	N/A			
Toolface Offset (deg)	55.26	213.16			

Gamma Ray Sensor Information

Tool Type	PCG	PCG			
Distance From Bit (ft)	52.03	49.36			
Recorded Sample Period (sec)	10	10			
Software Version	8.15	8.15			
Sub Serial Number	11404289	11404289			
Insert/Sonde Serial Number	11120594	11120594			

REMARKS

1. All depths are true vertical depths and are calibrated to the driller' pipe tally and are measured from the 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.
4. The Following smoothing parameters have been applied to the data"

PGXR (Gamma Ray CG):

Interval Resolution: 0.5 feet

Coercion Distance: 0.6 feet

Gap Fill: 3.0 feet

ROPA (Rate of Penetration):

Interval Resolution: 0.5 feet

Coercion Distance: 1.2 feet

WARRANTY

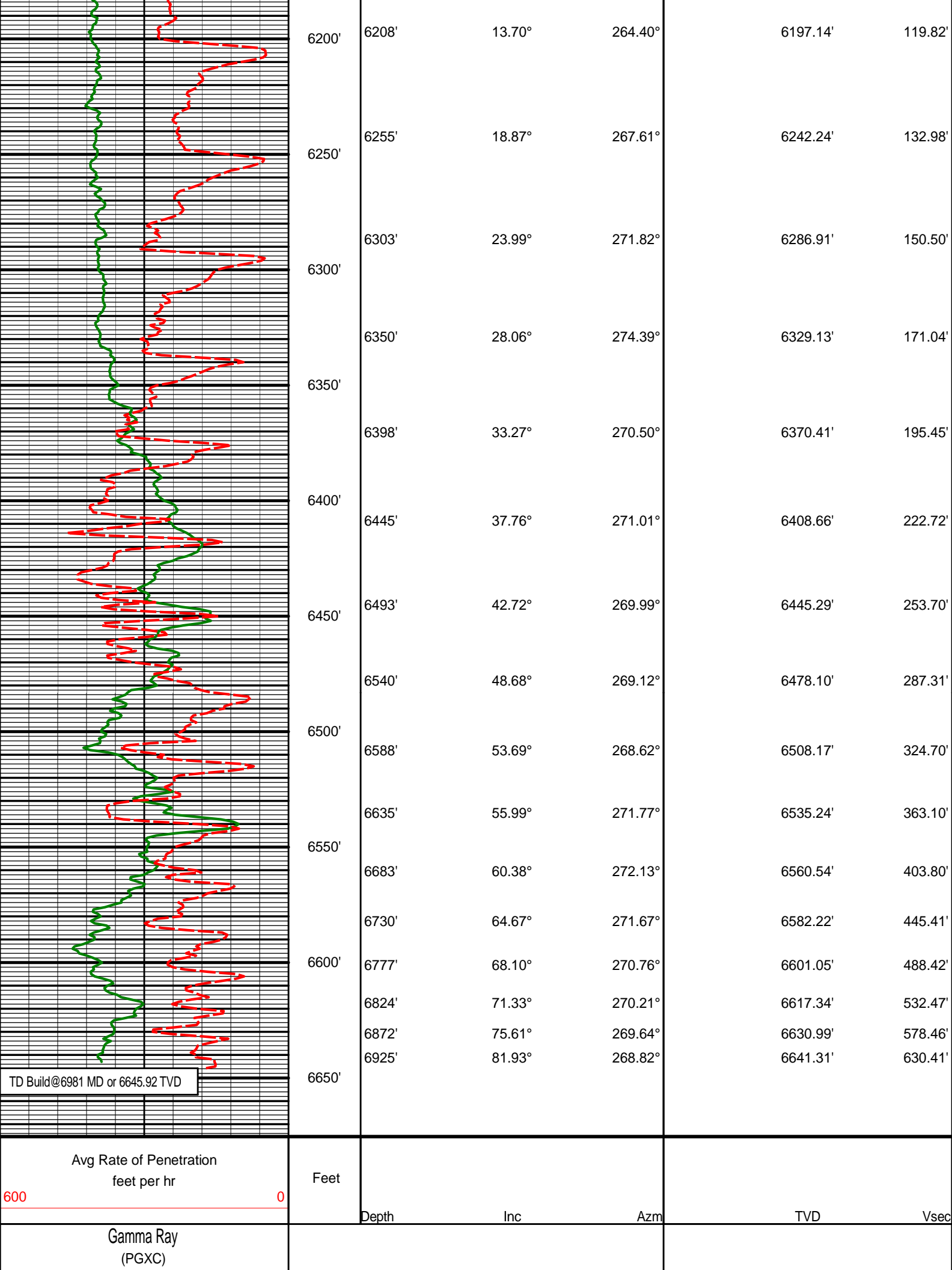
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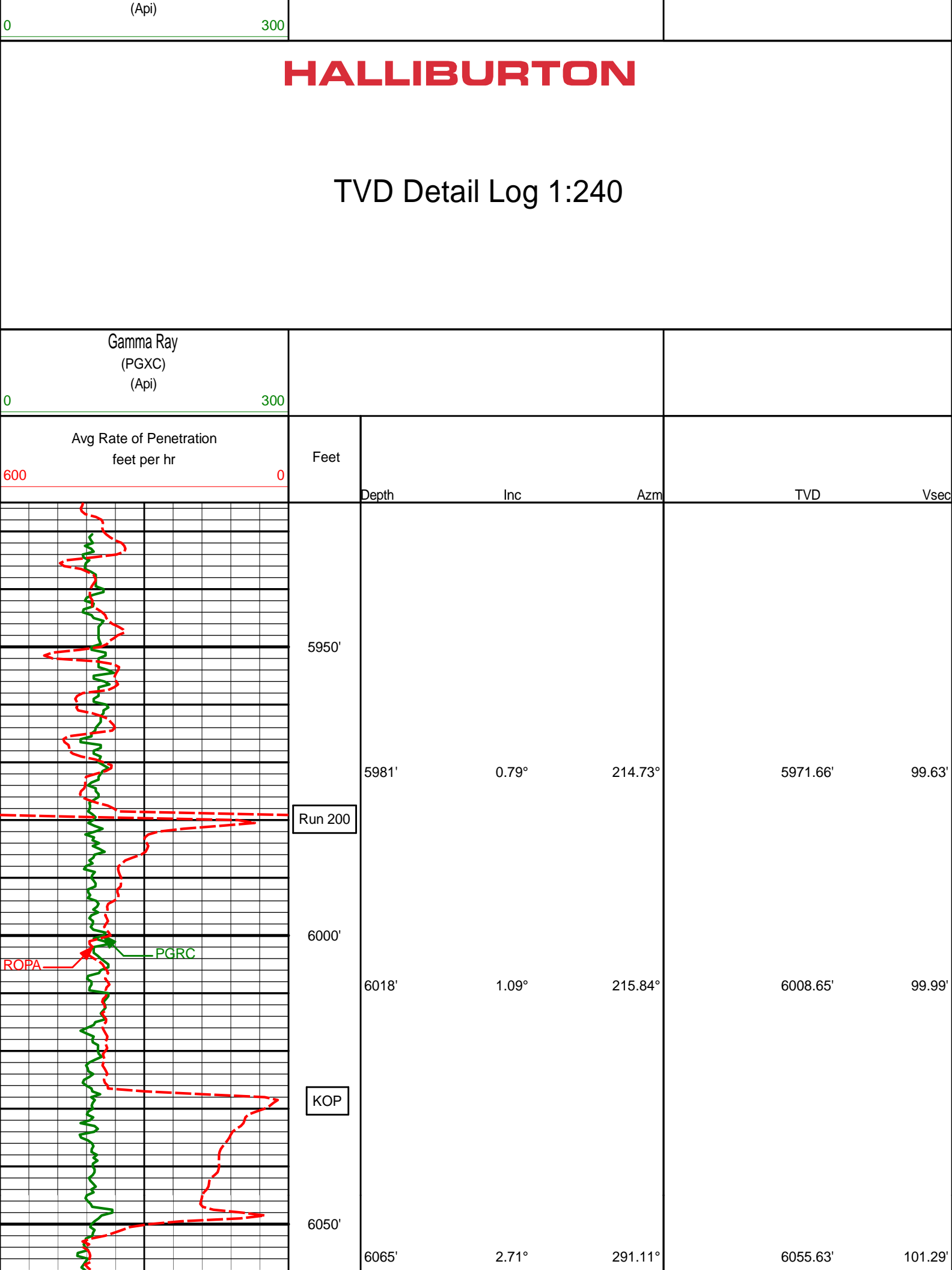
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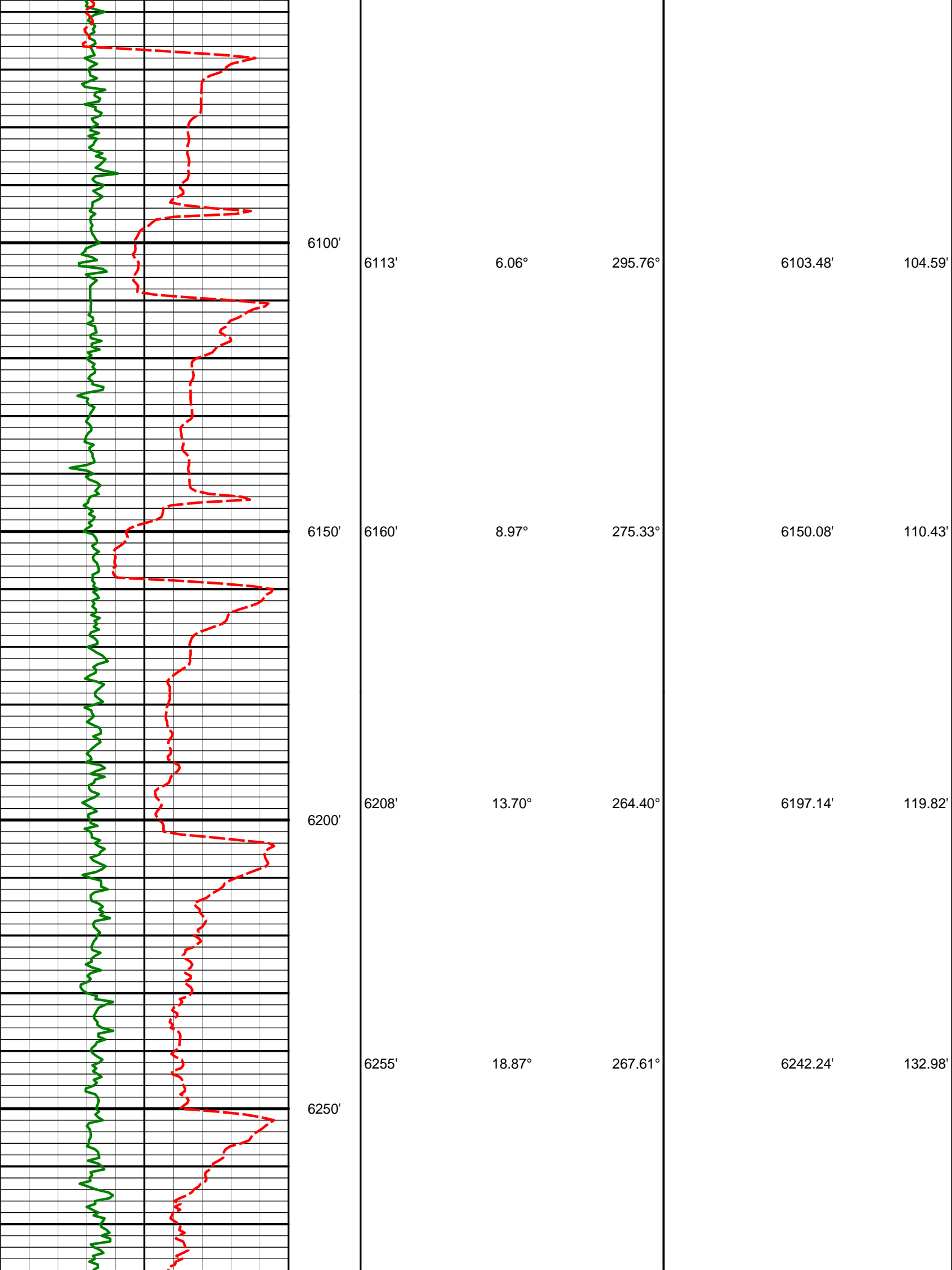
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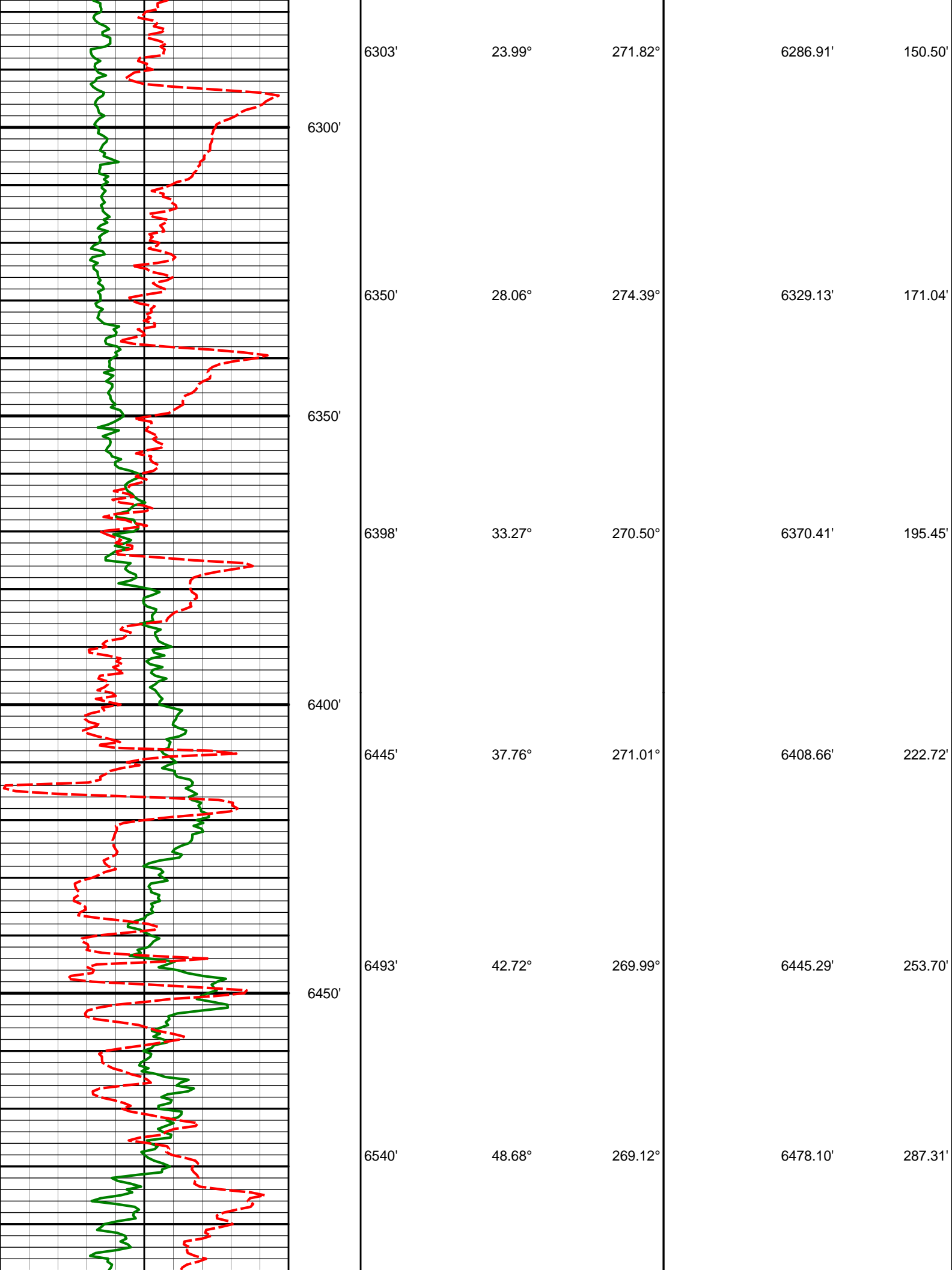
TVD Detail Log 1:600

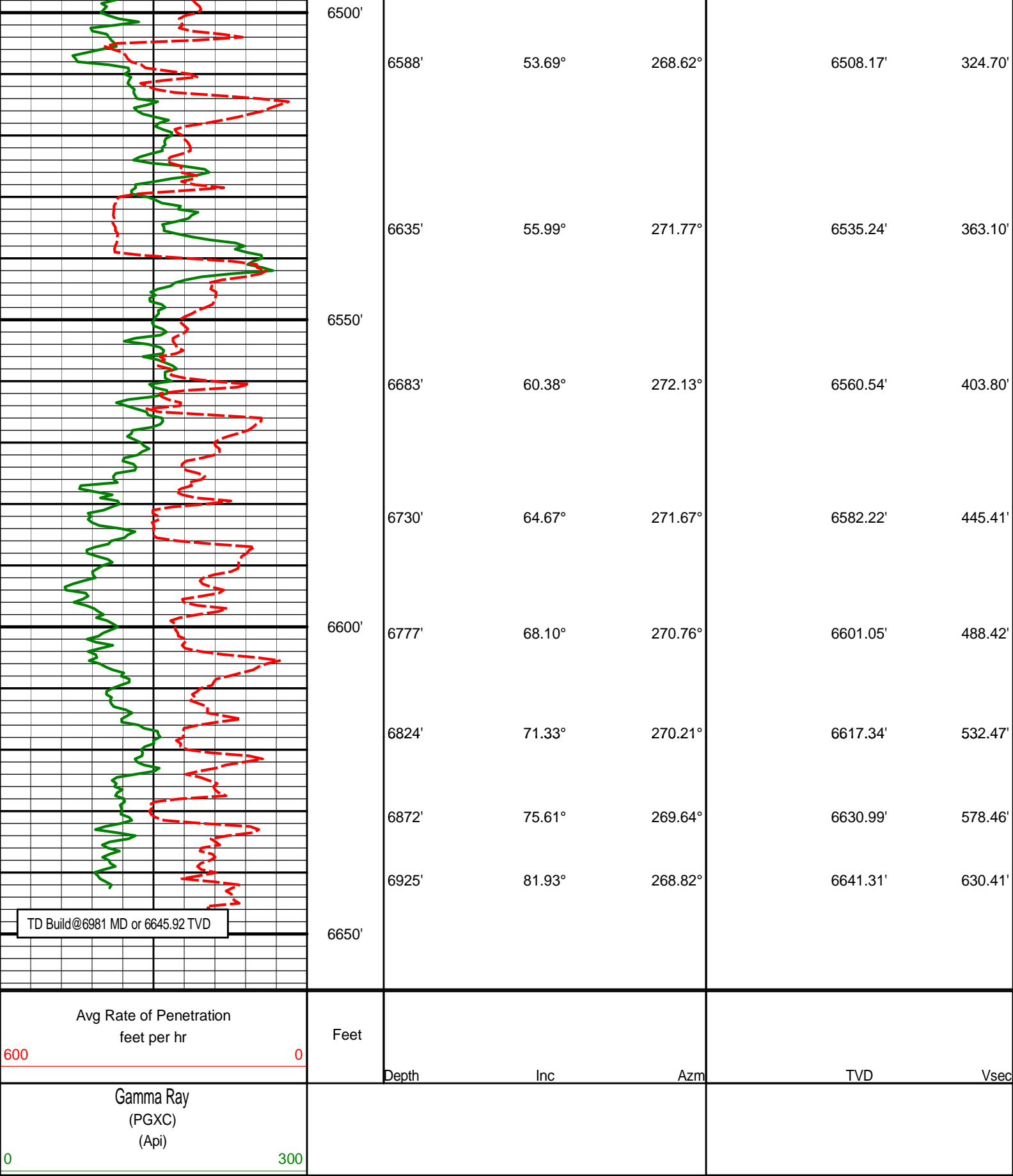
Gamma Ray (PGXC) (Api)						
0300						
Avg Rate of Penetration feet per hr		Feet				
6000						
			Depth	Inc	Azm	TVDVsec
			5930'	0.46°	225.53°	5920.66'99.27'
		5950'				
		5981'	0.79°	214.73°	5971.66'	99.63'
		Run 200				
		6000'	6018'	1.09°	215.84°	6008.65'99.99'
		KOP				
		6050'	6065'	2.71°	291.11°	6055.63'101.29'
		6100'	6113'	6.06°	295.76°	6103.48'104.59'
		6150'	6160'	8.97°	275.33°	6150.08'110.43'











DIRECTIONAL SURVEY REPORT

Noble Energy
Wells Ranch AA35-66-1AHNC
Wattenberg
Weld Colorado
USA

0.00	0.00	0.00	0.00	0.00 N	0.00 E	0.00	TIE-IN
302.00	0.60	110.82	301.99	0.56 S	1.48 E	-1.46	0.20
645.00	0.50	239.02	644.99	1.97 S	1.87 E	-1.82	0.29
729.00	0.59	233.76	728.98	2.42 S	1.21 E	-1.14	0.12
822.00	0.31	229.08	821.98	2.86 S	0.63 E	-0.56	0.30
915.00	0.46	171.38	914.98	3.40 S	0.50 E	-0.41	0.42
1008.00	0.66	211.04	1007.97	4.22 S	0.28 E	-0.16	0.46
1101.00	0.81	226.86	1100.97	5.13 S	0.48 W	0.62	0.27
1194.00	0.80	199.83	1193.96	6.19 S	1.18 W	1.34	0.40
1287.00	0.90	214.65	1286.95	7.41 S	1.81 W	2.01	0.26
1380.00	1.14	212.23	1379.93	8.79 S	2.72 W	2.96	0.26
1473.00	1.04	212.61	1472.92	10.28 S	3.67 W	3.95	0.11
1568.00	3.73	224.54	1567.83	13.21 S	6.30 W	6.66	2.86
1663.00	5.82	229.86	1662.49	18.52 S	12.15 W	12.65	2.25
1758.00	6.84	233.65	1756.91	24.98 S	20.39 W	21.06	1.16
1852.00	7.60	218.76	1850.17	33.14 S	28.79 W	29.68	2.14
1947.00	8.21	226.36	1944.27	42.72 S	37.63 W	38.78	1.27
2042.00	7.74	219.52	2038.36	52.34 S	46.61 W	48.02	1.11
2137.00	7.68	217.68	2132.50	62.30 S	54.56 W	56.24	0.27
2231.00	9.65	227.38	2225.42	72.61 S	64.20 W	66.16	2.60
2326.00	7.10	229.43	2319.40	81.82 S	74.52 W	76.72	2.70
2421.00	7.63	231.94	2413.62	89.52 S	83.95 W	86.35	0.65
2516.00	6.34	239.93	2507.92	96.04 S	93.45 W	96.03	1.70
2610.00	4.39	238.75	2601.50	100.51 S	101.02 W	103.72	2.08
2705.00	3.97	231.34	2696.25	104.45 S	106.70 W	109.50	0.72
2800.00	3.51	237.27	2791.04	108.08 S	111.71 W	114.61	0.63
2895.00	1.38	243.35	2885.95	110.16 S	115.18 W	118.14	2.26
2990.00	1.04	12.52	2980.94	109.83 S	116.02 W	118.97	2.31
3085.00	0.47	111.81	3075.94	109.14 S	115.47 W	118.40	1.27
3180.00	0.88	143.53	3170.93	109.87 S	114.67 W	117.62	0.57
3274.00	1.47	115.52	3264.91	110.97 S	113.16 W	116.14	0.86
3369.00	1.87	104.07	3359.87	111.87 S	110.55 W	113.56	0.55
3464.00	0.91	83.84	3454.84	112.17 S	108.30 W	111.31	1.12
3558.00	0.20	178.01	3548.84	112.25 S	107.55 W	110.57	1.01
3653.00	0.59	157.30	3643.84	112.87 S	107.36 W	110.39	0.43
3748.00	0.68	202.88	3738.83	113.84 S	107.39 W	110.45	0.53
3843.00	0.79	188.82	3833.82	115.00 S	107.71 W	110.80	0.22
3938.00	0.88	199.83	3928.81	116.34 S	108.06 W	111.18	0.19
4127.00	0.29	135.60	4117.80	118.04 S	108.21 W	111.39	0.42
4223.00	0.31	23.04	4213.80	117.98 S	107.94 W	111.11	0.52
4318.00	1.26	9.16	4308.79	116.71 S	107.67 W	110.81	1.01
4413.00	1.26	37.36	4403.77	114.85 S	106.87 W	109.96	0.65
4603.00	0.73	83.64	4593.74	113.05 S	104.40 W	107.44	0.48
4697.00	0.68	147.74	4687.74	113.46 S	103.51 W	106.56	0.80
4792.00	0.80	113.07	4782.73	114.20 S	102.60 W	105.67	0.48
4886.00	1.46	76.99	4876.71	114.18 S	100.83 W	103.90	1.00</

6540.00	48.68	269.12	6478.10	107.83 S	284.48 W	287.31	12.75
6588.00	53.69	268.62	6508.17	108.57 S	321.86 W	324.70	10.47
6635.00	55.99	271.77	6535.24	108.43 S	360.28 W	363.10	7.35
6683.00	60.38	272.13	6560.54	107.04 S	401.03 W	403.80	9.17
6730.00	64.67	271.67	6582.22	105.66 S	442.70 W	445.41	9.17
6777.00	68.10	270.76	6601.05	104.75 S	485.75 W	488.42	7.51
6824.00	71.33	270.21	6617.34	104.38 S	529.82 W	532.47	6.96
6872.00	75.61	269.64	6630.99	104.44 S	575.83 W	578.46	8.99
6925.00	81.93	268.82	6641.31	105.15 S	627.78 W	630.41	12.02

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 268.44 DEGREES (GRID)
A TOTAL CORRECTION OF 7.62 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 6925.00 FEET
IS 636.53 FEET ALONG 260.49 DEGREES (GRID)**

Tie-In @ Surface

Surveys at 302 ft and 645 ft were taken and provided by HP 322 while they were drilling the surface hole and have been converted from magnetic north to grid north.

Date Printed:22 March 2014