

Natural Gamma Ray  
Rate Of Penetration



1 : 600

County : Harper		Field : Wildcat	
Location : Lat: 37° 10' 2.82" North Long: 98° 3' 21.10" West		Well : Lockwood Farms 3307 14-1H	
Company : Shell Exploration Production Co		Rig : Nabors 102	
Company : Shell Exploration Production Co Rig : Nabors 102 Well : Lockwood Farms 3307 14-1H Field : Wildcat County : Harper API Number : 15-077-21772		LOCATION Latitude : 37° 10' 2.82" North Longitude : 98° 3' 21.10" West UTM Easting = 2,129,423.39 ft UTM Northing = 182,652.64 ft	
Permanent Datum : Ground Level Log Measured From : Drill Floor Drilling Measured From : Drill Floor		Elevation : 1350.40 ft 31.70 ft Above Permanent Datum <b>MD LOG</b>	
Depth Logged : 90.00 ft To 9,450.00 ft Date Logged : 01-Feb-12 To 20-Mar-12 Total Depth MD : 9,450.00 ft TVD : 4,725.55 ft Spud Date : 01-Feb-12		Unit No. : PP46 Job No. : OK-XX-0009199477 Plot Type : Final Plot Date : 11-Apr-12	
Run No. : 1 Size : 12.250 in From : 90.00 ft To : 721.00 ft		Borehole Record (MD) Run No. : 1 Size : 12.250 in From : 90.00 ft To : 721.00 ft	
Run No. : 2 Size : 8.750 in From : 721.00 ft To : 4,364.00 ft		Borehole Record (MD) Run No. : 2 Size : 8.750 in From : 721.00 ft To : 4,364.00 ft	
Run No. : 3 Size : 8.750 in From : 4,364.00 ft To : 5,250.00 ft		Borehole Record (MD) Run No. : 3 Size : 8.750 in From : 4,364.00 ft To : 5,250.00 ft	
Run No. : 4 Size : 6.125 in From : 5,250.00 ft To : 6,893.00 ft		Borehole Record (MD) Run No. : 4 Size : 6.125 in From : 5,250.00 ft To : 6,893.00 ft	
Run No. : 5 Size : 6.125 in From : 6,893.00 ft To : 9,450.00 ft		Borehole Record (MD) Run No. : 5 Size : 6.125 in From : 6,893.00 ft To : 9,450.00 ft	

WELL INFORMATION

MWD Run Number	200	300	400	500
Date run completed	09-Mar-12	12-Mar-12	17-Mar-12	20-Mar-12
Rig Bit Number	2	3	4	5
Bit Size (in)	8.750	8.750	6.125	6.125
Tool Nominal OD (in)	6.750	6.750	4.750	4.750
Log Start Depth (MD, ft)	721.00	4,364.00	5,250.00	6,893.00
Log End Depth (MD, ft)	4,364.00	5,250.00	6,893.00	9,450.00
Drill or Wipe	Drill	Drill	Drill	Drill
Drill/Wipe Start Date and Time	06-Mar-12 17:30	10-Mar-12 06:00	15-Mar-12 23:00	18-Mar-12 03:20
Drill/Wipe End Date and Time	09-Mar-12 15:00	11-Mar-12 19:30	17-Mar-12 14:00	20-Mar-12 10:30
Min Inc (deg) @ Depth (MD, ft)	.03 @ 3,588.00	46.70 @ 4,390.00	86.79 @ 6,432.00	86.02 @ 7,392.00
Max Inc (deg) @ Depth (MD, ft)	38.54 @ 4,302.00	90.49 @ 5,193.00	91.11 @ 6,815.00	88.28 @ 6,911.00
Bit TFA(in2) / Bit Type	.56 / PDC	.46 / PDC	.38 / PDC	0 / PDC
Flow Rate (gpm)	500.00	550.00	250.00	250.00
Max AV (fpm) / CV (fpm) @ MWD	35.0 / 57.0	59.0 / 120.0	123.0 / 132.0	90.0 / 220.0
Fluid Type	Fresh Water Gel	Fresh Water Gel	Fresh Water Gel	Fresh Water Gel
Density (ppg) / Viscosity (spqt)	8.85 / 32.00	9.10 / 47.00	8.60 / 32.00	8.50 / 52.00
Filtrate CL (ppm)	600.00	1,300.00	600.00	440.00
pH / Fluid Loss (mptm)	8.50 / 1	10.00 / 68	8.60 / 1	8.50 / 1
PV (cP) / YP (Ihf2)	3 / 1.00	16 / 15.00	3 / 1.00	6 / 6.00
% Solids / % Sand	1.20 / 0.50	4.80 / 0.50	1.20 / 0.50	1.20 / 0.50
% 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	107.00 / PCM	150.00 / PCM	137.50 / PCM	139.96 / 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	RJ Pike	RJ Pike	RJ Pike	RJ Pike
Customer Representative	Josh Kirk	Josh Kirk	Josh Kirk	Josh Kirk

# SENSOR INFORMATION

## Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC	PCDC	
Distance From Bit (ft)	57.96	51.26	59.17	59.17	
Software Version	6.21	6.21	6.21	6.21	
Sub Serial Number	11254964	11254964	11595279	11595279	
Sonde Serial Number	400830	11638596	400880	400880	
Sensor ID Number	N/A	N/A	N/A	N/A	
Toolface Offset (deg)	277.45	192.28	234.94	144.89	

## Gamma Ray Sensor Information

Tool Type	PCG	PCG	PCG	PCG	
Distance From Bit (ft)	63.46	57.48	52.95	52.95	
Recorded Sample Period (sec)	25	25	25	25	
Software Version	8.15	8.15	8.15	8.15	
Sub Serial Number	11254964	11254964	11595279	11595279	
Insert/Sonde Serial Number	11293350	11293350	11680935	11680935	

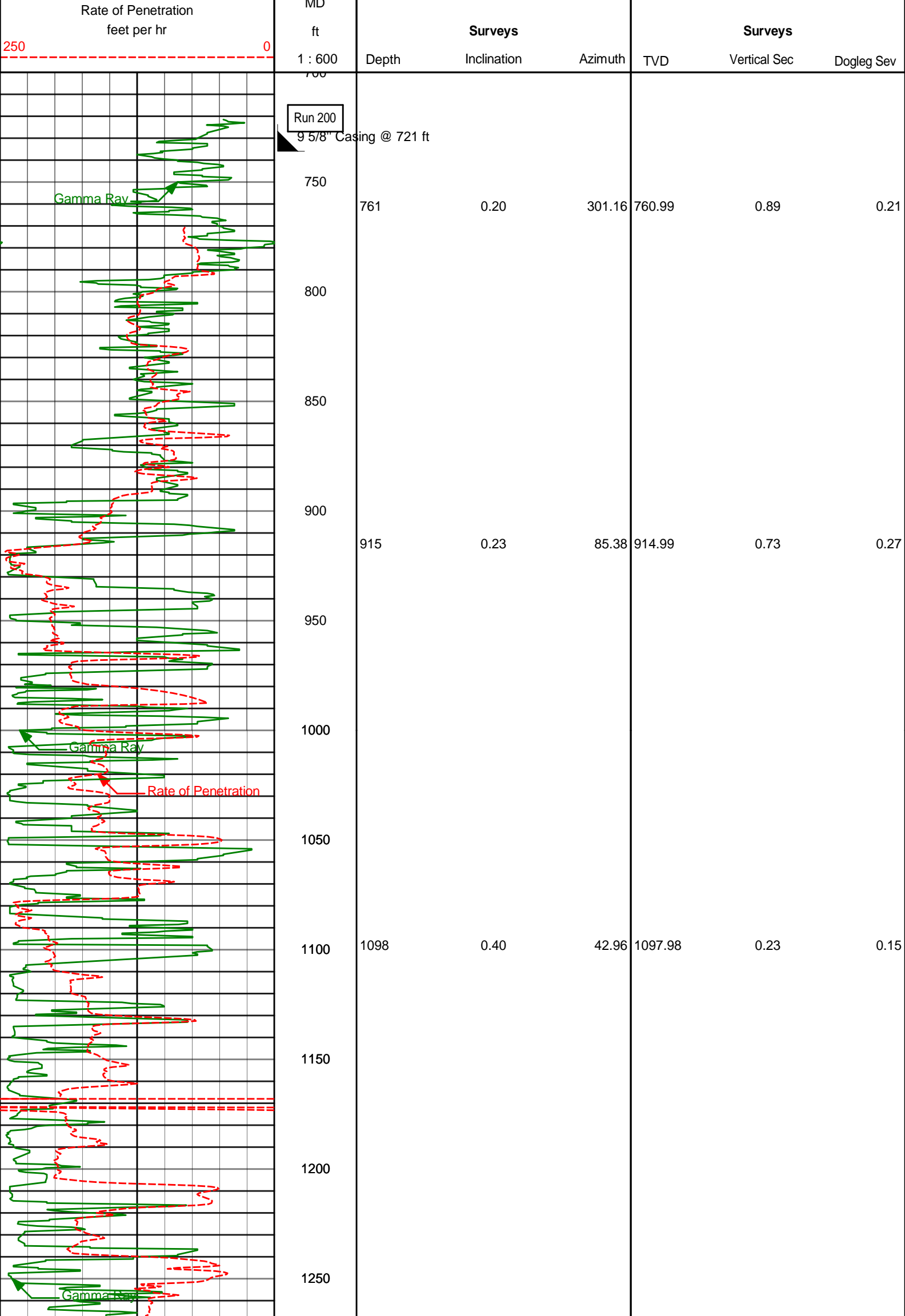
## REMARKS

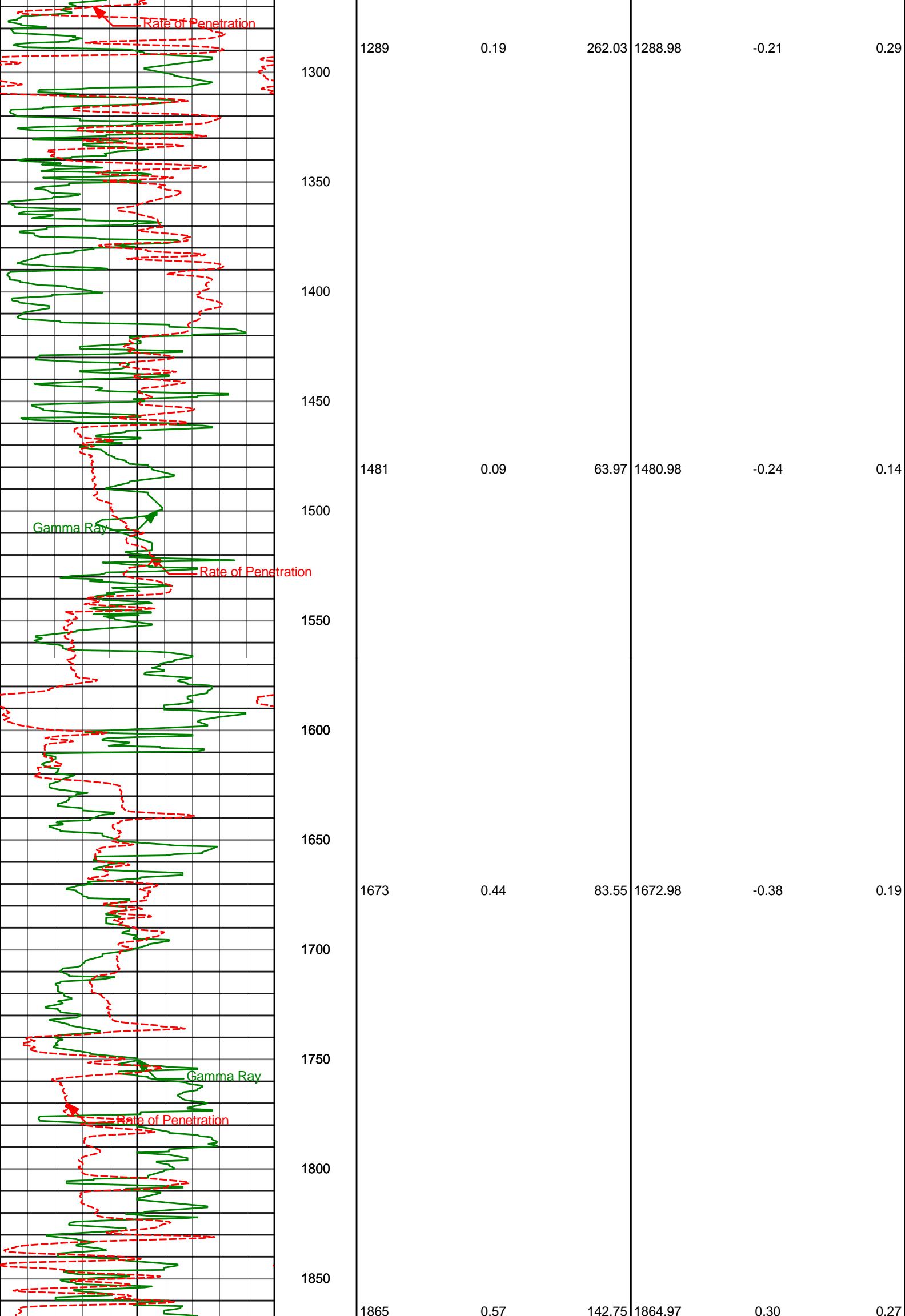
1. All depths are calibrated to the driller's pipe tally and are measured from the rotary table.
2. No depth corrections have been made for pipe stretch or compression.
3. All data presented is recorded (memory data) unless otherwise stated.
4. The following smoothing parameters have been applied to the data:
  - ROP: 1.0 ft interval, 3.0 ft coercion distance.
  - GAMMA: 0.5 ft interval, 0.6 ft coercion distance.

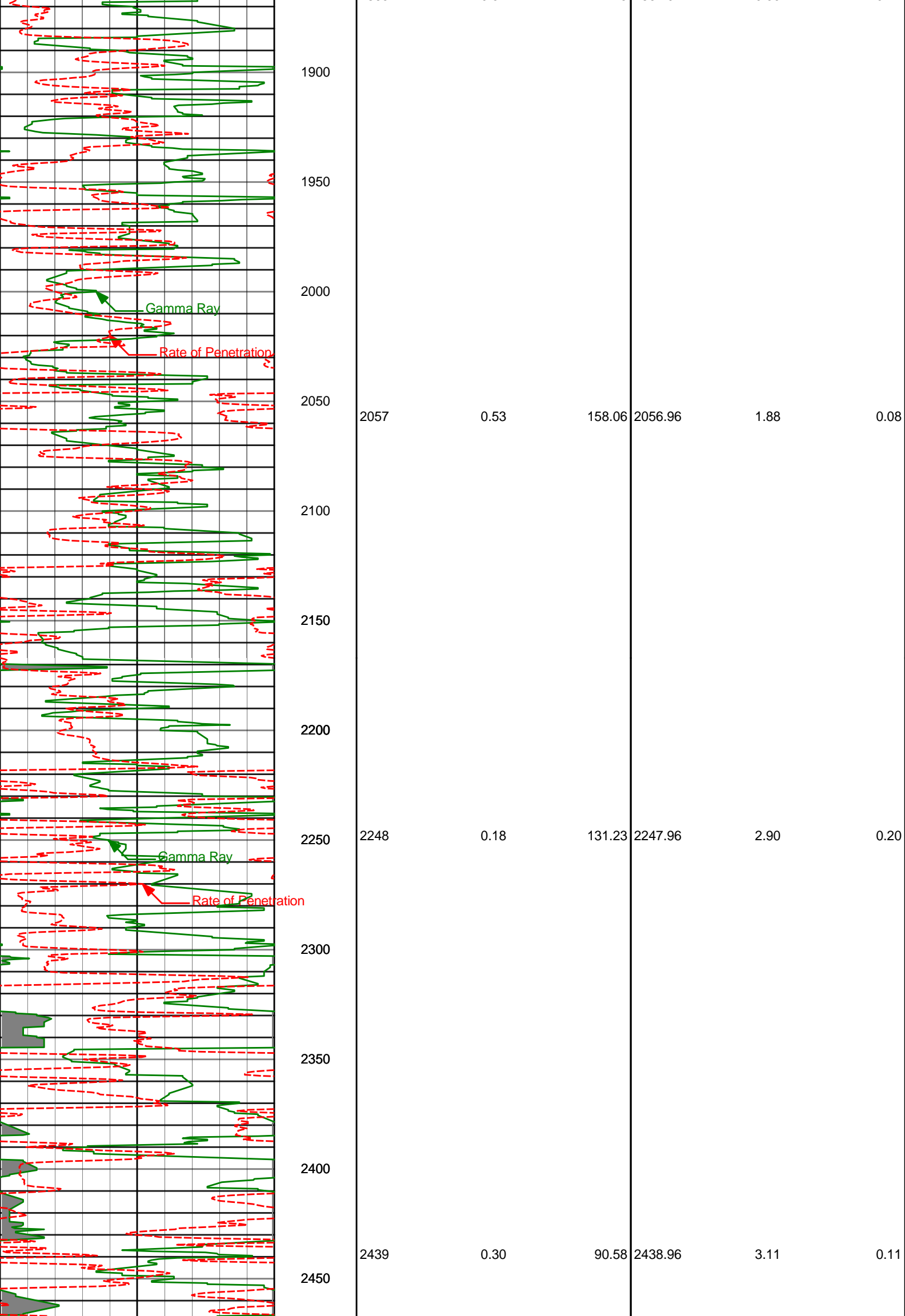
## WARRANTY

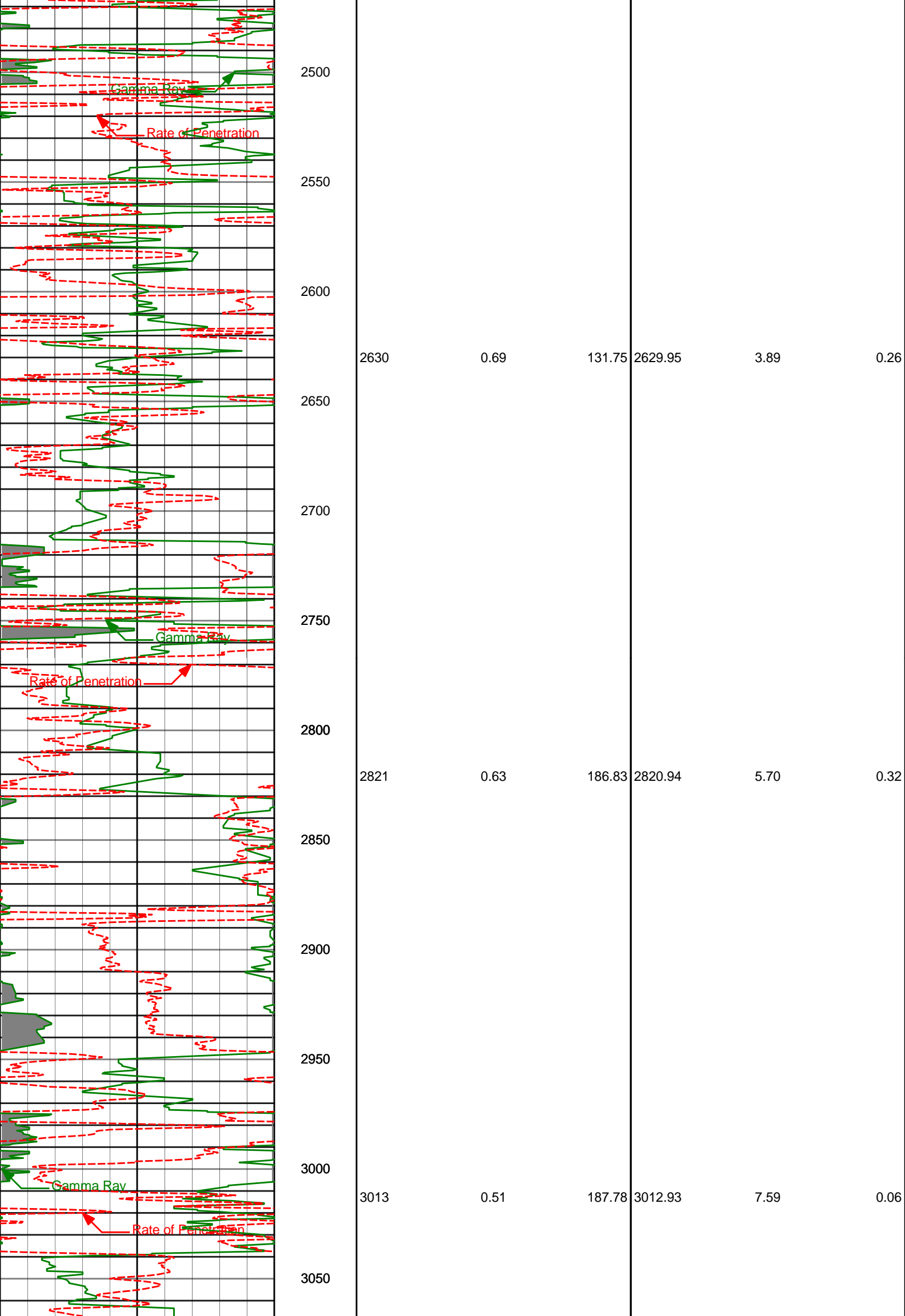
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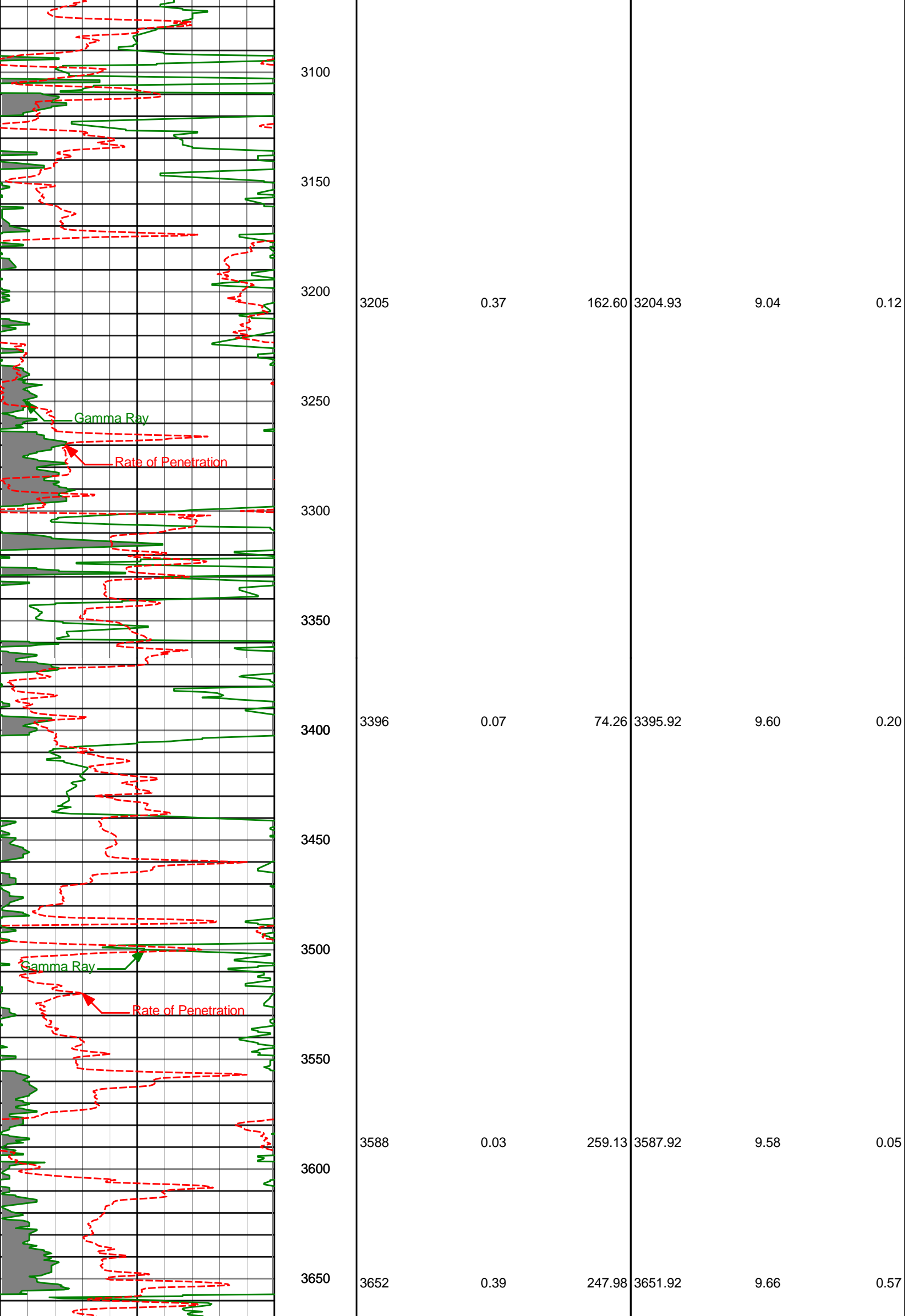
Gamma Ray api	0	150			
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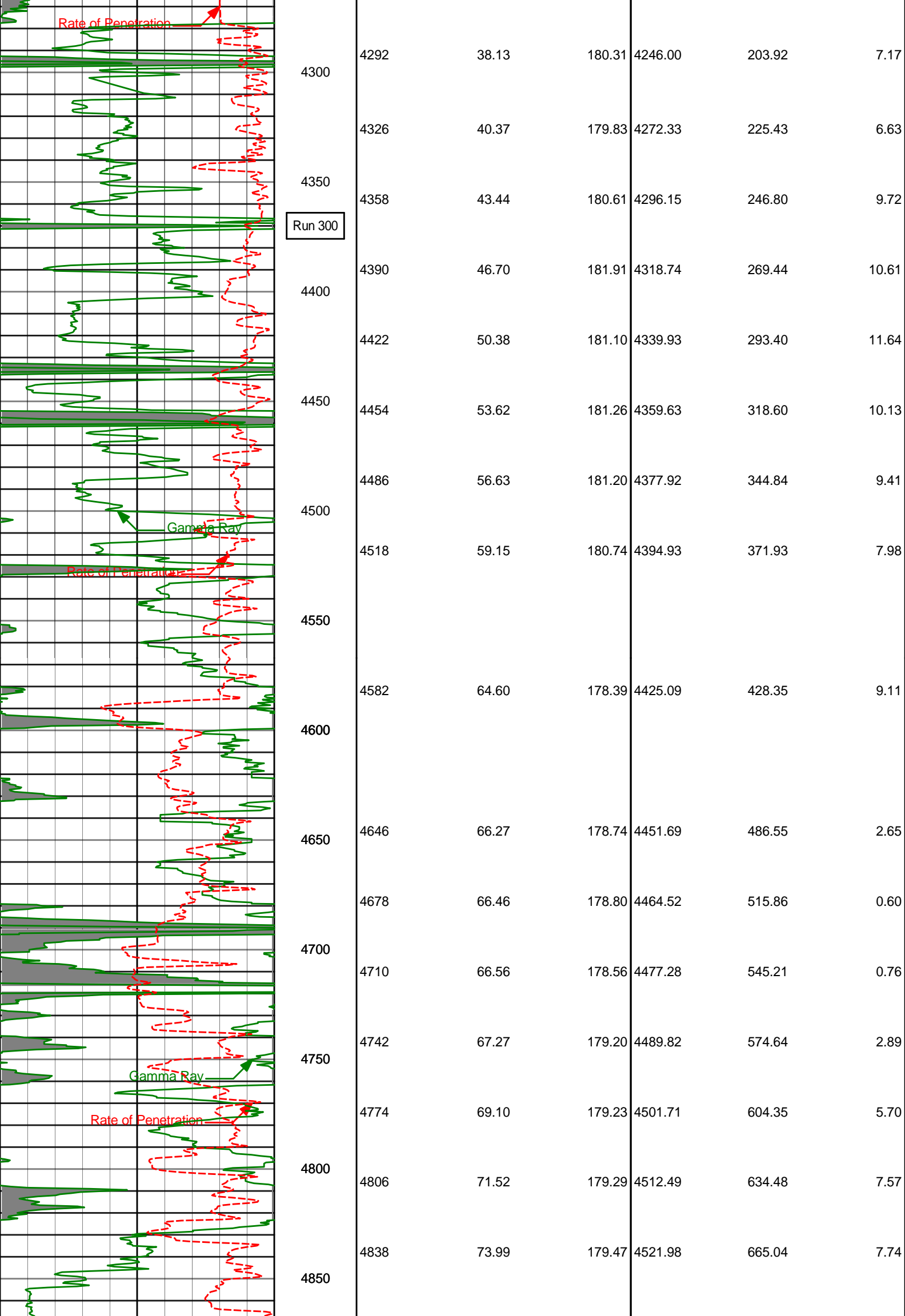


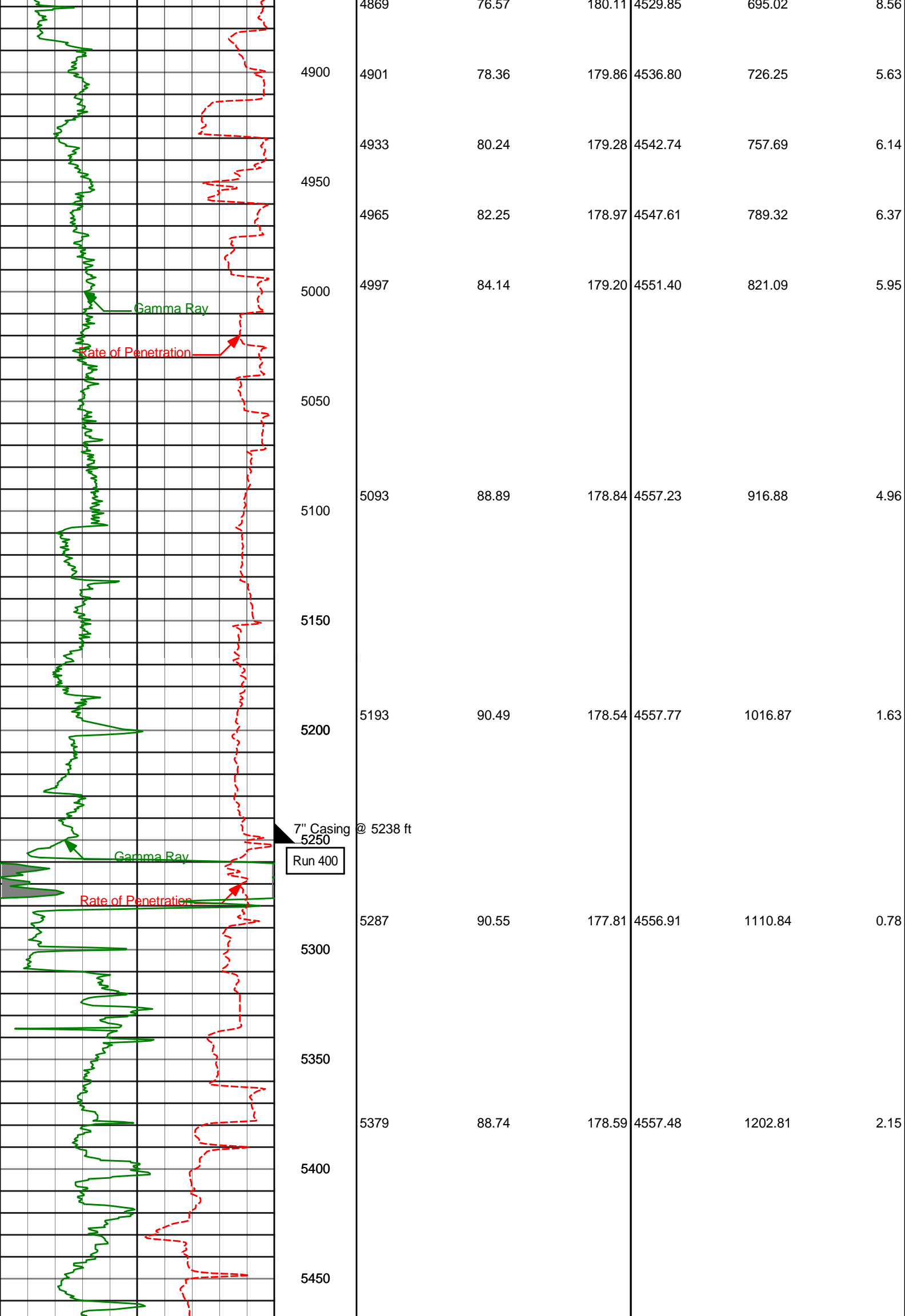












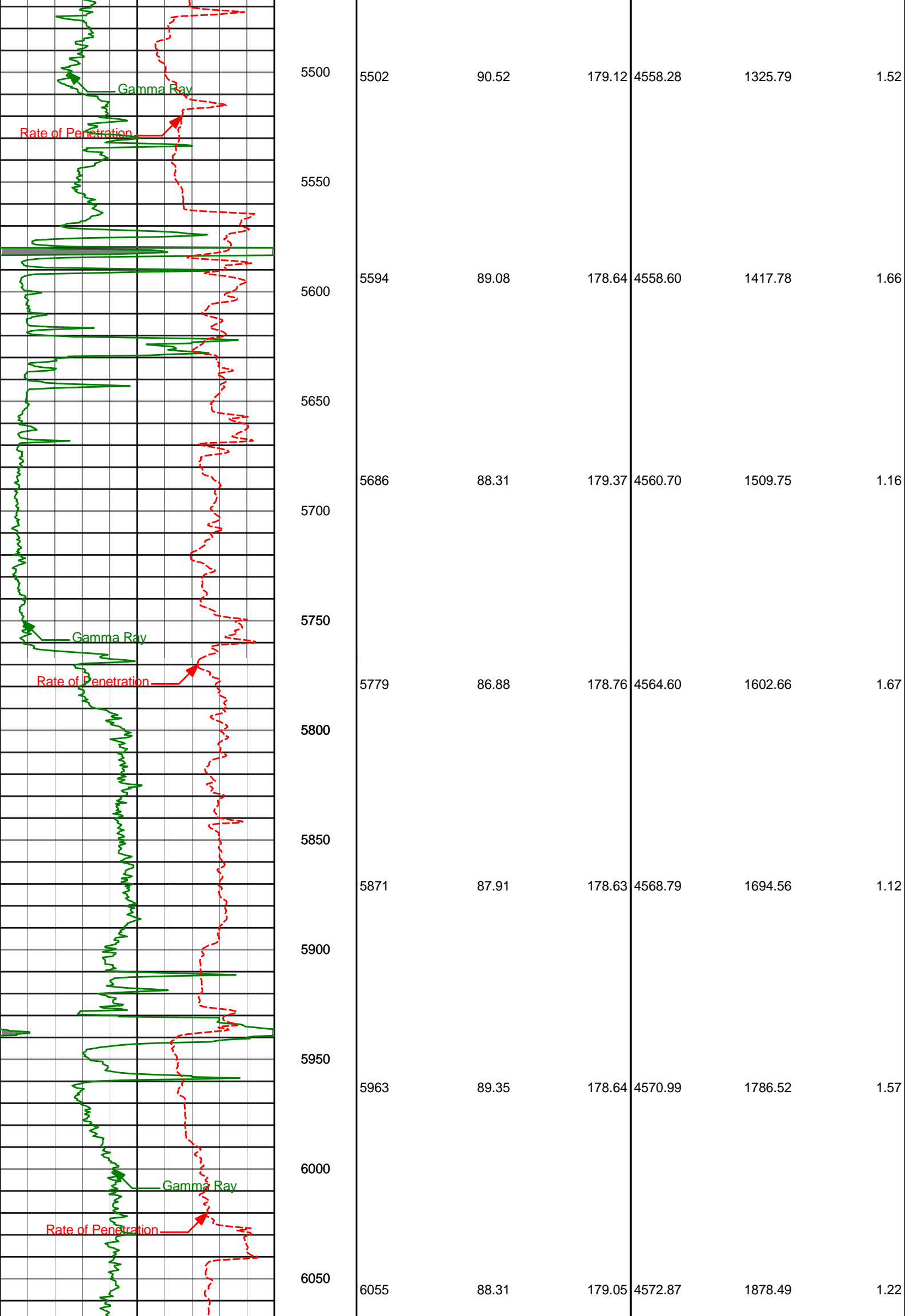
7" Casing @ 5238 ft  
 5250  
 Run 400

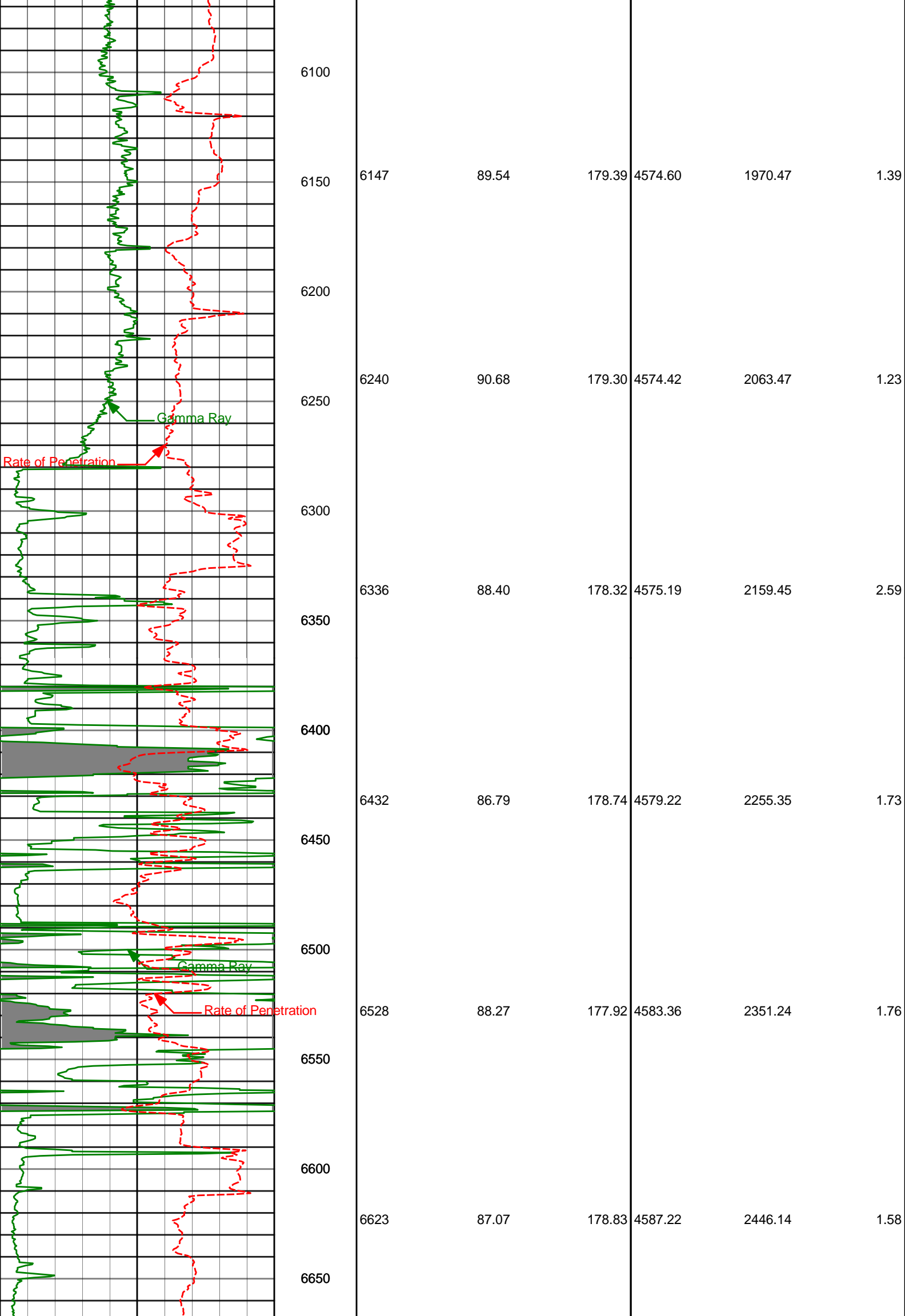
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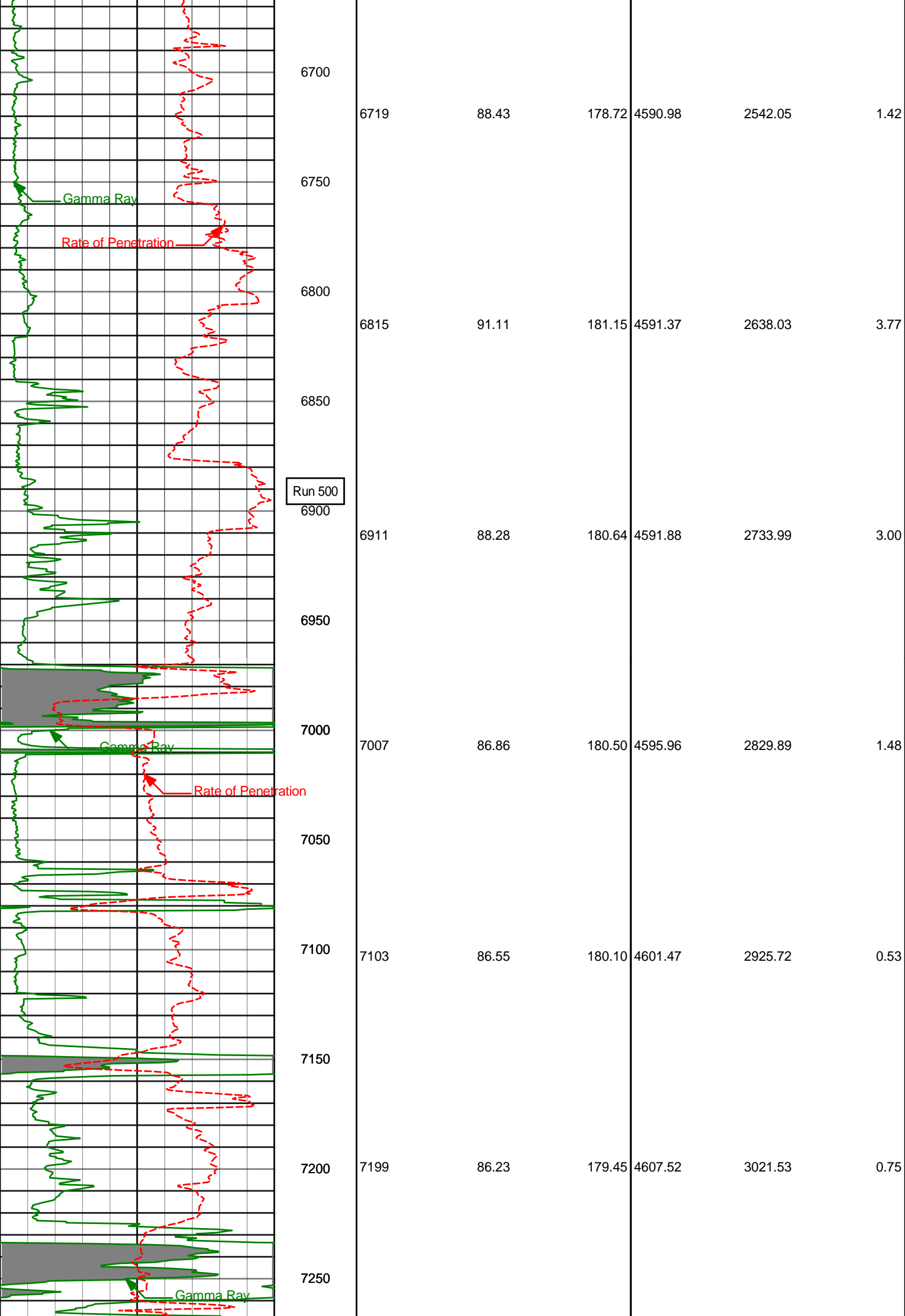
Rate of Penetration

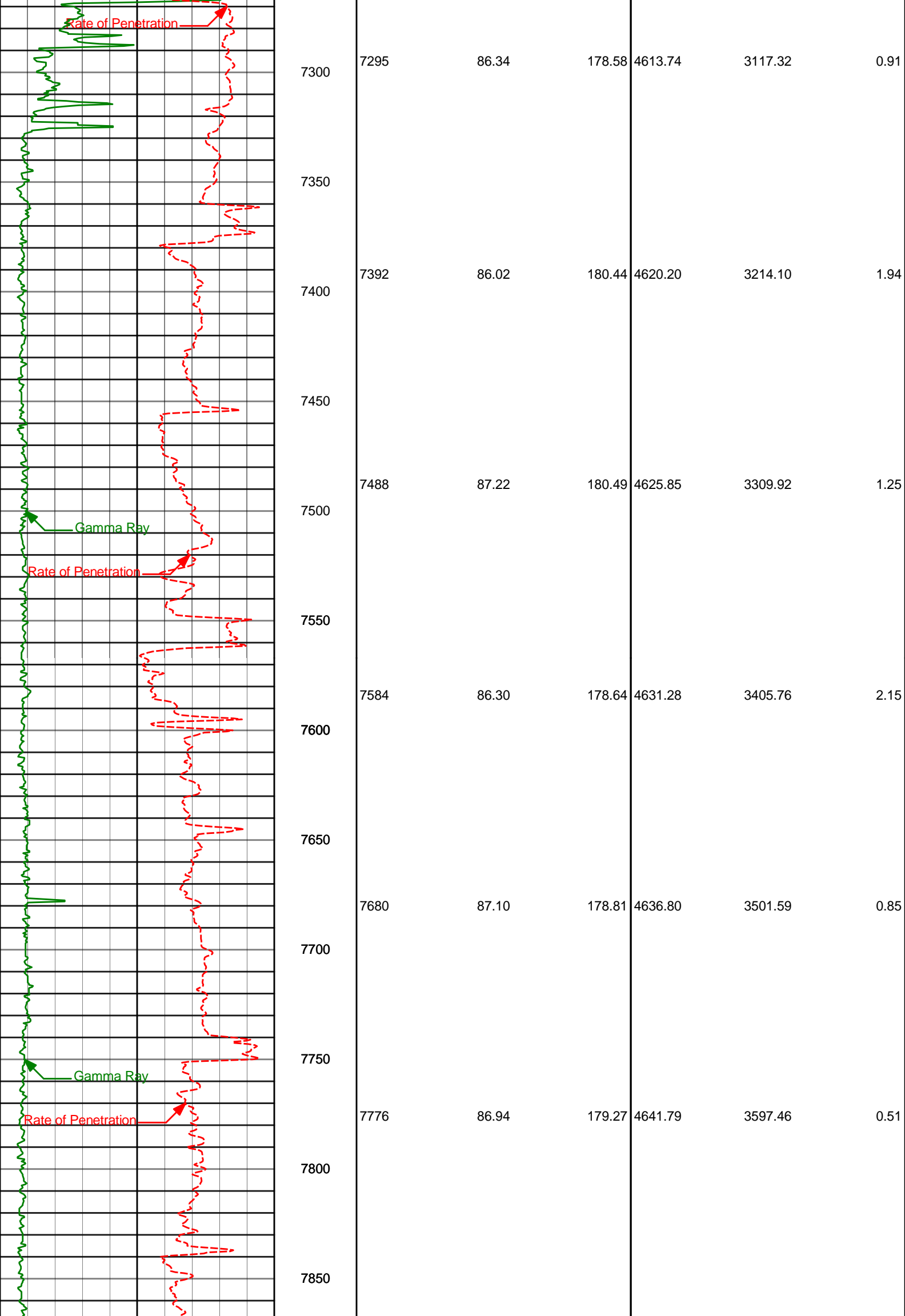
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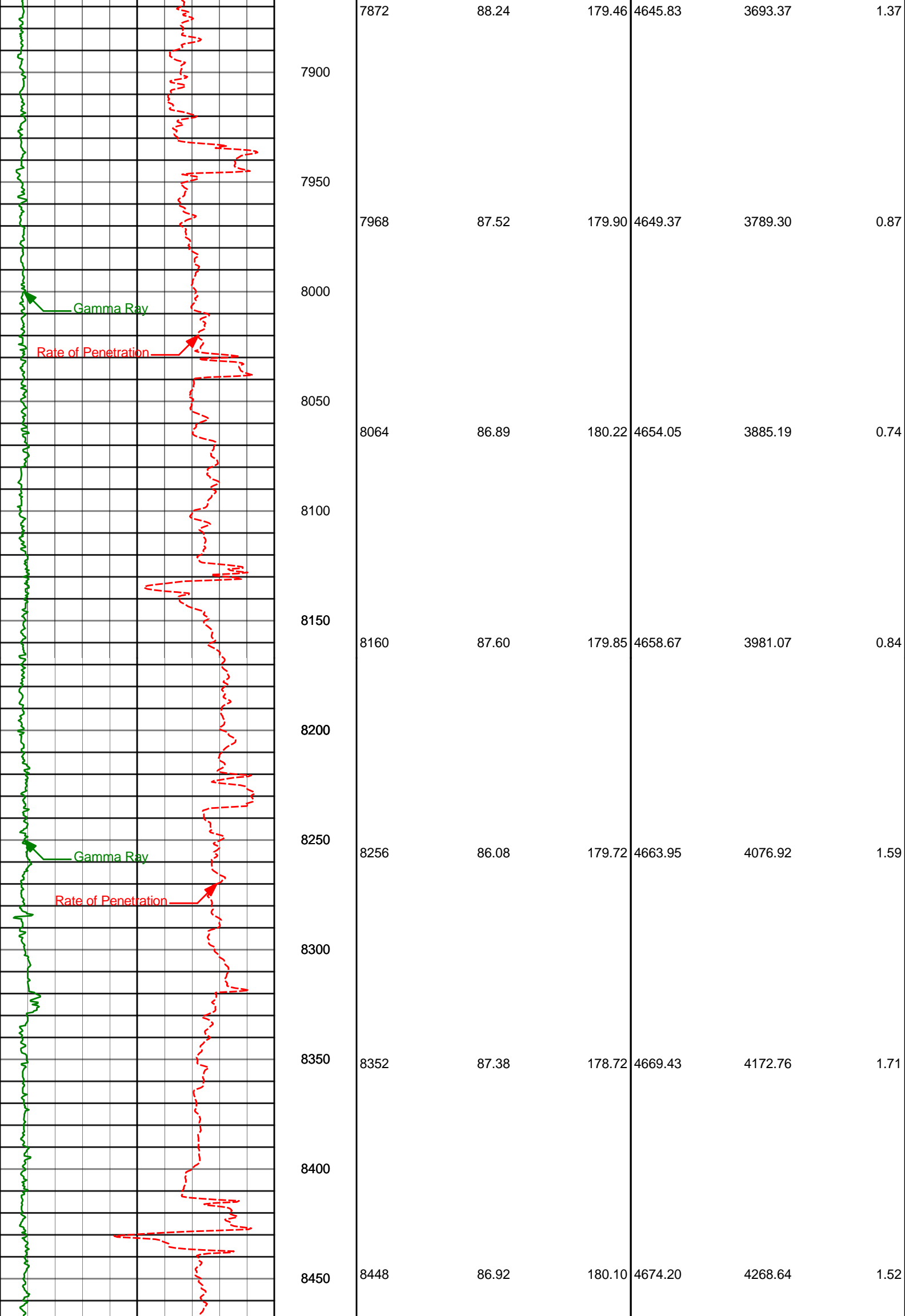
Rate of Penetration

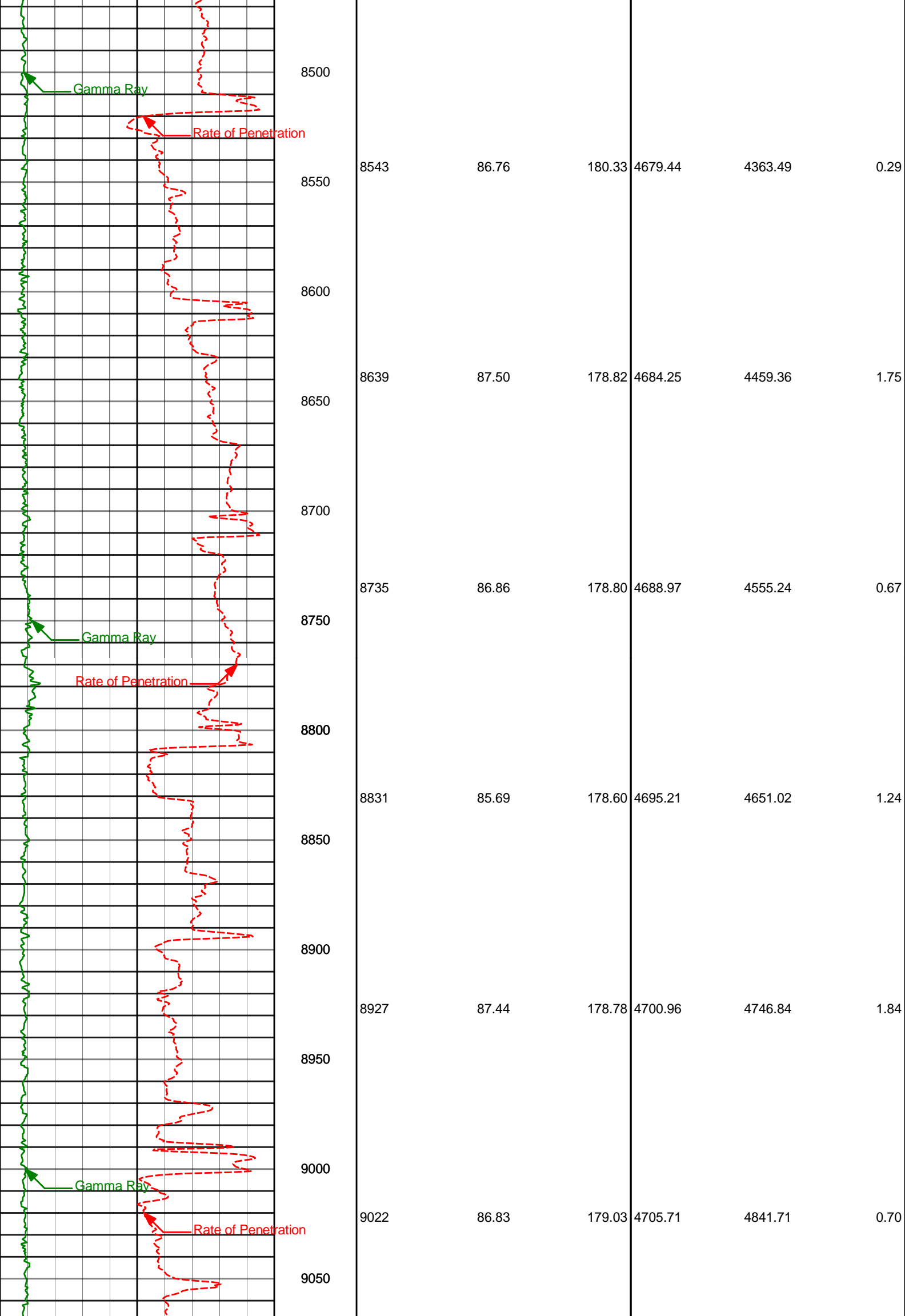




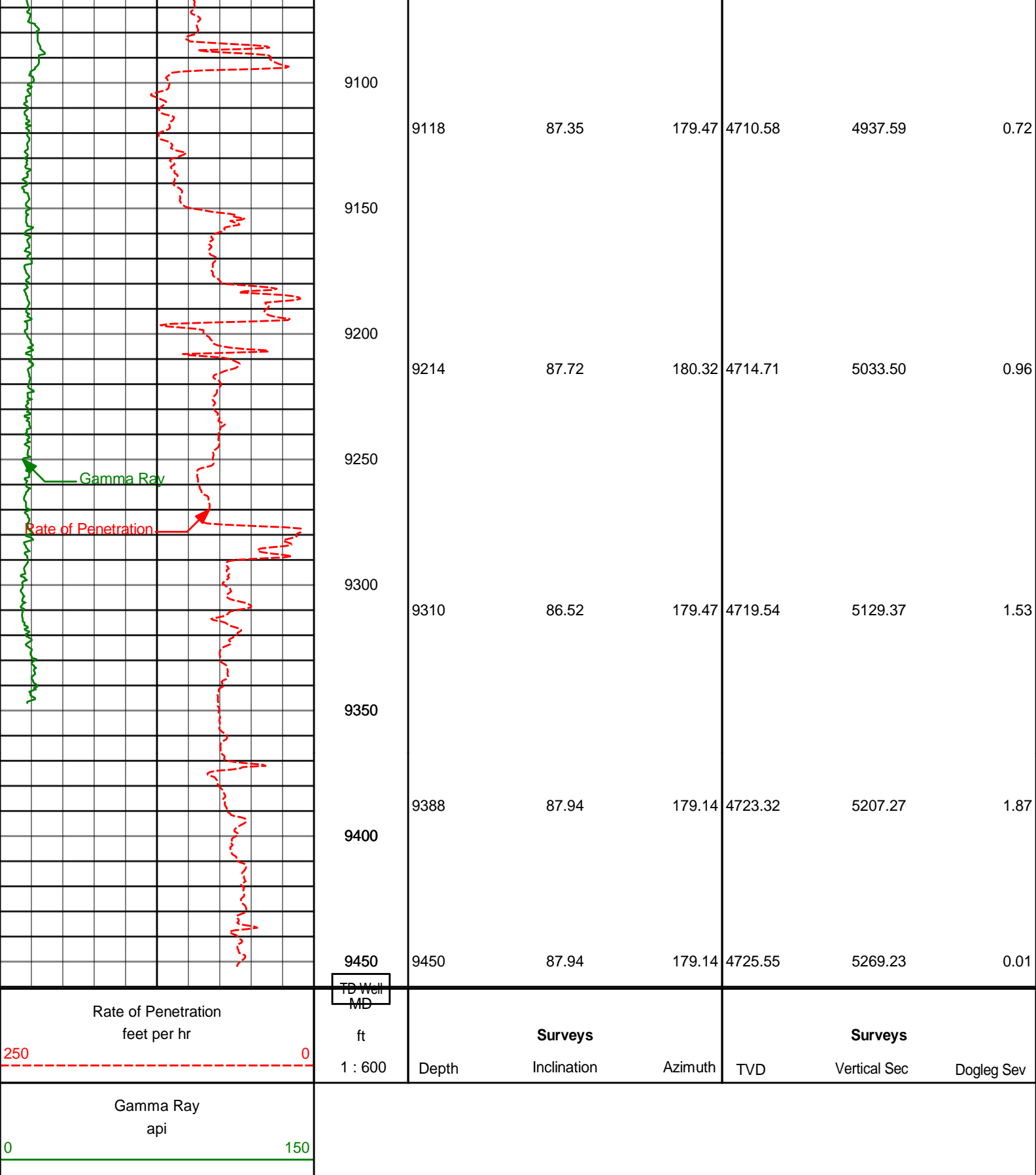












**HALLIBURTON**

**DIRECTIONAL SURVEY REPORT**

Shell Exploration Production Co  
 Lockwood Farms 3307 14-1H  
 Wildcat  
 Harper Kansas  
 USA

OK-XX-0009199477

Surveys from 200' to 9388' are MWD surveys. Final survey is a straight line projection to the bit @ 9450'.

Measured Depth	Inclination	Direction	Vertical Depth	Latitude	Departure	Vertical Section	Dogleg
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0.00	0.00	0.00	0.00	0.00 N	0.00 E	0.00	TIE-IN
200.00	0.73	244.47	199.99	0.55 S	1.15 W	0.54	0.36
265.00	0.26	258.25	264.99	0.76 S	1.67 W	0.74	0.74
355.00	0.54	257.68	354.99	0.89 S	2.28 W	0.87	0.31
416.00	0.33	244.51	415.99	1.03 S	2.72 W	1.00	0.38
508.00	0.03	63.04	507.99	1.13 S	2.94 W	1.11	0.39
601.00	0.30	304.76	600.99	0.98 S	3.12 W	0.95	0.34
654.00	0.09	207.04	653.99	0.94 S	3.25 W	0.91	0.61
761.00	0.20	301.16	760.99	0.92 S	3.45 W	0.89	0.21
915.00	0.23	85.38	914.99	0.75 S	3.36 W	0.73	0.27
1098.00	0.40	42.96	1097.98	0.26 S	2.55 W	0.23	0.15
1289.00	0.19	262.03	1288.98	0.19 N	2.40 W	-0.21	0.29
1481.00	0.09	63.97	1480.98	0.21 N	2.58 W	-0.24	0.14
1673.00	0.44	83.55	1672.98	0.37 N	1.70 W	-0.38	0.19
1865.00	0.57	142.75	1864.97	0.31 S	0.38 W	0.30	0.27
2057.00	0.53	158.06	2056.96	1.88 S	0.52 E	1.88	0.08
2248.00	0.18	131.23	2247.96	2.89 S	1.07 E	2.90	0.20
2439.00	0.30	90.58	2438.96	3.09 S	1.81 E	3.11	0.11
2630.00	0.69	131.75	2629.95	3.86 S	3.16 E	3.89	0.26
2821.00	0.63	186.83	2820.94	5.67 S	3.89 E	5.70	0.32
3013.00	0.51	187.78	3012.93	7.56 S	3.65 E	7.59	0.06
3205.00	0.37	162.60	3204.93	9.01 S	3.72 E	9.04	0.12
3396.00	0.07	74.26	3395.92	9.57 S	4.02 E	9.60	0.20
3588.00	0.03	259.13	3587.92	9.55 S	4.08 E	9.58	0.05
3652.00	0.39	247.98	3651.92	9.63 S	3.85 E	9.66	0.57
3684.00	0.19	304.52	3683.92	9.64 S	3.71 E	9.67	1.03
3716.00	1.25	202.31	3715.92	9.94 S	3.53 E	9.96	4.09
3748.00	2.98	182.79	3747.90	11.09 S	3.36 E	11.12	5.76
3780.00	4.33	185.58	3779.83	13.12 S	3.20 E	13.15	4.28
3812.00	6.00	186.02	3811.70	15.99 S	2.91 E	16.02	5.22
3845.00	8.24	187.91	3844.44	20.05 S	2.40 E	20.07	6.82
3877.00	10.90	186.36	3876.00	25.33 S	1.75 E	25.35	8.34
3909.00	13.06	186.00	3907.30	31.94 S	1.03 E	31.94	6.76
3941.00	15.55	186.35	3938.30	39.80 S	0.18 E	39.80	7.77
3973.00	18.62	187.36	3968.89	49.13 S	0.95 W	49.12	9.65
4005.00	21.79	186.78	3998.91	60.09 S	2.30 W	60.07	9.94
4037.00	25.12	185.97	4028.27	72.75 S	3.71 W	72.72	10.44
4069.00	28.03	185.76	4056.88	86.99 S	5.17 W	86.94	9.09
4100.00	28.56	187.13	4084.18	101.59 S	6.82 W	101.53	2.72
4133.00	29.18	186.87	4113.08	117.40 S	8.76 W	117.32	1.91
4164.00	30.16	185.81	4140.01	132.65 S	10.46 W	132.56	3.61
4196.00	31.73	185.04	4167.46	149.03 S	12.01 W	148.93	5.06
4228.00	34.10	184.25	4194.32	166.36 S	13.41 W	166.25	7.51
4260.00	36.14	182.19	4220.49	184.74 S	14.44 W	184.61	7.38
4292.00	38.13	180.31	4246.00	204.05 S	14.85 W	203.92	7.17
4326.00	40.37	179.83	4272.33	225.56 S	14.88 W	225.43	6.63
4358.00	43.44	180.61	4296.15	246.93 S	14.97 W	246.80	9.72
4390.00	46.70	181.91	4318.74	269.58 S	15.47 W	269.44	10.61
4422.00	50.38	181.10	4339.93	293.55 S	16.10 W	293.40	11.64
4454.00	53.62	181.26	4359.63	318.75 S	16.62 W	318.60	10.13
4486.00	56.63	181.20	4377.92	345.00 S	17.18 W	344.84	9.41
4518.00	59.15	180.74	4394.93	372.10 S	17.64 W	371.93	7.98
4582.00	64.60	178.39	4425.09	428.51 S	17.18 W	428.35	9.11
4646.00	66.27	178.74	4451.69	486.70 S	15.72 W	486.55	2.65
4678.00	66.46	178.80	4464.52	516.01 S	15.09 W	515.86	0.60
4710.00	66.56	178.56	4477.28	545.35 S	14.41 W	545.21	0.76
4742.00	67.27	179.20	4489.82	574.78 S	13.83 W	574.64	2.89
4774.00	69.10	179.23	4501.71	604.48 S	13.42 W	604.35	5.70
4806.00	71.52	179.29	4512.49	634.61 S	13.03 W	634.48	7.57
4838.00	73.99	179.47	4521.98	665.17 S	12.70 W	665.04	7.74
4869.00	76.57	180.11	4529.85	695.15 S	12.59 W	695.02	8.56
4901.00	78.36	179.86	4536.80	726.38 S	12.58 W	726.25	5.63
4933.00	80.24	179.28	4542.74	757.82 S	12.35 W	757.69	6.14
4965.00	82.25	178.97	4547.61	789.44 S	11.86 W	789.32	6.37
4997.00	84.14	179.20	4551.40	821.21 S	11.36 W	821.09	5.95
5093.00	88.89	178.84	4557.23	917.00 S	9.71 W	916.88	4.96
5193.00	90.49	178.54	4557.77	1016.96 S	7.43 W	1016.87	1.63
5287.00	90.55	177.81	4556.91	1110.91 S	4.44 W	1110.84	0.78
5379.00	88.74	178.59	4557.48	1202.86 S	1.55 W	1202.81	2.15
5502.00	90.52	179.12	4558.28	1325.83 S	0.91 E	1325.79	1.52
5594.00	89.08	178.64	4558.60	1417.81 S	2.71 E	1417.78	1.66
5686.00	88.31	179.37	4560.70	1509.77 S	4.30 E	1509.75	1.16
5779.00	86.88	178.76	4564.60	1602.67 S	5.81 E	1602.66	1.67
5871.00	87.91	178.63	4568.79	1694.55 S	7.91 E	1694.56	1.12
5963.00	89.35	178.64	4570.99	1786.50 S	10.10 E	1786.52	1.57
6055.00	88.31	179.05	4572.87	1878.46 S	11.95 E	1878.49	1.22
6147.00	89.54	179.39	4574.60	1970.43 S	13.20 E	1970.47	1.39
6240.00	90.68	179.30	4574.42	2063.42 S	14.27 E	2063.47	1.23
6336.00	88.40	178.32	4575.19	2159.39 S	16.26 E	2159.45	2.59
6432.00	86.79	178.74	4579.22	2255.27 S	18.72 E	2255.35	1.73

6528.00	88.27	177.92	4583.36	2351.14 S	21.52 E	2351.24	1.76
6623.00	87.07	178.83	4587.22	2446.02 S	24.21 E	2446.14	1.58
6719.00	88.43	178.72	4590.98	2541.92 S	26.27 E	2542.05	1.42
6815.00	91.11	181.15	4591.37	2637.90 S	26.37 E	2638.03	3.77
6911.00	88.28	180.64	4591.88	2733.88 S	24.87 E	2733.99	3.00
7007.00	86.86	180.50	4595.96	2829.79 S	23.91 E	2829.89	1.48
7103.00	86.55	180.10	4601.47	2925.63 S	23.41 E	2925.72	0.53
7199.00	86.23	179.45	4607.52	3021.43 S	23.79 E	3021.53	0.75
7295.00	86.34	178.58	4613.74	3117.22 S	25.43 E	3117.32	0.91
7392.00	86.02	180.44	4620.20	3213.99 S	26.26 E	3214.10	1.94
7488.00	87.22	180.49	4625.85	3309.82 S	25.49 E	3309.92	1.25
7584.00	86.30	178.64	4631.28	3405.66 S	26.22 E	3405.76	2.15
7680.00	87.10	178.81	4636.80	3501.48 S	28.35 E	3501.59	0.85
7776.00	86.94	179.27	4641.79	3597.33 S	29.96 E	3597.46	0.51
7872.00	88.24	179.46	4645.83	3693.24 S	31.02 E	3693.37	1.37
7968.00	87.52	179.90	4649.37	3789.17 S	31.56 E	3789.30	0.87
8064.00	86.89	180.22	4654.05	3885.06 S	31.46 E	3885.19	0.74
8160.00	87.60	179.85	4658.67	3980.95 S	31.40 E	3981.07	0.84
8256.00	86.08	179.72	4663.95	4076.80 S	31.77 E	4076.92	1.59
8352.00	87.38	178.72	4669.43	4172.63 S	33.08 E	4172.76	1.71
8448.00	86.92	180.10	4674.20	4268.50 S	34.07 E	4268.64	1.52
8543.00	86.76	180.33	4679.44	4363.36 S	33.72 E	4363.49	0.29
8639.00	87.50	178.82	4684.25	4459.23 S	34.43 E	4459.36	1.75
8735.00	86.86	178.80	4688.97	4555.09 S	36.41 E	4555.24	0.67
8831.00	85.69	178.60	4695.21	4650.86 S	38.58 E	4651.02	1.24
8927.00	87.44	178.78	4700.96	4746.66 S	40.77 E	4746.84	1.84
9022.00	86.83	179.03	4705.71	4841.53 S	42.59 E	4841.71	0.70
9118.00	87.35	179.47	4710.58	4937.39 S	43.84 E	4937.59	0.72
9214.00	87.72	180.32	4714.71	5033.30 S	44.01 E	5033.50	0.96
9310.00	86.52	179.47	4719.54	5129.18 S	44.19 E	5129.37	1.53
9388.00	87.94	179.14	4723.32	5207.08 S	45.13 E	5207.27	1.87
9450.00	87.94	179.14	4725.55	5269.03 S	46.06 E	5269.23	0.01

**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 179.52 DEGREES (TRUE)  
A TOTAL CORRECTION OF 4.74 DEG FROM MAGNETIC NORTH TO TRUE NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.  
HORIZONTAL DISPLACEMENT(CLOSURE) AT 9450.00 FEET  
IS 5269.23 FEET ALONG 179.50 DEGREES (TRUE)**