

	Wellsite	Wellsite		Wellsite	Wellsite		Wellsite	Wellsite
Steven Cano	2017-07-12	2017-07-15	Ty Jackson	2017-07-12	2017-07-15			

Mud Properties Record

Date / Time	Run No.	Measured Depth (ft)	Mud Type	Density (ppg)	Viscosity (cP)	pH	Fluid Loss (cm3)	Oil / Water	Source	Total Chlorides (ppm)	K+ (%)
2017-07-12 19:03	1	1938.00	Oil Based Mud	9.2	9	N/A	N/A	78.2/21.8	Active Pit	25000	0.00
2017-07-14 08:16	2	6385.00	Oil Based Mud	9.3	9	N/A	N/A	81.5/18.5	Active Pit	28000	0.00
2017-07-15 14:00	2	10000.00	Oil Based Mud	9.2	10	N/A	N/A	76.3/23.7	Active Pit	25000	0.00

Mud Resistivity Record

Date / Time	Run No.	Measured Depth (ft)	Surface Temp (degF)	Surface			BHCT (degF)	Downhole		
				Rm (ohm.m)	Rmf (ohm.m)	Rmc (ohm.m)		Rm @ BHCT (ohm.m)	Rmf @ BHCT (ohm.m)	Rmc @ BHCT (ohm.m)
2017-07-13 15:31	1	2000.00	90.0	100.000	N/A	N/A	200.0	100.000	N/A	N/A
2017-07-15 15:31	2	11085.00	90.0	100.000	N/A	N/A	212.0	100.000	N/A	N/A

Equipment and Service Data

Run No.	Tool	Serial Number	Measurement	Sensor Offset (ft)	Bit Offset (ft)	Max O.D. (in)	Min I.D. (in)
1	OnTrak	12115658	Pressure	4.37	5508.38	6.750	0.000
1	OnTrak	12115658	Gamma (double)	5.26	5509.27	6.750	0.000
1	OnTrak	12115658	Resistivity (4tx)	9.30	5513.31	6.750	0.000
1	OnTrak	12115658	Directional (mag)	15.09	5519.10	6.750	0.000
2	OnTrak	12115658	Pressure	4.37	5508.38	6.750	0.000
2	OnTrak	12115658	Gamma (double)	5.26	5509.27	6.750	0.000
2	OnTrak	12115658	Resistivity (4tx)	9.30	5513.31	6.750	0.000
2	OnTrak	12115658	Directional (mag)	15.09	5519.10	6.750	0.000

Service and Tool Mnemonics

Mnemonic	Name	Description
OTK	OnTrak	Sensor Sub (Inc, Azi, Temp, Azimuthal GR, Res, AP, VSS), OnTrak Platform
BCPM	BCPM	Bi-Directional Communication and Power Module, OnTrak Platform

Comments

<div> 1 Depth measurements obtained from a depth control system not supplied or operated by Baker Hughes. Due to lack of control by Baker Hughes logging engineers, depth calibrations and measurements could not be independently verified. </div> <div> 2 Baker Hughes LWD run 1 and 2 utilized a 6 3/4 inch Ontrak services (Multiple Propagation Resistivity, Gamma Ray, and Directional) behind a 8 1/2 inch bit and rotary steerable assembly to perform a MAD (Measurement After Drilling) pass from 1938 to 5485 feet MD (1938 to 5477 feet TVD). The data collected during this run was ream logged up to 16 hours after being drilled and it is presented independent of the drilling log. </div>


Remarks

Number	Measured Depth (ft)	Hole Section (in)	Run No.	Remark
1	5485.00	8.500	2	The interval from 5485 to 11085 feet MD (5477 to 6075 feet TVD) due to sensor to bit offset at well TD.

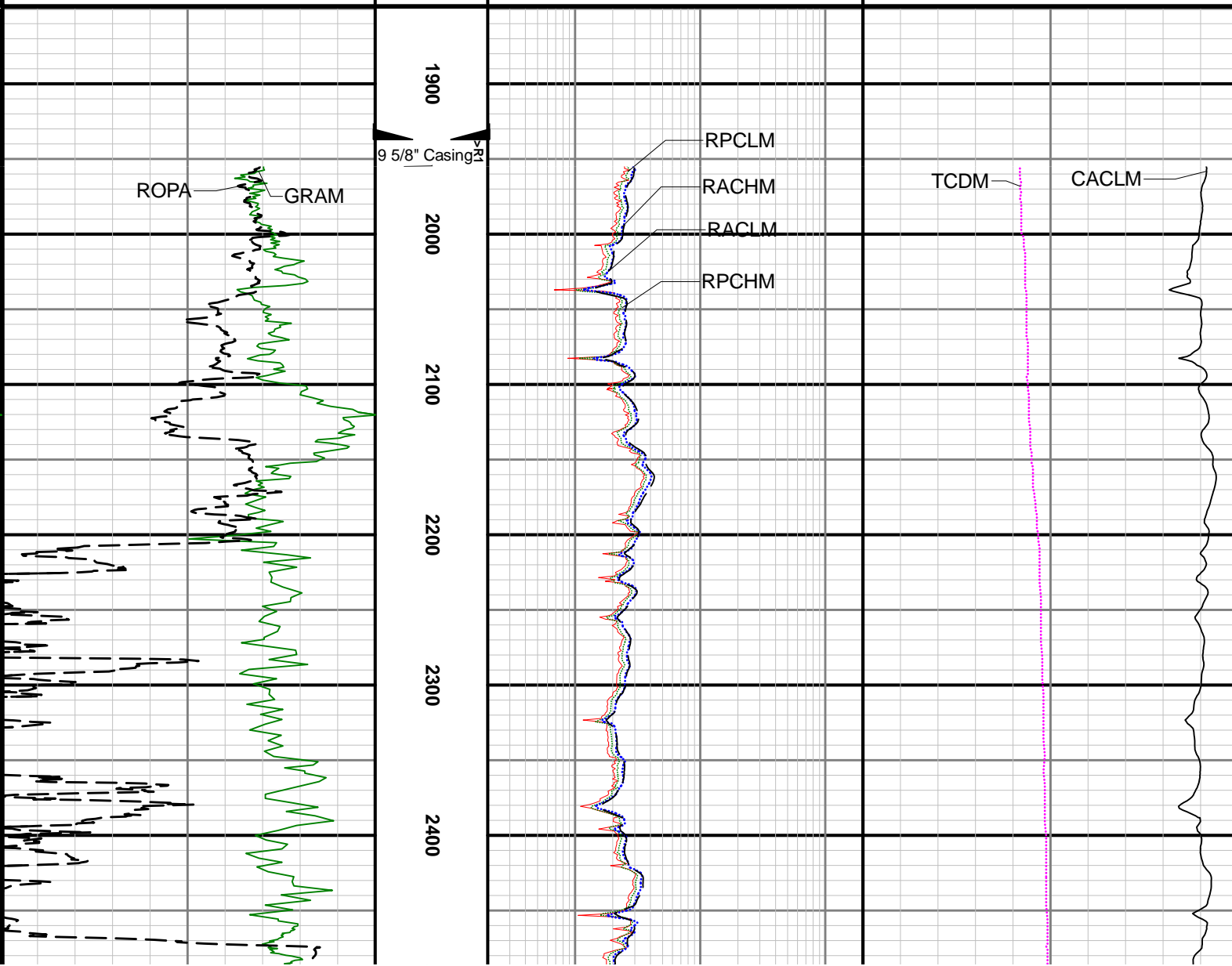
Curve Mnemonics

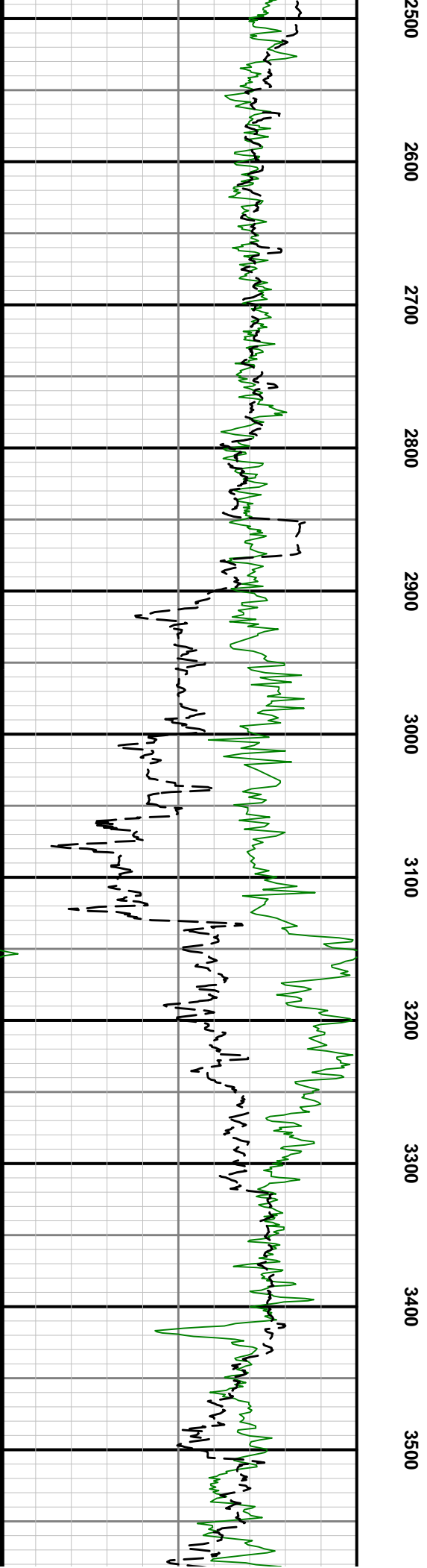
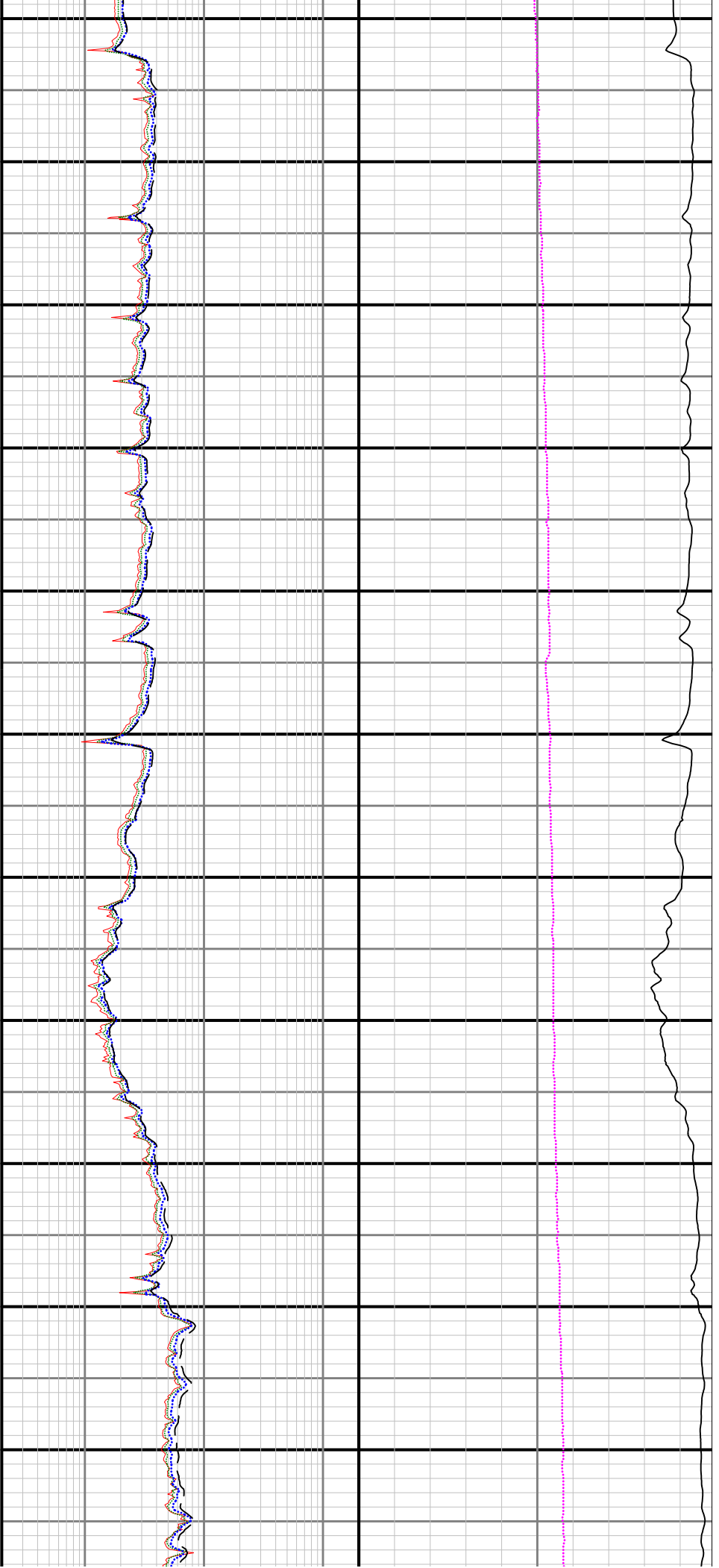
Presented Curves	Description	Units
CACLM	Conductivity Attenuation - Corrected - 400kHz	mmho/m
RACHM	Resistivity Attenuation - Corrected - 2MHz	ohm.m
RACLM	Resistivity Attenuation - Corrected - 400kHz	ohm.m
RPCHM	Resistivity Phase - Corrected - 2MHz	ohm.m

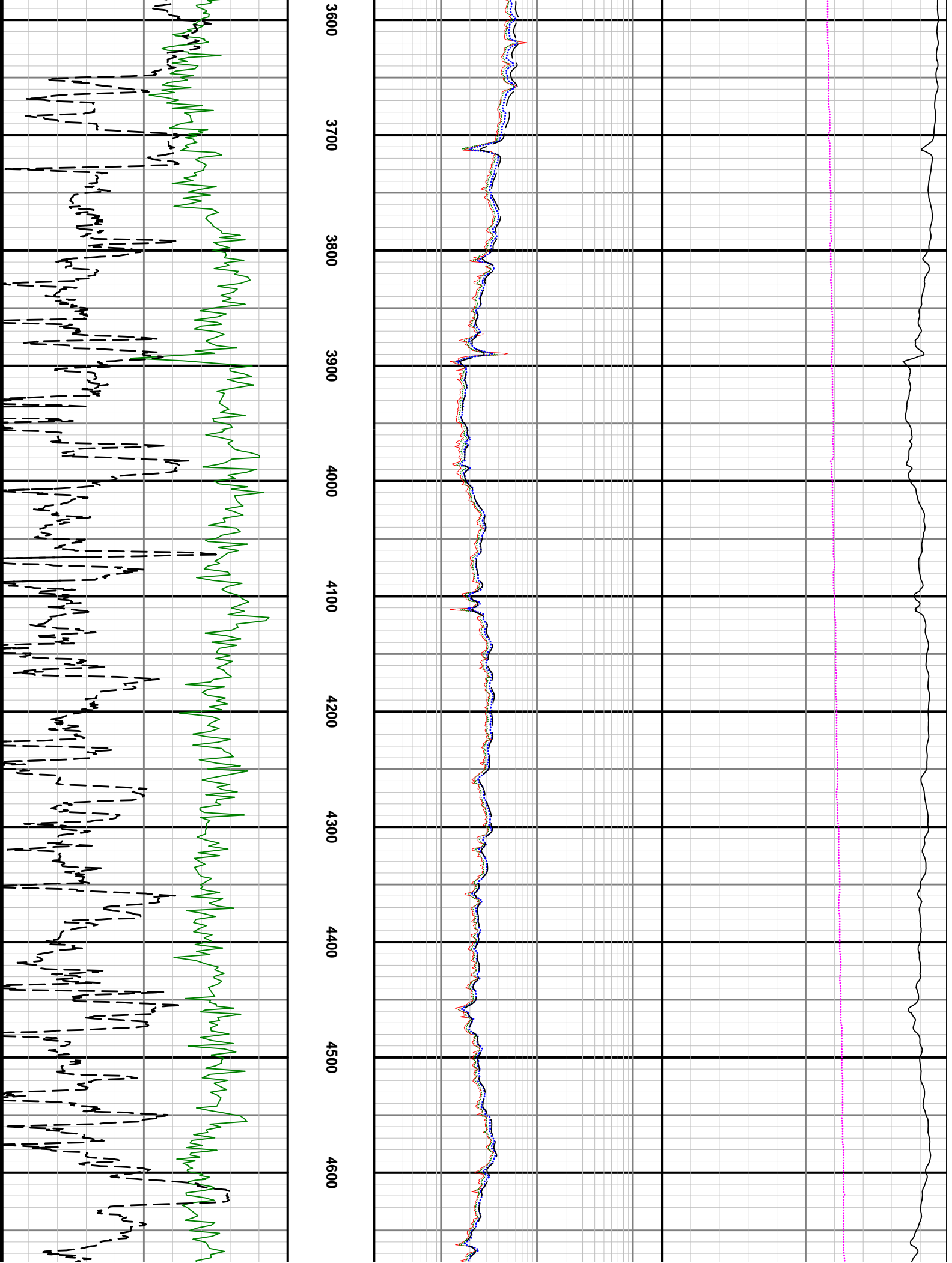
RPCLM	Resistivity Phase - Corrected - 400kHz	ohm.m
ROPA	Depth Averaged ROP 3 ft Average	ft/h
GRAM	Gamma Ray - Apparent 3 ft Average	API
TCDM	Downhole Temperature	degF

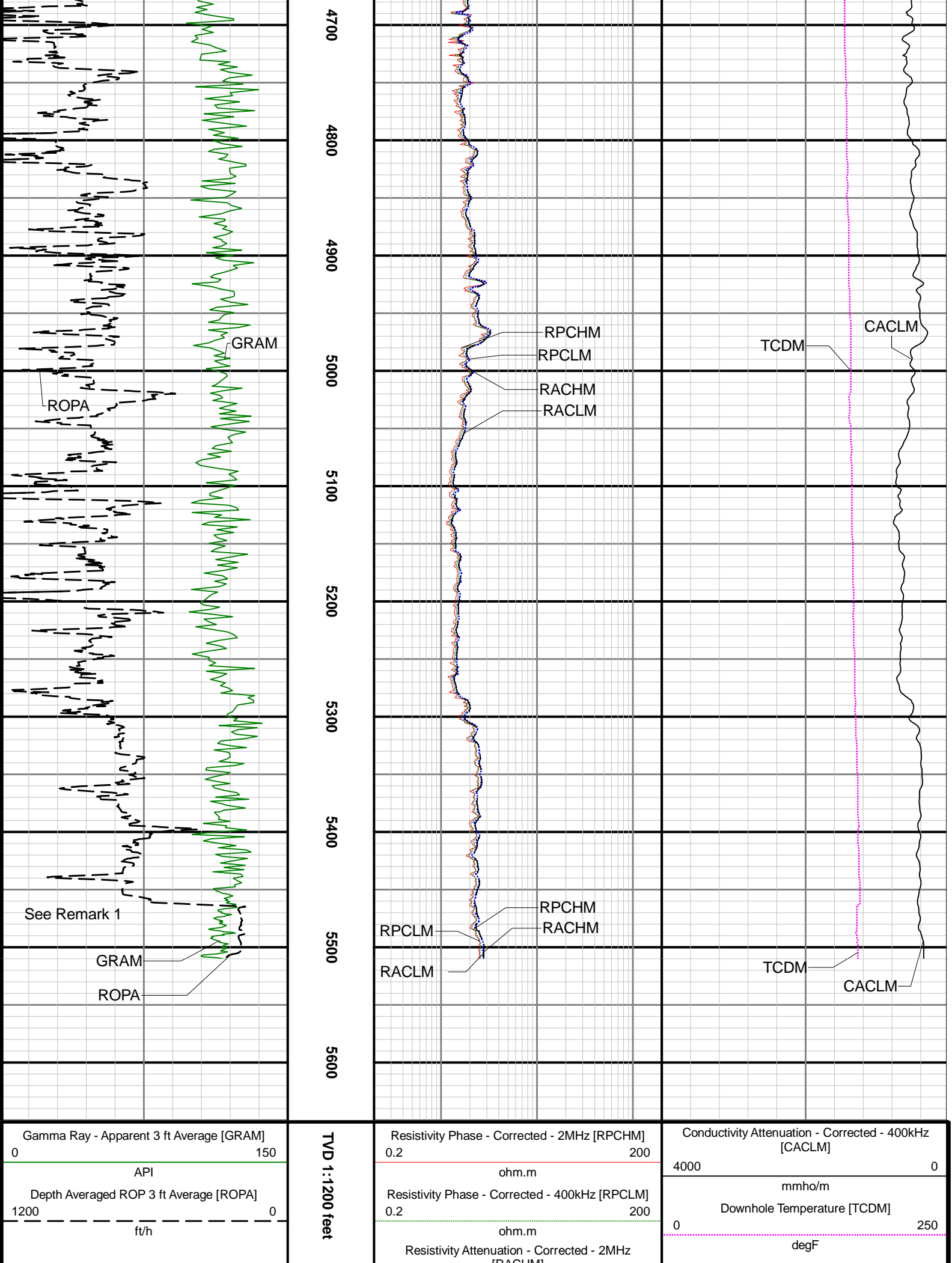
	Company	Noble Energy			
	Well	Freedom Federal LC21-630			
	Interval	Date From:	2017-07-14 03:30:55	Top:	1955.00
	Created	Date To:	2017-07-15 14:32:36	Bottom:	5510.00
		2017-07-17 10:03			

Gamma Ray - Apparent 3 ft Average [GRAM] 0 150	TVD 1:1200 feet	Resistivity Phase - Corrected - 2MHz [RPCHM] 0.2 200	Conductivity Attenuation - Corrected - 400kHz [CACLM] 4000 0
API		ohm.m	mmho/m
Depth Averaged ROP 3 ft Average [ROPA] 1200 0		Resistivity Phase - Corrected - 400kHz [RPCLM] 0.2 200	Downhole Temperature [TCDM] 0 250
ft/h		ohm.m	degF
		Resistivity Attenuation - Corrected - 2MHz [RACHM] 0.2 200	
		ohm.m	
		Resistivity Attenuation - Corrected - 400kHz [RACLM] 0.2 200	
		ohm.m	









[RACHIM]

0.2 200

ohm.m

Resistivity Attenuation - Corrected - 400kHz

[RACHIM]

0.2 200

ohm.m

Directional Survey Summary

Latitude:	6.944444	Longitude:	101.916667
North Reference:	Grid	Drill Depth Zero:	Rig Floor
Vertical Datum is:	Mean Sea Level	Vertical Datum to DDZ: (ft)	30.00
Vertical Section North: (m)	N/A	Vertical Section East: (m)	N/A
Vertical Section Azimuth: (deg)	N/A		
Grid Convergence: (deg)	N/A	Magnetic Declination: (deg)	N/A
Total Correction: (deg)	6.72	TVD Calculation Method:	Minimum Curvature
Magnetic Correction:	N/A	Local Magnetic Field: (nT)	52610
Local Magnetic Dip Angle: (deg)	67.08	Local Gravity Field: (m/s2)	N/A

Tie-In / Projection	Measured Depth (ft)	Inclination (deg)	Azimuth (deg)	Temperature (degF)	North (ft)	East (ft)	True Vertical Depth (ft)	Vertical Section (ft)	Course Length (ft)	Dog Leg Severity (deg/100ft)	Build Rate (deg/100ft)	Turn Rate (deg/100ft)
Tie-In	0.00	0.00	0.00	N/A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	84.94	0.26	184.19	N/A	-0.19	-0.01	84.94	0.02	84.94	0.31	0.31	-206.98
	178.64	0.54	199.01	N/A	-0.82	-0.17	178.64	0.19	93.70	0.32	0.30	15.82
	270.39	0.48	220.20	N/A	-1.52	-0.56	270.38	0.59	91.75	0.21	-0.07	23.10
	365.09	0.33	213.35	N/A	-2.05	-0.97	365.08	1.01	94.70	0.17	-0.16	-7.23
	459.65	0.24	119.75	N/A	-2.38	-0.95	459.64	0.99	94.56	0.44	-0.10	-98.98
	554.90	0.16	167.69	N/A	-2.61	-0.74	554.89	0.80	95.25	0.19	-0.08	50.33
	648.67	0.29	200.01	N/A	-2.96	-0.80	648.66	0.86	93.77	0.19	0.14	34.47
	743.14	0.37	137.12	N/A	-3.41	-0.67	743.13	0.74	94.47	0.37	0.08	-66.57
	837.66	0.32	57.12	N/A	-3.49	-0.24	837.65	0.31	94.52	0.47	-0.05	-84.64
	932.18	0.03	306.43	N/A	-3.33	-0.04	932.17	0.11	94.52	0.35	-0.31	-117.11
	1026.87	0.06	316.66	N/A	-3.28	-0.09	1026.86	0.16	94.69	0.03	0.03	10.80
	1121.38	0.15	115.21	N/A	-3.30	-0.02	1121.37	0.08	94.51	0.22	0.10	167.76
	1216.23	0.10	155.94	N/A	-3.43	0.13	1216.22	-0.06	94.85	0.10	-0.05	42.94
	1310.96	0.57	147.29	N/A	-3.90	0.42	1310.94	-0.34	94.73	0.50	0.50	-9.13
	1405.43	0.39	167.14	N/A	-4.61	0.74	1405.41	-0.65	94.47	0.26	-0.19	21.01
	1500.10	0.53	176.87	N/A	-5.36	0.84	1500.08	-0.73	94.67	0.17	0.15	10.28
	1594.43	0.21	207.59	N/A	-5.95	0.78	1594.41	-0.66	94.33	0.39	-0.34	32.57
	1688.96	0.28	201.98	N/A	-6.31	0.62	1688.93	-0.49	94.53	0.08	0.07	-5.93
	1783.69	0.23	97.09	N/A	-6.55	0.72	1783.66	-0.58	94.73	0.43	-0.05	-110.73
	1878.16	0.29	148.59	N/A	-6.78	1.03	1878.13	-0.89	94.47	0.25	0.06	54.51
	1929.00	0.34	163.29	N/A	-7.03	1.14	1928.97	-1.00	50.84	0.19	0.10	28.91
	1978.00	0.35	174.86	N/A	-7.32	1.20	1977.97	-1.05	49.00	0.14	0.02	23.61
	2072.00	0.07	267.30	N/A	-7.61	1.16	2071.97	-1.01	94.00	0.38	-0.30	98.34
	2166.00	0.11	275.23	N/A	-7.61	1.02	2165.97	-0.86	94.00	0.04	0.04	8.44
	2261.00	0.13	262.99	N/A	-7.61	0.82	2260.97	-0.66	95.00	0.03	0.02	-12.88
	2355.00	0.04	187.30	N/A	-7.66	0.71	2354.97	-0.55	94.00	0.13	-0.10	-80.52
	2450.00	0.10	343.97	N/A	-7.61	0.68	2449.97	-0.53	95.00	0.14	0.06	164.92
	2545.00	1.52	286.71	N/A	-7.17	-0.55	2544.96	0.69	95.00	1.55	1.49	-60.27
	2639.00	3.32	299.39	N/A	-5.47	-4.11	2638.87	4.23	94.00	1.99	1.91	13.49
	2733.00	5.05	310.33	N/A	-1.46	-9.64	2732.62	9.67	94.00	2.02	1.84	11.64
	2828.00	7.47	315.89	N/A	5.68	-17.13	2827.05	17.01	95.00	2.62	2.55	5.85
	2922.00	8.22	313.01	N/A	14.65	-26.29	2920.17	25.99	94.00	0.90	0.80	-3.06
	3017.00	8.13	310.12	N/A	23.61	-36.40	3014.20	35.90	95.00	0.44	-0.09	-3.04
	3111.00	8.18	311.62	N/A	32.34	-46.48	3107.25	45.80	94.00	0.23	0.05	1.60
	3206.00	8.19	316.63	N/A	41.75	-56.18	3201.28	55.31	95.00	0.75	0.01	5.27
	3300.00	8.24	311.82	N/A	51.11	-65.80	3294.32	64.73	94.00	0.73	0.05	-5.12
	3395.00	6.83	289.03	N/A	57.49	-76.21	3388.52	75.01	95.00	3.45	-1.48	-23.99
	3490.00	4.69	245.20	N/A	57.70	-85.08	3483.08	83.88	95.00	4.98	-2.25	-46.14
	3584.00	3.57	214.47	N/A	53.68	-90.23	3576.84	89.10	94.00	2.59	-1.19	-32.69
	3679.00	1.09	122.06	N/A	50.76	-91.14	3671.78	90.07	95.00	3.97	-2.61	-97.27
	3774.00	0.06	136.52	N/A	50.24	-90.34	3766.77	89.28	95.00	1.09	-1.08	15.22
	3868.00	0.13	179.35	N/A	50.10	-90.30	3860.77	89.25	94.00	0.10	0.07	45.56
	3963.00	0.25	103.28	N/A	49.94	-90.10	3955.77	89.05	95.00	0.27	0.13	-80.07
	4057.00	0.19	67.43	N/A	49.96	-89.76	4049.77	88.71	94.00	0.16	-0.06	-38.14
	4152.00	0.09	162.81	N/A	49.95	-89.59	4144.77	88.54	95.00	0.23	-0.11	100.40
	4246.00	0.09	132.74	N/A	49.83	-89.51	4238.77	88.47	94.00	0.05	0.00	-31.99
	4341.00	0.10	33.04	N/A	49.84	-89.41	4333.77	88.37	95.00	0.15	0.01	-104.95
	4436.00	0.16	99.02	N/A	49.89	-89.24	4428.77	88.19	95.00	0.16	0.06	69.45
	4625.00	0.03	181.51	N/A	49.80	-88.98	4617.77	87.93	189.00	0.08	-0.07	43.65
	4719.00	0.22	341.14	N/A	49.95	-89.03	4711.77	87.99	94.00	0.26	0.20	169.82

	4814.00	0.19	198.94	N/A	49.97	-89.15	4806.77	88.10	95.00	0.41	-0.03	-149.68
	4909.00	0.03	271.50	N/A	49.82	-89.22	4901.77	88.18	95.00	0.19	-0.17	76.38
	5003.00	0.06	295.59	N/A	49.85	-89.29	4995.77	88.24	94.00	0.04	0.03	25.63
	5097.00	0.29	296.49	N/A	49.97	-89.55	5089.77	88.50	94.00	0.24	0.24	0.96
	5192.00	0.57	70.87	N/A	50.23	-89.32	5184.77	88.26	95.00	0.84	0.29	141.45
	5287.00	0.34	197.38	N/A	50.12	-88.95	5279.76	87.90	95.00	0.86	-0.24	133.17
	5381.00	0.10	4.88	N/A	49.94	-89.03	5373.76	87.98	94.00	0.47	-0.26	178.19
	5476.00	0.48	267.36	N/A	50.00	-89.42	5468.76	88.37	95.00	0.53	0.40	-102.65
	5570.00	10.13	275.35	N/A	50.76	-98.06	5562.25	97.00	94.00	10.27	10.27	8.50
	5608.00	13.41	280.22	N/A	51.85	-105.73	5599.45	104.64	38.00	9.01	8.63	12.82
	5703.00	20.82	274.78	N/A	55.22	-133.44	5690.18	132.27	95.00	7.97	7.80	-5.73
	5797.00	29.81	267.09	N/A	55.42	-173.51	5775.09	172.33	94.00	10.16	9.56	-8.18
	5892.00	38.21	267.39	N/A	52.88	-226.54	5853.77	225.40	95.00	8.84	8.84	0.32
	5986.00	47.05	269.60	N/A	51.31	-290.11	5922.86	288.99	94.00	9.54	9.40	2.35
	6080.00	56.14	269.23	N/A	50.55	-363.69	5981.20	362.57	94.00	9.68	9.67	-0.39
	6175.00	64.74	268.32	N/A	48.75	-446.23	6028.02	445.13	95.00	9.09	9.05	-0.96
	6269.00	70.08	267.57	N/A	45.63	-532.93	6064.12	531.88	94.00	5.73	5.68	-0.80
	6364.00	75.88	267.18	N/A	41.47	-623.63	6091.91	622.65	95.00	6.12	6.11	-0.41
	6460.00	83.61	270.76	N/A	39.81	-718.00	6109.00	717.03	96.00	8.85	8.05	3.73
	6554.00	90.43	274.12	N/A	43.81	-811.72	6113.88	810.64	94.00	8.08	7.26	3.57
	6649.00	90.62	271.62	N/A	48.57	-906.59	6113.01	905.39	95.00	2.64	0.20	-2.63
	6743.00	90.65	268.67	N/A	48.80	-1000.57	6111.97	999.35	94.00	3.14	0.03	-3.14
	6933.00	90.52	267.32	N/A	42.16	-1190.44	6110.03	1189.32	190.00	0.71	-0.07	-0.71
	7027.00	90.55	266.93	N/A	37.44	-1284.32	6109.15	1283.27	94.00	0.42	0.03	-0.41
	7122.00	90.55	265.32	N/A	31.02	-1379.09	6108.24	1378.16	95.00	1.69	0.00	-1.69
	7216.00	90.55	265.02	N/A	23.11	-1472.75	6107.34	1471.96	94.00	0.32	0.00	-0.32
	7311.00	90.55	263.74	N/A	13.81	-1567.29	6106.42	1566.67	95.00	1.35	0.00	-1.35
	7405.00	90.55	264.06	N/A	3.82	-1660.75	6105.52	1660.32	94.00	0.34	0.00	0.34
	7500.00	90.43	265.24	N/A	-5.04	-1755.33	6104.71	1755.07	95.00	1.25	-0.13	1.24
	7594.00	90.49	265.15	N/A	-12.91	-1849.00	6103.96	1848.87	94.00	0.12	0.06	-0.10
	7689.00	90.52	265.55	N/A	-20.61	-1943.68	6103.12	1943.70	95.00	0.42	0.03	0.42
	7783.00	90.46	266.15	N/A	-27.42	-2037.43	6102.31	2037.57	94.00	0.64	-0.06	0.64
	7878.00	90.52	268.05	N/A	-32.22	-2132.30	6101.50	2132.52	95.00	2.00	0.06	2.00
	7973.00	90.59	269.50	N/A	-34.25	-2227.28	6100.58	2227.51	95.00	1.53	0.07	1.53
	8067.00	90.62	270.37	N/A	-34.36	-2321.27	6099.59	2321.48	94.00	0.93	0.03	0.93
	8256.00	90.43	270.25	N/A	-33.34	-2510.26	6097.86	2510.41	189.00	0.12	-0.10	-0.06
	8351.00	90.58	269.97	N/A	-33.16	-2605.25	6097.02	2605.39	95.00	0.33	0.16	-0.29
	8445.00	90.65	268.84	N/A	-34.13	-2699.24	6096.01	2699.37	94.00	1.20	0.07	-1.20
	8540.00	90.62	268.06	N/A	-36.70	-2794.20	6094.96	2794.36	95.00	0.82	-0.03	-0.82
	8634.00	90.74	267.71	N/A	-40.17	-2888.13	6093.84	2888.35	94.00	0.39	0.13	-0.37
	8729.00	90.62	267.10	N/A	-44.47	-2983.03	6092.71	2983.31	95.00	0.65	-0.13	-0.64
	8824.00	90.58	267.27	N/A	-49.14	-3077.91	6091.72	3078.27	95.00	0.18	-0.04	0.18
	8918.00	90.59	267.75	N/A	-53.22	-3171.81	6090.76	3172.24	94.00	0.51	0.01	0.51
	9013.00	90.59	267.43	N/A	-57.21	-3266.72	6089.78	3267.21	95.00	0.34	0.00	-0.34
	9107.00	90.62	267.83	N/A	-61.10	-3360.64	6088.79	3361.18	94.00	0.43	0.03	0.43
	9202.00	90.55	268.49	N/A	-64.15	-3455.58	6087.82	3456.17	95.00	0.70	-0.07	0.69
	9296.00	90.71	269.18	N/A	-66.06	-3549.56	6086.79	3550.16	94.00	0.75	0.17	0.73
	9391.00	90.68	269.75	N/A	-66.95	-3644.55	6085.63	3645.15	95.00	0.60	-0.03	0.60
	9485.00	90.49	269.55	N/A	-67.52	-3738.54	6084.67	3739.14	94.00	0.29	-0.20	-0.21
	9579.00	90.74	271.66	N/A	-66.53	-3832.52	6083.66	3833.08	94.00	2.26	0.27	2.24
	9674.00	90.15	272.67	N/A	-62.94	-3927.45	6082.93	3927.91	95.00	1.23	-0.62	1.06
	9769.00	90.40	272.46	N/A	-58.69	-4022.35	6082.47	4022.71	95.00	0.34	0.26	-0.22
	9863.00	90.37	270.47	N/A	-56.29	-4116.32	6081.84	4116.60	94.00	2.12	-0.03	-2.12
	9958.00	90.28	267.30	N/A	-58.14	-4211.28	6081.30	4211.59	95.00	3.34	-0.09	-3.34
	10052.00	90.31	266.00	N/A	-63.63	-4305.12	6080.82	4305.52	94.00	1.38	0.03	-1.38
	10147.00	90.28	266.03	N/A	-70.23	-4399.89	6080.33	4400.40	95.00	0.04	-0.03	0.03
	10242.00	90.34	264.97	N/A	-77.68	-4494.59	6079.81	4495.24	95.00	1.12	0.06	-1.12
	10336.00	90.31	264.98	N/A	-85.92	-4588.23	6079.28	4589.03	94.00	0.03	-0.03	0.01
	10431.00	90.31	265.48	N/A	-93.82	-4682.90	6078.77	4683.84	95.00	0.53	0.00	0.53
	10525.00	90.18	266.41	N/A	-100.46	-4776.66	6078.36	4777.72	94.00	1.00	-0.14	0.99
	10619.00	90.31	267.19	N/A	-105.71	-4870.52	6077.96	4871.66	94.00	0.84	0.14	0.83
	10714.00	90.28	267.59	N/A	-110.04	-4965.42	6077.47	4966.63	95.00	0.42	-0.03	0.42
	10809.00	90.37	267.49	N/A	-114.12	-5060.33	6076.93	5061.60	95.00	0.14	0.09	-0.11
	10903.00	90.37	267.74	N/A	-118.03	-5154.24	6076.33	5155.58	94.00	0.27	0.00	0.27
	10998.00	90.22	267.05	N/A	-122.34	-5249.14	6075.84	5250.55	95.00	0.74	-0.16	-0.73
	11061.00	90.18	267.13	N/A	-125.54	-5312.06	6075.62	5313.52	63.00	0.14	-0.06	0.13
Projection	11085.00	90.18	267.13	N/A	-126.74	-5336.03	6075.54	5337.51	24.00	0.00	0.00	0.00