



A Schlumberger Company

RESISTIVITY
GAMMA-RAY
CONDUCTIVITY

1" = 100'
FEET TVD

COMPANY : NOBLE ENERGY INC
WELL : WELLS RANCH AA11-637
FIELD : WATTENBERG
COUNTY : WELD
STATE : CO
COUNTRY : USA
API No. : 05-123-41253

COMPANY : NOBLE ENERGY INC
WELL : WELLS RANCH AA11-637
FIELD : WATTENBERG
COUNTY : WELD
STATE : CO
COUNTRY : USA
API WELL No. : 05-123-41253

WELL LOCATION

LAT:40°29'55"N LON:104°23'42"W
X:3,307,273 Y:1,426,409' NAD83
SEC:11 TWP:06N RANGE:63W

OTHER SERVICES

DIRECTIONAL
ROP

DEPTH REF. : ROTARY TABLE
ELEVATION : 30.00 ft (ROTARY TABLE - GROUND LEVEL)
ALTITUDE : 4855.00 ft (GROUND LEVEL - MEAN SEA LEVEL)

BOREHOLE RECORD

DEVIATION RECORD

HOLE SIZE in	FROM ft	TO ft	INCLINATION deg	FROM ft	TO ft
13 1/2	0	1861	00 - 06	0	2229
8 3/4	0	7227	06 +/- -3	2229	4016
8 1/2	7227	13827	06 - 01	4016	4300
			01 +/- -3	4300	6005
			01 - 90	6005	7177
			90 +/- -1	7177	13827

CASING RECORD

CASING SIZE in	FROM ft	TO ft
9 5/8	0	1850

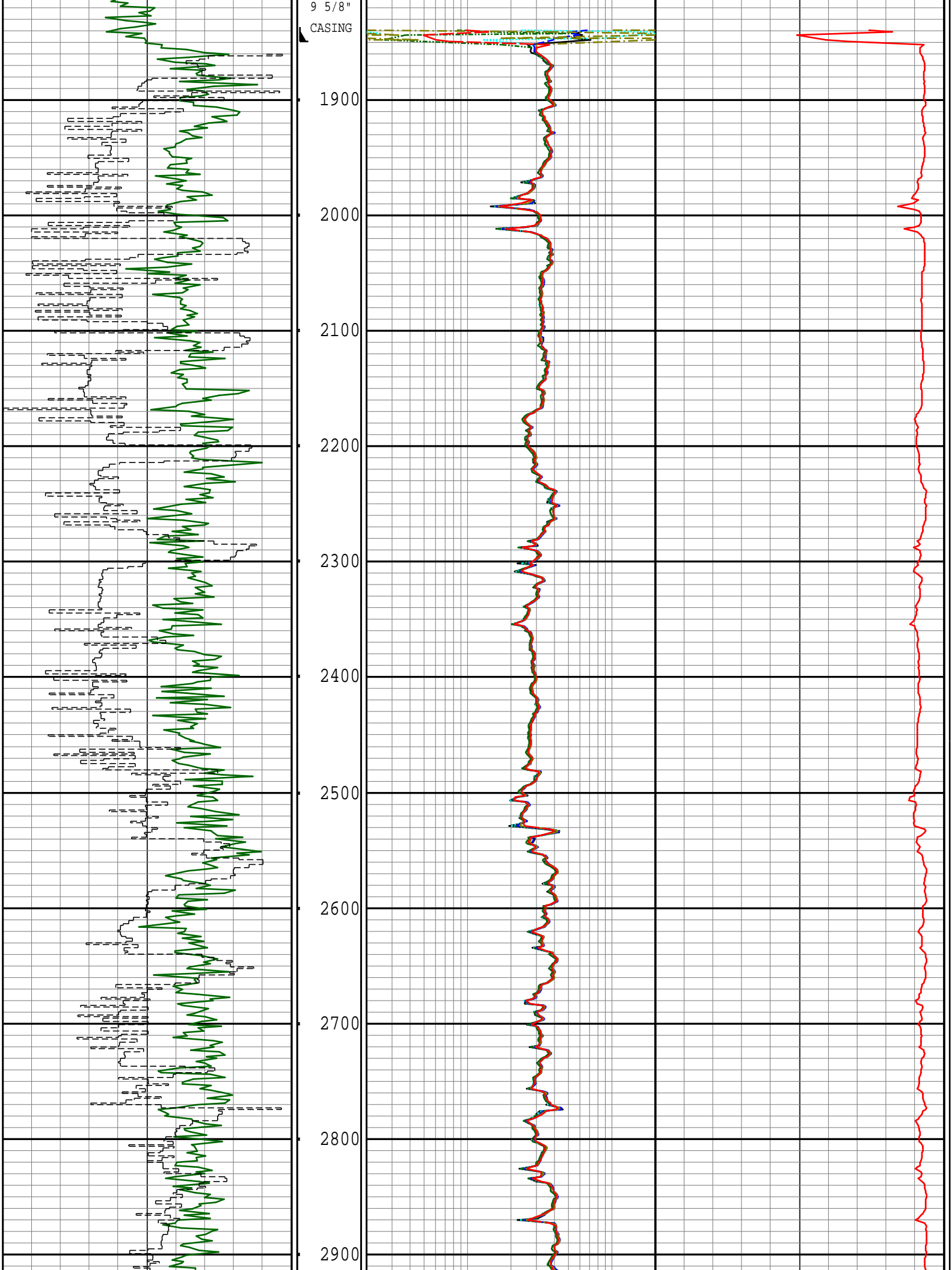
DRILLING Co.: HELMERICH & PAYNE, INC.
RIG : 326
LMD UNIT No.: RENTAL DISTRICT : COMMERCE CTY
SPUD DATE : 30-MAY-15
LMD START DATE : 01-JUN-15 DEPTH : 1861 ft
LMD END DATE : 06-JUN-15 DEPTH : 13827 ft
TOTAL DEPTH : 13827 ft

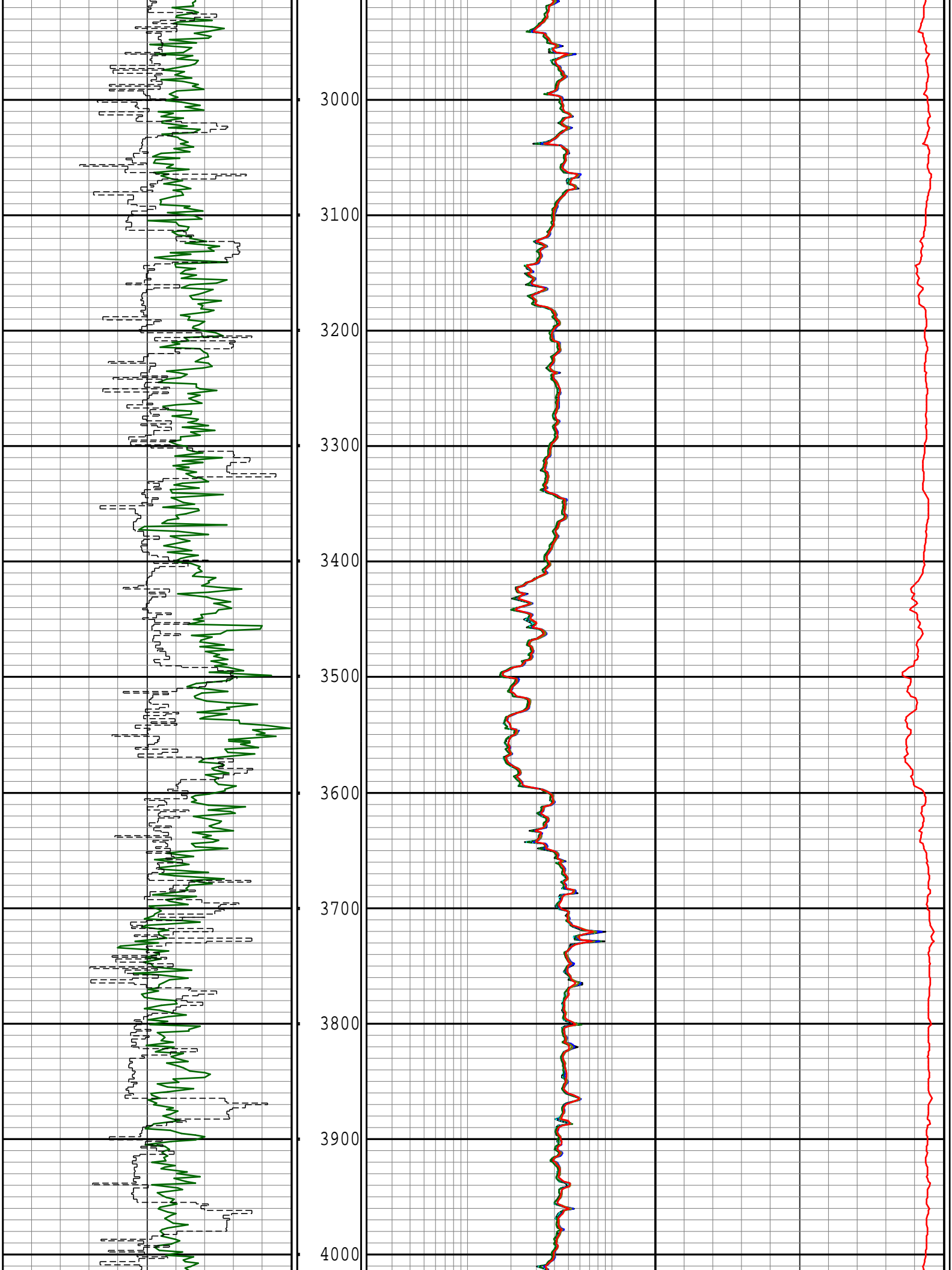
RUN DATA

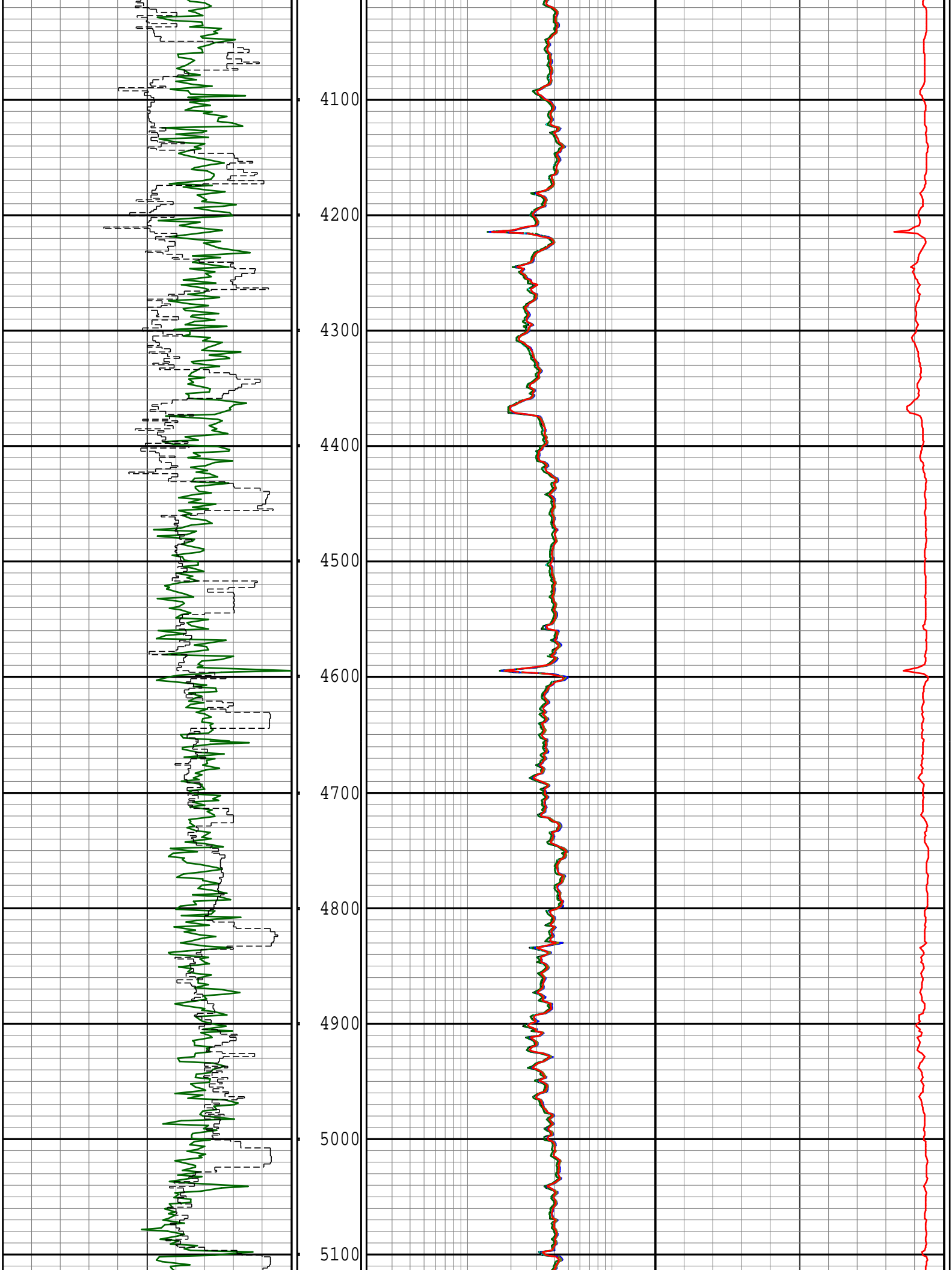
RUN NUMBER	1	3			
START DATE	01-JUN-15	03-JUN-15			
START TIME	10:45	16:30			
END DATE	02-JUN-15	06-JUN-15			
END TIME	19:45	08:30			
DEPTH IN ft	1861	7227			
DEPTH OUT ft	6451	13827			
LOG TOP ft	1850	7172			
LOG BOTTOM ft	6348	13784			
HOLE SIZE in	8 3/4	8 1/2			
MUD DATA @ ft	5772	13827			
MUD TYPE	WATER BASE	WATER BASE			
DENSITY lb/gal	8.95	10.00			
VISCOSITY s/qt	28	38			
pH	10.5	10.1			
FLUID LOSS cm3/30	27.1				
SALINITY ppm	2400	34972			
Rm ohmm @ deg F	@	0.200 @ 68			
Rmf ohmm @ deg F	@	0.150 @ 68			

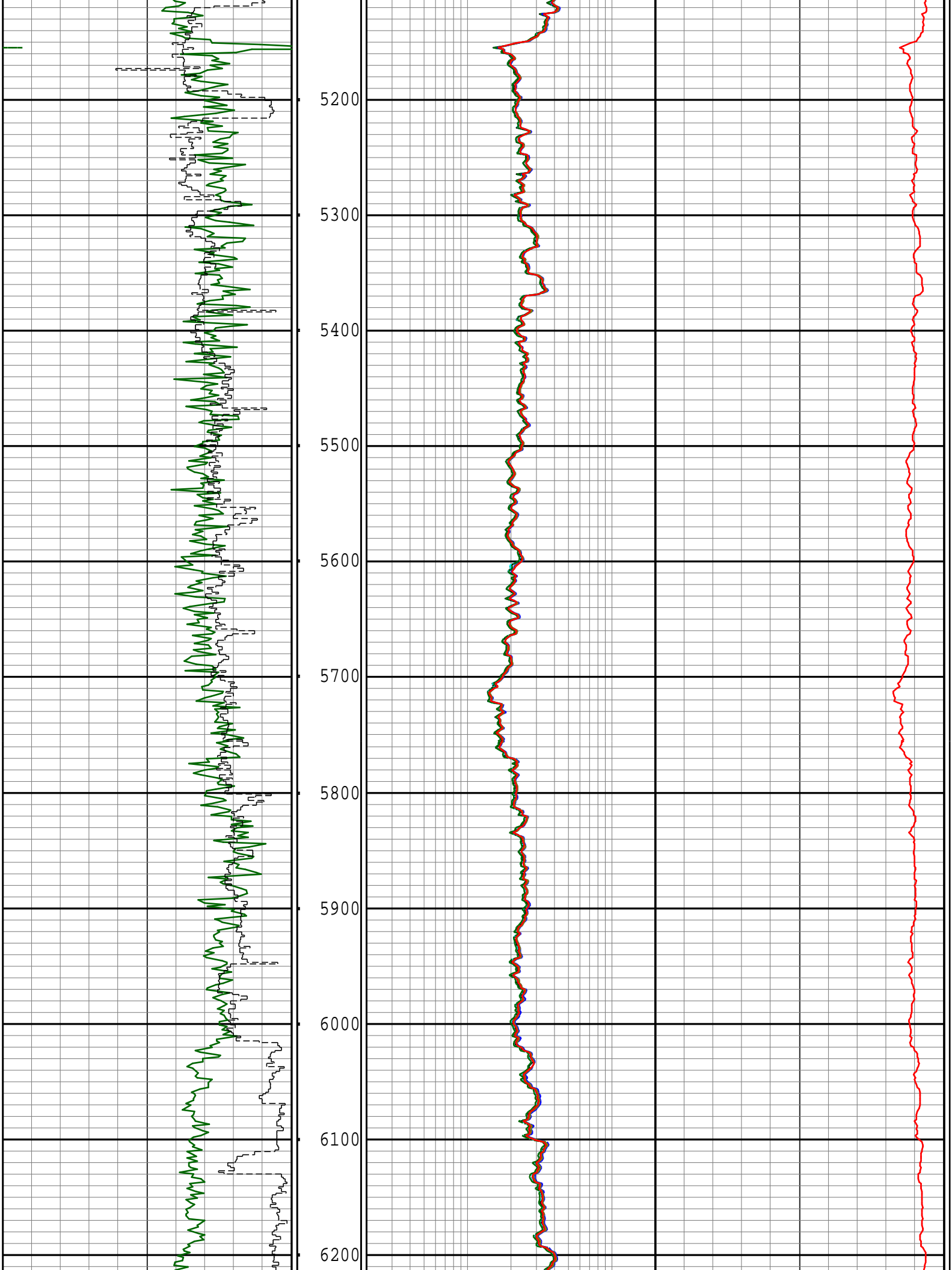
REMARKS
NOBLE ENERGY INC AFE #: 201005
PATHFINDER JOB #: 15CC00477
ALL LOGGING DATA IS MEMORY UNLESS STATED OTHERWISE.
ALL REFERENCES TO LOG TOP, LOG BOTTOM, OR LOGGING TOOL DEPTH REFER TO THE GAMMA-RAY SENSOR UNLESS STATED OTHERWISE. SENSOR OFFSETS FOR THE OTHER LOGGING TOOLS ARE SHOWN IN THE BHA REPORT ON THE LOG TRAILER.
ALL ANNOTATIONS IN THE DEPTH TRACK ARE REFERENCED TO BIT DEPTH.
THIRD PARTY DEPTH TRACKING PROVIDED BY PASON.
RUN #1: 6 3/4" AWR LOGGING RUN (ENSIGN DIR).
RUN #2: 6 1/2" MOTOR ONLY RUN (ENSIGN DIR/GR).
RUN #3: 6 3/4" SLIMPULSE DIR/GR LOGGING RUN.
REMARK #1: GAMMA-RAY LOGGED THOUGH CASING FROM 1765'-1850'MD (1765'-1850'TVD).
REMARK #2: GAMMA-RAY FROM 6348'-7172'MD (6322'-6710'TVD) SUPPLIED BY ENSIGN DIRECTIONAL.
NOTICE - All interpretations are opinions based on inferences from electrical or other measurements and we do not guarantee the accuracy or correctness of any interpretations. We shall not, except in the case of gross or willful negligence on our part, be liable or responsible for loss, costs, damages or expenses incurred or sustained by anyone as a result of any interpretations made by one of our officers, agents or employees. These interpretations are also subject to our General Terms and Conditions as set out in our current Price Schedule.
PATHFINDER - A Schlumberger Company
Version No : RX6 V7.01 Release 11May2015
Plot Time : 16-Jun-2015 12:53

[illegible]









64.21	0.54	164.3	64.21		-0.08	0.29 S	0.08 E	0.30	164.58	
158.12	0.79	154.34	158.11	93.91	-0.48	1.30 S	0.48 E	1.39	159.72	0.29
252.03	0.28	179.38	252.02	93.91	-0.76	2.11 S	0.76 E	2.25	160.14	0.59
345.94	0.29	221.79	345.93	93.91	-0.60	2.52 S	0.61 E	2.59	166.45	0.22
439.85	0.44	256.14	439.84	93.91	-0.09	2.78 S	0.10 E	2.78	177.97	0.28
533.76	0.32	159.60	533.75	93.91	0.17	3.11 S	0.16 W	3.12	182.94	0.61
627.67	0.28	160.37	627.65	93.91	0.00	3.58 S	0.01 E	3.58	179.86	0.04
721.58	0.21	131.78	721.56	93.91	-0.20	3.91 S	0.21 E	3.91	176.87	0.15
815.49	0.26	140.23	815.47	93.91	-0.46	4.19 S	0.48 E	4.21	173.48	0.06
909.40	0.40	132.12	909.38	93.91	-0.84	4.57 S	0.86 E	4.65	169.37	0.16
1003.31	0.39	153.19	1003.29	93.91	-1.23	5.07 S	1.25 E	5.23	166.21	0.15
1097.22	0.38	141.25	1097.20	93.91	-1.56	5.60 S	1.58 E	5.82	164.21	0.09
1191.13	0.36	144.35	1191.10	93.91	-1.93	6.09 S	1.95 E	6.39	162.22	0.03
1285.04	0.28	136.10	1285.01	93.91	-2.26	6.49 S	2.28 E	6.88	160.63	0.10
1378.95	0.23	136.86	1378.92	93.91	-2.55	6.79 S	2.57 E	7.26	159.28	0.05
1472.86	0.20	140.59	1472.83	93.91	-2.78	7.06 S	2.80 E	7.59	158.34	0.03
1566.77	0.17	224.65	1566.74	93.91	-2.78	7.28 S	2.81 E	7.81	158.91	0.27
1660.68	0.24	122.18	1660.65	93.91	-2.85	7.49 S	2.88 E	8.02	158.97	0.34
1754.59	0.24	195.53	1754.56	93.91	-2.96	7.78 S	2.99 E	8.34	158.97	0.31
1848.50	0.22	192.02	1848.47	93.91	-2.87	8.15 S	2.90 E	8.65	160.40	0.03
THE FOLLOWING ARE ENSIGN DIRECTIONAL SURVEYS.										
1953.00	0.43	270.38	1952.97	104.50	-2.44	8.34 S	2.47 E	8.70	163.52	0.42
2045.00	2.02	76.50	2044.95	92.00	-3.67	7.96 S	3.70 E	8.78	155.08	2.65
2137.00	3.91	62.87	2136.83	92.00	-8.05	6.15 S	8.07 E	10.15	127.32	2.18
2229.00	5.63	75.71	2228.51	92.00	-15.22	3.61 S	15.23 E	15.65	103.32	2.19
2321.00	7.29	74.13	2319.92	92.00	-25.22	0.90 S	25.22 E	25.24	92.04	1.81
2412.00	6.90	70.10	2410.22	91.00	-35.92	2.54 N	35.92 E	36.01	85.95	0.70
2504.00	6.37	69.82	2501.61	92.00	-45.92	6.18 N	45.90 E	46.32	82.33	0.58
2596.00	8.08	75.97	2592.87	92.00	-57.00	9.51 N	56.97 E	57.75	80.52	2.04
2690.00	8.61	76.76	2685.88	94.00	-70.27	12.73 N	70.22 E	71.37	79.73	0.58
2785.00	8.17	74.12	2779.86	95.00	-83.70	16.20 N	83.64 E	85.19	79.04	0.61
2879.00	7.78	74.56	2872.95	94.00	-96.27	19.72 N	96.20 E	98.20	78.41	0.42
2974.00	7.34	74.13	2967.13	95.00	-108.32	23.09 N	108.23 E	110.67	77.95	0.47
3069.00	7.25	73.51	3061.36	95.00	-119.91	26.46 N	119.82 E	122.70	77.55	0.13
3163.00	7.34	85.11	3154.60	94.00	-131.59	28.65 N	131.49 E	134.57	77.71	1.57
3258.00	6.72	86.25	3248.89	95.00	-143.19	29.53 N	143.08 E	146.10	78.34	0.67
3353.00	8.09	80.02	3343.09	95.00	-155.32	31.05 N	155.21 E	158.29	78.69	1.67
3447.00	6.51	79.31	3436.33	94.00	-167.08	33.19 N	166.96 E	170.23	78.76	1.68
3542.00	6.42	69.12	3530.73	95.00	-177.35	36.08 N	177.22 E	180.85	78.49	1.21
3732.00	7.08	69.21	3719.41	190.00	-198.25	44.02 N	198.09 E	202.92	77.47	0.35
3826.00	7.16	67.54	3812.68	94.00	-209.09	48.32 N	208.92 E	214.43	76.98	0.24
3921.00	7.69	75.54	3906.89	95.00	-220.73	52.17 N	220.54 E	226.63	76.69	1.22
4016.00	6.37	71.76	4001.17	95.00	-231.91	55.40 N	231.71 E	238.24	76.55	1.47
4110.00	4.40	83.45	4094.76	94.00	-240.45	57.45 N	240.24 E	247.01	76.55	2.39
4205.00	2.55	94.43	4189.58	95.00	-246.18	57.70 N	245.97 E	252.65	76.80	2.06
4300.00	0.62	38.36	4284.54	95.00	-248.61	57.94 N	248.40 E	255.06	76.87	2.38
4394.00	1.41	351.42	4378.53	94.00	-248.75	59.48 N	248.54 E	255.56	76.54	1.15
4489.00	2.28	310.12	4473.48	95.00	-247.14	61.86 N	246.92 E	254.55	75.94	1.62
4584.00	1.76	318.38	4568.42	95.00	-244.74	64.16 N	244.50 E	252.78	75.30	0.63
4679.00	1.89	252.99	4663.38	95.00	-242.27	64.80 N	242.04 E	250.56	75.01	2.08
4773.00	1.23	189.53	4757.36	94.00	-240.62	63.35 N	240.39 E	248.59	75.24	1.84
4868.00	2.99	223.02	4852.29	95.00	-238.75	60.53 N	238.53 E	246.09	75.76	2.19
4963.00	3.08	200.25	4947.16	95.00	-236.16	56.32 N	235.95 E	242.58	76.57	1.26
5058.00	3.78	216.69	5041.99	95.00	-233.39	51.42 N	233.20 E	238.80	77.57	1.26
5153.00	3.43	250.09	5136.81	95.00	-228.83	47.94 N	228.66 E	233.63	78.16	2.21
5247.00	2.02	280.67	5230.71	94.00	-224.56	47.29 N	224.38 E	229.31	78.10	2.10
5342.00	1.67	258.00	5325.66	95.00	-221.56	47.31 N	221.39 E	226.38	77.94	0.85
5437.00	1.23	252.99	5420.63	95.00	-219.23	46.72 N	219.06 E	223.98	77.96	0.48
5531.00	0.92	224.60	5514.61	94.00	-217.73	45.89 N	217.56 E	222.35	78.09	0.65
5626.00	0.62	204.91	5609.61	95.00	-216.97	44.88 N	216.81 E	221.41	78.30	0.42
5721.00	1.05	222.66	5704.60	95.00	-216.16	43.78 N	216.00 E	220.39	78.54	0.52
5816.00	1.45	199.72	5799.57	95.00	-215.16	42.00 N	215.01 E	219.07	78.95	0.67
5910.00	1.54	191.46	5893.54	94.00	-214.50	39.65 N	214.36 E	217.99	79.52	0.25
6005.00	1.19	154.72	5988.52	95.00	-214.66	37.50 N	214.52 E	217.78	80.08	0.97
6100.00	7.29	265.20	6083.27	95.00	-209.06	36.11 N	208.93 E	212.03	80.20	8.20
6194.00	13.40	264.93	6175.70	94.00	-192.25	34.64 N	192.12 E	195.22	79.78	6.50
6289.00	19.38	258.25	6266.80	95.00	-165.81	30.46 N	165.70 E	168.47	79.59	6.59
6384.00	23.10	266.70	6355.35	95.00	-131.74	26.17 N	131.64 E	134.22	78.76	5.06

Survey Report											
Vertical Section Plane: 269.79°						Total Correction: 7.54° East to Grid					
Calculation Method: Minimum Curvature						Survey Reference: Wellhead					
North Aligned to: Grid North						Well: WELLS RANCH AA11-637					
RT: 30' ROTARY TABLE TO GROUND LEVEL						FIELD: WATTENBURG					
Measured Depth (ft)	Inclination (deg)	Azimuth (deg)	TVD (ft)	Course Length (ft)	Vertical Section (ft)	Rect Co-ord North (ft)	Rect Co-ord East (ft)	Closure Distance (ft)	Closure Direction (deg)	Dog-leg Severity (dg/hft)	Temp (deg F)
6420.00	23.56	270.21	6388.41	36.00	-117.49	25.79 N	117.40 E	120.19	77.61	4.07	
6514.00	32.26	282.17	6471.46	94.00	-74.08	31.16 N	73.97 E	80.27	67.15	10.97	
6609.00	46.86	283.22	6544.51	95.00	-15.29	44.51 N	15.12 E	47.01	18.77	15.38	
6704.00	60.48	275.13	6600.72	95.00	60.01	56.20 N	60.22 W	82.37	313.02	15.87	
6798.00	72.18	270.04	6638.41	94.00	145.83	59.90 N	146.05 W	157.85	292.30	13.39	
6893.00	74.19	269.51	6665.89	95.00	236.76	59.54 N	236.98 W	244.34	284.10	2.18	

6988.00	79.47	269.50	6687.53	95.00	329.23	58.74 N	329.44 W	334.64	280.11	5.56
7082.00	81.01	268.19	6703.46	94.00	421.85	56.87 N	422.06 W	425.87	277.67	2.14
7177.00	90.40	267.00	6710.57	95.00	516.40	52.89 N	516.60 W	519.30	275.85	9.96
THE FOLLOWING ARE PATHFINDER MWD SURVEYS.										
7275.00	90.62	266.02	6709.70	98.00	614.24	46.93 N	614.41 W	616.20	274.37	1.03
7370.00	90.89	266.66	6708.45	95.00	709.06	40.87 N	709.21 W	710.39	273.30	0.73
7464.00	90.62	266.42	6707.21	94.00	802.90	35.19 N	803.03 W	803.80	272.51	0.38
7559.00	90.45	266.28	6706.32	95.00	897.72	29.15 N	897.84 W	898.31	271.86	0.23
7654.00	90.82	267.58	6705.27	95.00	992.60	24.06 N	992.69 W	992.98	271.39	1.42
7745.00	90.38	268.03	6704.31	91.00	1083.54	20.57 N	1083.62 W	1083.81	271.09	0.69
7837.00	90.58	268.35	6703.54	92.00	1175.50	17.67 N	1175.57 W	1175.70	270.86	0.41
7929.00	90.38	268.14	6702.77	92.00	1267.46	14.85 N	1267.52 W	1267.61	270.67	0.31
8022.00	90.52	268.20	6702.04	93.00	1360.42	11.88 N	1360.47 W	1360.52	270.50	0.16
8114.00	91.24	268.59	6700.63	92.00	1452.38	9.30 N	1452.43 W	1452.46	270.37	0.89
8206.00	90.14	269.75	6699.52	92.00	1544.37	7.97 N	1544.41 W	1544.43	270.30	1.74
8298.00	90.17	269.96	6699.27	92.00	1636.37	7.74 N	1636.41 W	1636.42	270.27	0.23
8390.00	90.48	269.87	6698.75	92.00	1728.36	7.60 N	1728.40 W	1728.42	270.25	0.35
8482.00	90.65	270.96	6697.84	92.00	1820.35	8.27 N	1820.40 W	1820.41	270.26	1.20
8574.00	89.76	269.64	6697.52	92.00	1912.35	8.75 N	1912.39 W	1912.41	270.26	1.73
8666.00	89.72	269.84	6697.93	92.00	2004.34	8.33 N	2004.39 W	2004.41	270.24	0.22
8757.00	89.72	270.24	6698.38	91.00	2095.34	8.40 N	2095.39 W	2095.40	270.23	0.44
8852.00	89.86	270.04	6698.73	95.00	2190.34	8.63 N	2190.39 W	2190.40	270.23	0.26
8947.00	89.45	269.33	6699.30	95.00	2285.34	8.11 N	2285.38 W	2285.40	270.20	0.86
9041.00	89.24	269.51	6700.37	94.00	2379.33	7.15 N	2379.37 W	2379.38	270.17	0.29
9136.00	89.24	269.40	6701.63	95.00	2474.32	6.25 N	2474.36 W	2474.37	270.14	0.12
9231.00	89.86	269.78	6702.38	95.00	2569.32	5.57 N	2569.35 W	2569.36	270.12	0.76
9326.00	90.41	270.13	6702.15	95.00	2664.31	5.50 N	2664.35 W	2664.36	270.12	0.69
9420.00	90.48	270.15	6701.42	94.00	2758.31	5.73 N	2758.35 W	2758.36	270.12	0.08
9515.00	90.45	270.22	6700.65	95.00	2853.30	6.03 N	2853.34 W	2853.35	270.12	0.08
9609.00	90.31	270.01	6700.03	94.00	2947.30	6.22 N	2947.34 W	2947.35	270.12	0.27
9704.00	90.45	270.07	6699.40	95.00	3042.30	6.29 N	3042.34 W	3042.35	270.12	0.16
9799.00	90.21	269.91	6698.85	95.00	3137.29	6.27 N	3137.34 W	3137.35	270.11	0.30
9894.00	89.86	269.89	6698.79	95.00	3232.29	6.10 N	3232.34 W	3232.34	270.11	0.37
9988.00	89.73	269.59	6699.13	94.00	3326.29	5.68 N	3326.34 W	3326.34	270.10	0.35
10083.00	89.79	269.87	6699.53	95.00	3421.29	5.23 N	3421.33 W	3421.34	270.09	0.30
10178.00	89.72	269.87	6699.94	95.00	3516.29	5.01 N	3516.33 W	3516.34	270.08	0.07
10273.00	89.90	270.26	6700.25	95.00	3611.29	5.12 N	3611.33 W	3611.34	270.08	0.45
10367.00	89.24	269.38	6700.96	94.00	3705.29	4.83 N	3705.33 W	3705.33	270.07	1.17
10462.00	89.35	269.50	6702.12	95.00	3800.28	3.90 N	3800.32 W	3800.32	270.06	0.17
10556.00	89.55	269.84	6703.03	94.00	3894.27	3.36 N	3894.31 W	3894.31	270.05	0.42
10651.00	90.00	269.83	6703.40	95.00	3989.27	3.08 N	3989.31 W	3989.31	270.04	0.47
10745.00	90.03	269.51	6703.38	94.00	4083.27	2.54 N	4083.31 W	4083.31	270.04	0.34
10840.00	89.90	269.71	6703.43	95.00	4178.27	1.90 N	4178.31 W	4178.31	270.03	0.25
10935.00	90.28	269.95	6703.28	95.00	4273.27	1.61 N	4273.30 W	4273.30	270.02	0.47
11029.00	89.72	269.44	6703.28	94.00	4367.27	1.11 N	4367.30 W	4367.30	270.01	0.81
11124.00	89.48	268.75	6703.95	95.00	4462.26	0.39 S	4462.29 W	4462.29	270.00	0.77
11219.00	90.31	270.05	6704.12	95.00	4557.25	1.38 S	4557.28 W	4557.28	269.98	1.62
11314.00	89.69	268.97	6704.12	95.00	4652.25	2.19 S	4652.27 W	4652.27	269.97	1.31
11408.00	89.69	269.12	6704.63	94.00	4746.24	3.76 S	4746.26 W	4746.26	269.95	0.16
11503.00	90.38	270.19	6704.57	95.00	4841.24	4.33 S	4841.26 W	4841.26	269.95	1.34
11598.00	89.93	269.83	6704.31	95.00	4936.24	4.32 S	4936.26 W	4936.26	269.95	0.61
11692.00	90.14	269.91	6704.26	94.00	5030.24	4.53 S	5030.26 W	5030.26	269.95	0.24
11787.00	90.62	270.36	6703.63	95.00	5125.23	4.31 S	5125.25 W	5125.25	269.95	0.69
11881.00	90.07	270.00	6703.06	94.00	5219.23	4.01 S	5219.25 W	5219.25	269.96	0.70
11976.00	90.41	269.88	6702.66	95.00	5314.23	4.11 S	5314.25 W	5314.25	269.96	0.38
12071.00	90.45	270.08	6701.95	95.00	5409.22	4.14 S	5409.25 W	5409.25	269.96	0.21
12165.00	90.45	270.34	6701.21	94.00	5503.22	3.80 S	5503.24 W	5503.24	269.96	0.28
12260.00	90.52	270.11	6700.41	95.00	5598.21	3.43 S	5598.24 W	5598.24	269.96	0.25
12355.00	90.52	270.50	6699.55	95.00	5693.20	2.92 S	5693.23 W	5693.23	269.97	0.41
12449.00	89.97	270.69	6699.14	94.00	5787.19	1.94 S	5787.23 W	5787.23	269.98	0.62
12544.00	89.52	269.77	6699.57	95.00	5882.19	1.56 S	5882.22 W	5882.22	269.98	1.08
12638.00	89.86	270.30	6700.08	94.00	5976.19	1.50 S	5976.22 W	5976.22	269.99	0.67
12733.00	90.07	269.99	6700.13	95.00	6071.18	1.26 S	6071.22 W	6071.22	269.99	0.39
12827.00	89.90	269.32	6700.16	94.00	6165.18	1.83 S	6165.22 W	6165.22	269.98	0.74
12922.00	90.03	269.24	6700.22	95.00	6260.18	3.02 S	6260.21 W	6260.21	269.97	0.16

Survey Report												
Vertical Section Plane: 269.79°						Total Correction: 7.54° East to Grid						
Calculation Method: Minimum Curvature						Survey Reference: Wellhead						
North Aligned to: Grid North						Well: WELLS RANCH AA11-637						
RT: 30' ROTARY TABLE TO GROUND LEVEL						FIELD: WATTENBURG						
Measured Depth (ft)	Inclination (deg)	Azimuth (deg)	TVD (ft)	Course Length (ft)	Vertical Section (ft)	Rect Co-ord North (ft)	Rect Co-ord East (ft)	Closure Distance (ft)	Closure Direction (deg)	Dog-leg Severity (dg/hft)	Temp (deg F)	
13016.00	90.14	269.33	6700.08	94.00	6354.18	4.20 S	6354.20 W	6354.20	269.96	0.15		
13111.00	89.90	269.47	6700.04	95.00	6449.17	5.19 S	6449.20 W	6449.20	269.95	0.29		
13205.00	90.00	269.44	6700.13	94.00	6543.17	6.09 S	6543.19 W	6543.20	269.95	0.11		
13299.00	90.10	269.41	6700.04	94.00	6637.17	7.03 S	6637.19 W	6637.19	269.94	0.11		
13394.00	90.03	269.25	6699.94	95.00	6732.17	8.14 S	6732.18 W	6732.19	269.93	0.18		
13489.00	89.97	268.28	6699.94	95.00	6827.15	10.19 S	6827.16 W	6827.17	269.91	1.02		
13583.00	89.76	266.00	6700.16	94.00	6921.04	14.88 S	6921.04 W	6921.05	269.88	2.44		
13678.00	89.69	266.53	6700.61	95.00	7015.86	21.07 S	7015.83 W	7015.86	269.83	0.56		
13772.00	89.76	266.84	6701.06	94.00	7109.72	26.50 S	7109.67 W	7109.72	269.79	0.34		
13866.00	89.86	266.84	6701.11	93.00	7199.73	28.23 S	7199.67 W	7199.73	269.72	0.73		

13785.00	89.86	266.84	6701.11	13.00	7122.71	27.22 S	7122.65 W	7122.71	269.78	0.77
STRAIGHT LINE PROJECTION TO BIT DEPTH AT 13827'MD.										
13827.00	89.86	266.84	6701.21	42.00	7164.65	29.53 S	7164.59 W	7164.65	269.76	0.00

PATHFINDER ENERGY SERVICES - TOOL CODES & DESCRIPTIONS			
HDS1M	HIGH SPEED DIRECTIONAL SURVEY MULTILINK TOOL	CLSSM	COMPENSATED LONG SPACE SONIC TOOL
HDS1L	HIGH SPEED DIRECTIONAL SURVEY GAMMA TOOL	SCLSS	SLIM COMPENSATED LONG SPACE SONIC MULTILINK TOOL
HDS1R	HIGH SPEED DIRECTIONAL SURVEY GAMMA RETRIEVABLE TOOL	DPM	DYNAMIC PRESSURE MODULE
AWR	ARRAY WAVE RESISTIVITY GAMMA MULTILINK TOOL	PZIG	AT-BIT INCLINATION AND GAMMA RAY
CWRGM	COMPENSATED WAVE RESISTIVITY GAMMA MULTILINK TOOL	2DRS	2D ROTARY STEERING TOOL
SCWR	SLIM COMPENSATED WAVE RESISTIVITY TOOL	3DRS	3D ROTARY STEERING TOOL
DNSCM	DENSITY NEUTRON STANDOFF CALIPER MULTILINK TOOL	DFT	DRILLING FORMATION TESTER

PATHFINDER ENERGY SERVICES - MNEMONICS LIST			
GENERAL			
AHV	ANNULAR HOLE VOLUME TICKS	ROP	RATE OF PENETRATION
AHVT	ANNULAR HOLE VOLUME-ACCUMULATIVE TOTAL	GRW	RAW GAMMA RAY
BHV	BOREHOLE VOLUME TICKS	GRC	CALIBRATED GAMMA RAY
BHVT	BOREHOLE VOLUME-ACCUMULATIVE TOTAL	GREC	ENVIRONMENTALLY CORRECTED GAMMA RAY
DEPT	MEASURED DEPTH	RM	RESISTIVITY OF MUD
MTVD	MEASURED TRUE VERTICAL DEPTH	RMF	RESISTIVITY OF MUD FILTRATE
INC	INCLINATION	SHOES	CASING SHOE SYMBOLS
AZI	AZIMUTH	SURVS	SURVEY TEXT SYMBOLS

4 3/4" SCWR			
C15A	CWR ATTENUATION CONDUCTIVITY (15")	R35A	CWR ATTENUATION RESISTIVITY (35")
C15P	CWR PHASE CONDUCTIVITY (15")	R35P	CWR PHASE RESISTIVITY (35")
C35A	CWR ATTENUATION CONDUCTIVITY (35")	UL1A	UNCOMPENSATED 15" ATTENUATION RESISTIVITY LOWER
C35P	CWR PHASE CONDUCTIVITY (35")	UL1P	UNCOMPENSATED 15" PHASE RESISTIVITY LOWER
CWRFET	CWR FORMATION EXPOSURE TIME	UL3A	UNCOMPENSATED 35" ATTENUATION RESISTIVITY LOWER
GRC	CALIBRATED GAMMA RAY	UL3P	UNCOMPENSATED 35" PHASE RESISTIVITY LOWER
GREC	ENVIRONMENTALLY CORRECTED GAMMA RAY	UU1A	UNCOMPENSATED 15" ATTENUATION RESISTIVITY UPPER
GRFET	GAMMA RAY FORMATION EXPOSURE TIME	UU1P	UNCOMPENSATED 15" PHASE RESISTIVITY UPPER
R15A	CWR ATTENUATION RESISTIVITY (15")	UU3A	UNCOMPENSATED 35" ATTENUATION RESISTIVITY UPPER
R15P	CWR PHASE RESISTIVITY (15")	UU3P	UNCOMPENSATED 35" PHASE RESISTIVITY UPPER

6 3/4", 8", & 9 1/2" CWR			
C25A	CWR ATTENUATION CONDUCTIVITY (25")	R55A	CWR ATTENUATION RESISTIVITY (55")
C25P	CWR PHASE CONDUCTIVITY (25")	R55P	CWR PHASE RESISTIVITY (55")
C55A	CWR ATTENUATION CONDUCTIVITY (55")	UL2A	UNCOMPENSATED 25" ATTENUATION RESISTIVITY LOWER
C55P	CWR PHASE CONDUCTIVITY (55")	UL2P	UNCOMPENSATED 25" PHASE RESISTIVITY LOWER
CWRFET	CWR FORMATION EXPOSURE TIME	UL5A	UNCOMPENSATED 55" ATTENUATION RESISTIVITY LOWER
GRC	CALIBRATED GAMMA RAY	UL5P	UNCOMPENSATED 55" PHASE RESISTIVITY LOWER
GREC	ENVIRONMENTALLY CORRECTED GAMMA RAY	UU2A	UNCOMPENSATED 25" ATTENUATION RESISTIVITY UPPER
GRFET	GAMMA RAY FORMATION EXPOSURE TIME	UU2P	UNCOMPENSATED 25" PHASE RESISTIVITY UPPER
R25A	CWR ATTENUATION RESISTIVITY (25")	UU5A	UNCOMPENSATED 55" ATTENUATION RESISTIVITY UPPER
R25P	CWR PHASE RESISTIVITY (25")	UU5P	UNCOMPENSATED 55" PHASE RESISTIVITY UPPER

4 3/4", 6 3/4", 8", & 9 1/2" AWR			
GRCA	AWR CALIBRATED GAMMA RAY	RDPH	DEEP PHASE RESISTIVITY FROM 2 MHZ FREQUENCY
GRWA	AWR RAW GAMMA RAY	RSAH	SHALLOW ATTENUATION RESISTIVITY FROM 2 MHZ FREQUENCY
TEMP_A	TEMPERATURE FROM AWR TOOL	RMAH	MEDIUM ATTENUATION RESISTIVITY FROM 2 MHZ FREQUENCY
INC_A	AWR STATIC INCLINATION	RDAH	DEEP ATTENUATION RESISTIVITY FROM 2 MHZ FREQUENCY
INCD_A	AWR DYNAMIC INCLINATION	CSPL	SHALLOW PHASE CONDUCTIVITY FROM 500 KHZ FREQUENCY
RSPL	SHALLOW PHASE RESISTIVITY FROM 500 KHZ FREQUENCY	CMPL	MEDIUM PHASE CONDUCTIVITY FROM 500 KHZ FREQUENCY
RMPL	MEDIUM PHASE RESISTIVITY FROM 500 KHZ FREQUENCY	CDPL	DEEP PHASE CONDUCTIVITY FROM 500 KHZ FREQUENCY
RDPL	DEEP PHASE RESISTIVITY FROM 500 KHZ FREQUENCY	CSPH	SHALLOW PHASE CONDUCTIVITY FROM 2 MHZ FREQUENCY
RSAL	SHALLOW ATTENUATION RESISTIVITY FROM 500 KHZ FREQUENCY	CMPH	MEDIUM PHASE CONDUCTIVITY FROM 2 MHZ FREQUENCY
RMAH	MEDIUM ATTENUATION RESISTIVITY FROM 2 MHZ FREQUENCY	CDPH	DEEP PHASE CONDUCTIVITY FROM 2 MHZ FREQUENCY

RVAL	MEDIUM ATTENUATION RESISTIVITY FROM 500 KHZ FREQUENCY	CDPH	DEEP PHASE CONDUCTIVITY FROM 2 MHZ FREQUENCY
RDAL	DEEP ATTENUATION RESISTIVITY FROM 500 KHZ FREQUENCY	ARFET	AWR FORMATION EXPOSURE TIME
RSPH	SHALLOW PHASE RESISTIVITY FROM 2 MHZ FREQUENCY	GAFET	AWR GAMMA RAY FORMATION EXPOSURE TIME
RMPH	MEDIUM PHASE RESISTIVITY FROM 2 MHZ FREQUENCY		

4 3/4", 6 3/4", 8" DNSC

BS	BIT SIZE	NLIM	NEUTRON POROSITY (LIMESTONE MATRIX)
CALI	CALIPER	NNEAR	NEAR NEUTRON COUNT RATE
DDDN	DNSC DATA DENSITY (0 - 4 SAMPLES/FT)	NRAT	NEUTRON RATIO
DGAM	DENSITY GAMMA (NATURAL)	NSAC	ENVIRONMENTALLY CORRECTED NEUTRON
DNPH	NEUTRON POROSITY CORRECTION		
DNSFET	DNSC FORMATION EXPOSURE TIME	NSAN	NEUTRON POROSITY (SANDSTONE MATRIX)
DPE	PE CORRECTION	PE	PHOTOELECTRIC INDEX

DPHI	DENSITY POROSITY (GIVEN MATRIX)	PEMI	PHOTOELECTRIC INDEX (MINIMUM FILTER)
DHRM	DENSITY CORRECTION MINUS	RHOB	BULK DENSITY
DRHO	DENSITY CORRECTION	SDNP	STANDARD DEVIATION NEUTRON POROSITY
DRHP	DENSITY CORRECTION PLUS	SDPE	STANDARD DEVIATION PE COMPUTATION
EDPH	DENSITY POROSITY-EVR PROCESSED	SDRH	STANDARD DEVIATION DENSITY
ENPH	NEUTRON POROSITY-EVR PROCESSED	SOA	UNWEIGHTED DENSITY STANDOFF
ERHO	BULK DENSITY-EVR PROCESSED	TBDN	TIME BEHIND DNSC
NDOL	NEUTRON POROSITY (DOLOMITE MATRIX)	WSOD	WEIGHTED STANDOFF DENSITY
NFAR	FAR NEUTRON COUNT RATE	WSON	WEIGHTED STANDOFF NEUTRON

4 3/4" SCLSS, 6 3/4" & 8" CLSS

ACFET	ACOUSTIC FORMATION EXPOSURE TIME	SHS1	MAX SHEAR SEMBLANCE , UPPER XMTR
SO	ACOUSTIC TOOL STANDOFF	SHS2	MAX SHEAR SEMBLANCE , LOWER XMTR
SOFF	STANDOFF	SLS1	SHEAR SEMBLANCE MIN CUTOFF , UPPER XMTR
DTCU	DELTA T COMP , UPPER XMTR-FIELD PROCESSED	SLS2	SHEAR SEMBLANCE MIN CUTOFF , LOWER XMTR
DTCL	DELTA T COMP , LOWER XMTR-FIELD PROCESSED	WFT1	WAVEFORM XMTR1 , ALL 4 RCVR (NON-PARSED)
DTP1	DELTA T COMP , UPPER XMTR-POST PROCESSED	WFT2	WAVEFORM XMTR2 , ALL 4 RCVR (NON-PARSED)
DTP2	DELTA T COMP , LOWER XMTR-POST PROCESSED	W11C	PARSED WAVEFORM , XMTR 1 , RCVR 1
DTS1	DELTA T SHEAR , UPPER XMTR-POST PROCESSED	W12C	PARSED WAVEFORM , XMTR 1 , RCVR 2
DTS2	DELTA T SHEAR , LOWER XMTR-POST PROCESSED	W13C	PARSED WAVEFORM , XMTR 1 , RCVR 3
SEM1	SEMBLANCE , UPPER XMTR-POST PROCESSED	W14C	PARSED WAVEFORM , XMTR 1 , RCVR 4
SEM2	SEMBLANCE , LOWER XMTR-POST PROCESSED	W21C	PARSED WAVEFORM , XMTR 2 , RCVR 1
SMX1	MAX COMP SEMBLANCE , UPPER XMTR	W22C	PARSED WAVEFORM , XMTR 2 , RCVR 2
SMX2	MAX COMP SEMBLANCE , LOWER XMTR	W23C	PARSED WAVEFORM , XMTR 2 , RCVR 3
SMN1	COMP SEMBLANCE MIN CUTOFF , UPPER XMTR	W24C	PARSED WAVEFORM , XMTR 2 , RCVR 4
SMN2	COMP SEMBLANCE MIN CUTOFF , LOWER XMTR		

4 3/4" , 6 3/4" , 8" & 9 1/2" DPM & QPM

ANPR	ANNULAR PRESSURE	KPOSI	KELLY POSITION
BDEPS	BIT DEPTH STAMP	MWC	MUD WEIGHT CALCULATED
DAPR	PRESSURE TOOL DIFFERENTIAL PRESSURE	MWI_P	MUD WEIGHT IN
DPPR	PRESSURE TOOL DRILL PIPE PRESSURE	SPP_I	STANDPIPE PRESSURE
ECDM	EQUIVALENT CIRCULATING DENSITY	SWOB	SURFACE WEIGHT ON BIT
HDEPS	HOLE DEPTH STAMP	TDPM	PRESSURE TOOL ANNULAR TEMPERATURE

6 3/4" DFT

DFGR	DFT GAMMA RAW	HYDA	HYDROSTATIC PRESSURE -- AFTER
DFGRC	DFT GAMMA CALIBRATED	HYDB	HYDROSTATIC PRESSURE -- BEFORE
DFANPR	DFT ANNULAR PRESSURE	FPRES	FORMATION PRESSURE
DFECD	DFT EQUIVALENT CIRCULATING DENSITY OF THE MUD		

4 3/4", 6 3/4" PZIG

NBDINC	NEAR BIT DYNAMIC INCLINATION	NBGR	NEAR BIT GAMMA CALIBRATED
NBSINC	NEAR BIT STATIC INCLINATION	NBTMP	NEAR BIT TEMPERATURE
NBGR	NEAR BIT GAMMA RAW	NBIFET	NEAR BIT FORMATION EXPOSURE TIME

BOTTOM HOLE ASSEMBLY RECORD

RUN 1		ft	RUN 3		ft		
8 3/4" PDC BIT	0.70		8 1/2" PDC BIT	0.75			
1.83° MUD MOTOR	27.73		POWERDRIVE ORBIT	13.44			
NMPC	14.96		UBHO	2.81			
UBHO	2.08		CLPS COLLAR	4.30			
NMPC	15.17		SLMPLSE (DIR/GR)	30.66			
NMFC	30.21		FLOW SLEEVE	3.01			
NM XO	2.08		STAB 8 3/8"	5.72			
AWR (RES/GR)	19.26		FILTER	3.05			
ABS (BATTERY)	14.29		XO	1.98			
NM XO	2.88		MUD MOTOR	26.00			
5" DP X36 JTS	1137.03		NMDC	29.72			
HWDP X45 JTS	1379.22		HWDP X3 JTS	92.47			
TOTAL BHA	2646.14		5" DP X237 JTS	7482.48			
			HWDP X36 JTS	1103.25			
			TOTAL BHA	8799.64			
SENSOR OFFSETS:			SENSOR OFFSETS:				
GAMMA-RAY	96.62		DIRECTIONAL	40.03			
RESISTIVITY	103.52		GAMMA-RAY	43.06			



A Schlumberger Company

RESISTIVITY
GAMMA-RAY
CONDUCTIVITY

1" = 100'
FEET TVD