PATHFINDER

A Schlumberger Company

AZIMUTHAL DENSITY
GAMMA-RAY

1" = 100'
FEET MD

COMPANY : WARD PETROLEUM
WELL : SHARP 24-3-11HC ST1
FIELD : WATTENBERG
COUNTY : ADAMS
STATE : CO
COUNTRY : USA
API No.: 05-001-09801

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COUNTY : ADAMS
STATE : CO
COUNTRY : USA
API No.: 05-001-09801

WELL LOCATION

LAT:39°56'39"N LON:104°50'46"W
X:3,183,355' Y:1,223,135'NAD83

SEC: 24 TWP: 15 RANGE: 67W

OTHER SERVICES

DIRECTIONAL
ROP
CALIPER
PE
BOREHOLE VOLUME

DEPTH REF. : ROTARY TABLE
ELEVATION : 25.00 ft (ROTARY TABLE - GROUND LEVEL)
ALTITUDE : 5019.00 ft (GROUND LEVEL - MEAN SEA LEVEL)

BOREHOLE RECORD

HOLE SIZE in	FROM ft	TO ft
13 1/2	0	1255
8 3/4	1255	8258
6 1/8	8258	12582

CASING RECORD

CASING SIZE in	FROM ft	TO ft
9 5/8	0	1235
7	0	8242

DEVIATION RECORD

INCLINATION deg	FROM ft	TO ft
00 - 12	0	5291
12 - 03	5291	7051
03 - 90	7051	8406
90 +/-4	8406	12582

DRILLING Co.: FRONTIER
RIG : 28
LWD UNIT No.: N/A DISTRICT : COMMERCE
SPUD DATE : 09-JUN-14
LWD START DATE : 28-JUN-14 DEPTH : 8640 ft
LWD END DATE : 04-JUL-14 DEPTH : 12582 ft
TOTAL DEPTH : 12582 ft

RUN DATA

RUN NUMBER	1	2	3																
START DATE	22-JUN-14	23-JUN-14	28-JUN-14																
START TIME	16:45	21:30	08:15																
END DATE	23-JUN-14	28-JUN-14	04-JUL-14																
END TIME	19:30	04:45																	
DEPTH IN ft	8258	8296	8640																
DEPTH OUT ft	8296	10241	12582																
LOG TOP ft	8242	8263	8640																
LOG BOTTOM ft	8263	10173	12544																
HOLE SIZE in	6 1/8	6 1/8	6 1/8																
MUD DATA @ ft	8296	10241	11592																
MUD TYPE	WATER BASED	WATER BASED	WATER BASED																
DENSITY lb/gal	9.20	9.70	9.50																
VISCOSITY s/qt	45	49	49																
pH	9.0	9.5	9.7																
FLUID LOSS cm3/30	8.0	4.4	5.2																
SALINITY ppm	1800	2000	2200																
Rm ohmm @ deg F	@	@	@																
Rmf ohmm @ deg F	@	@	@																

MAX REC TEMP deg F	184	188	209			
Rm @ MAX TEMP ohmm						
LWD ENGINEER #1	R. THOMASON	R. THOMASON	M. MEYER			
LWD ENGINEER #2	C. JONES	C. JONES	R. THOMASON			
LWD ENGINEER #3						

REMARKS

WARD PETROLEUM
PATHFINDER JOB #: 14CCO0550

ST1 DEPARTS ORIGINAL WELLBORE AT 8638'MD (7780'TVD) IN OPEN HOLE.

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 SERVICES PROVIDED BY PASON.

RUN #1: 4 3/4" HDS-1L/GAMMA/ISDNSC LOGGING RUN.
RUN #2: 4 3/4" HDS-1L/GAMMA/ISDNSC LOGGING RUN.
RUN #3: 4 3/4" HDS-1L/GAMMA/ISDNSC LOGGING RUN.

DENSITY POROSITY (DPHI) IS CALCULATED FOR A MATRIX DENSITY OF 2.68 G/CC AND A FLUID DENSITY OF 1.00 G/CC.

DENSITY DATA DENSITY (DDDN) TO THE LEFT OF THE DENSITY TRACK REPRESENTS 0-4 SAMPLES PER FOOT.
THE SLIDE INDICATOR TO THE LEFT OF THE DENSITY TRACK IS OFFSET TO THE DENSITY MEASURE POINT.

DENSITY MEASUREMENTS MAY BE SUBSTANDARD THROUGH INTERVALS OF HIGH WEIGHTED STANDOFF (WSOD).
HIGH WSOD IS CAUSED BY POOR WALL CONTACT AND MAY BE THE RESULT OF UNFAVORABLE STABILIZER POSITION, UNFAVORABLE TOOLFACE ORIENTATION DURING SLIDING, EXCESSIVE HOLE ENLARGEMENT OR HIGH ROP'S.

REMARK #1: GAMMA-RAY LOGGED THROUGH CASING FROM 8233'-8242'MD (7784'-7784'TVD).

Borehole Volume

Proposed Depth of Top Cement:	**8243.00 ft**
Bottom of Hole Depth:	**12582.00 ft**
Bit Size Used To Drill The Hole Interval:	**6.125 in**

Depth Of Last Casing Shoe:	**12543.00 ft**
OD Of Last Casing:	**4.500 in**
Assumed Hole Size Below Last Caliper Measurement:	**6.903 in**
Calculated Total Borehole Volume:	**1082.30 cu-ft**
Calculated Total Annular Hole Volume:	**605.62 cu-ft**

BoreHole and Annular Log Definitions

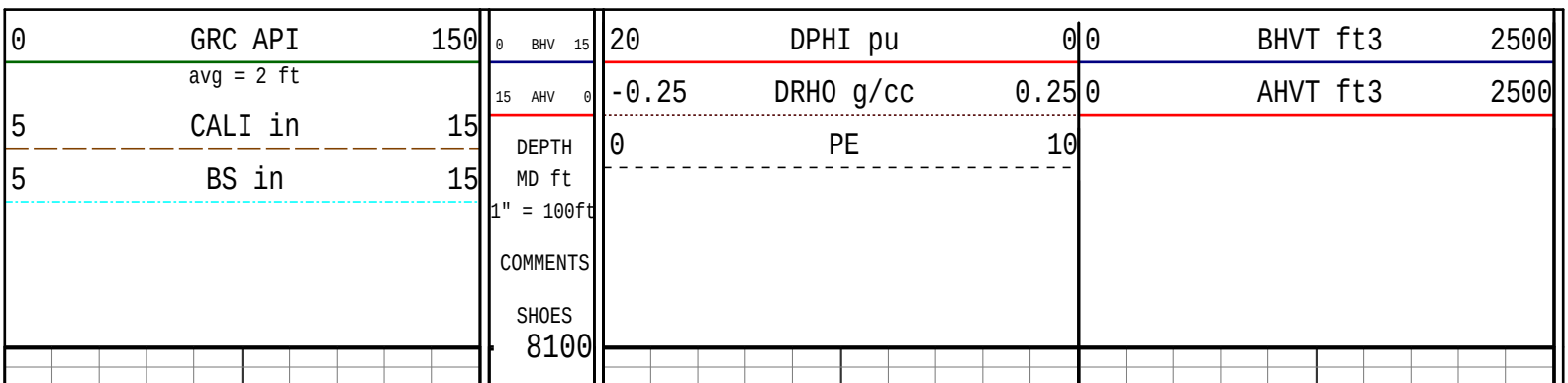
BHV Tick Mark Definitions

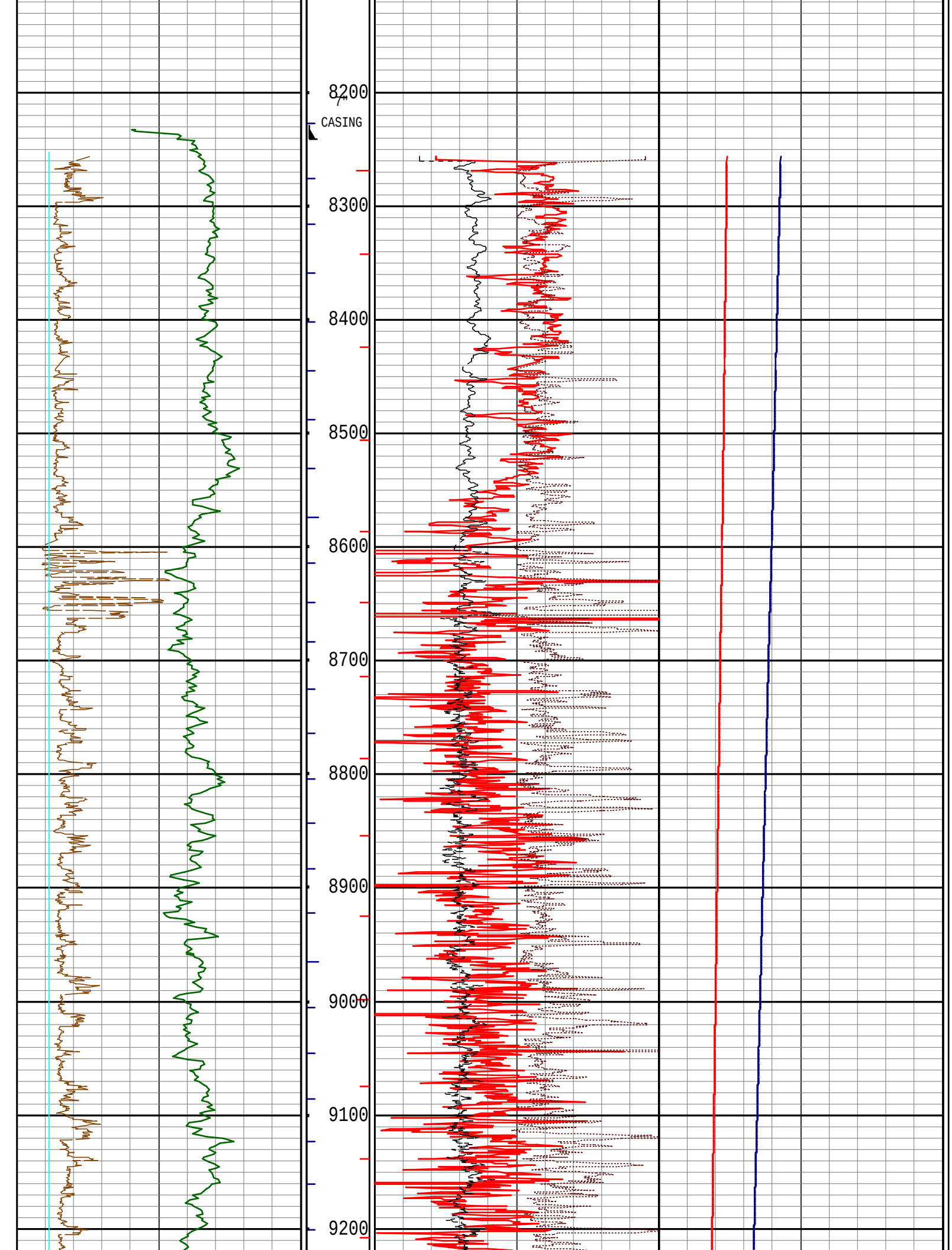
Short	**(Not Used)**
Medium	**10.00 cu-ft**
Long	**100.00 cu-ft**

AHV Tick Mark Definitions

Short	**(Not Used)**
Medium	**10.00 cu-ft**
Long	**100.00 cu-ft**

Version No : RX5 V6.05A Release 13Dec2013
Plot Time : 04-Jul-2014 15:57

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7"
CASING
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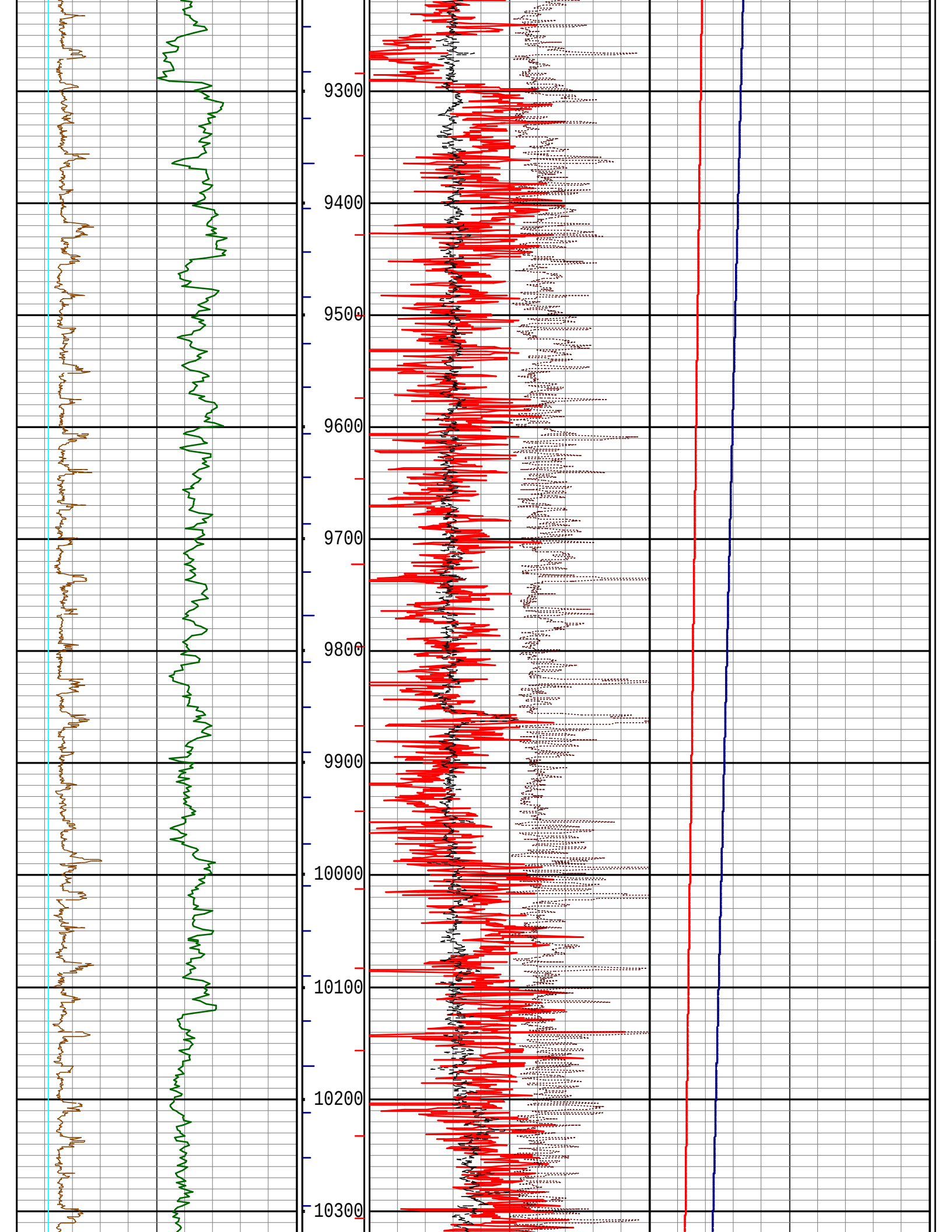
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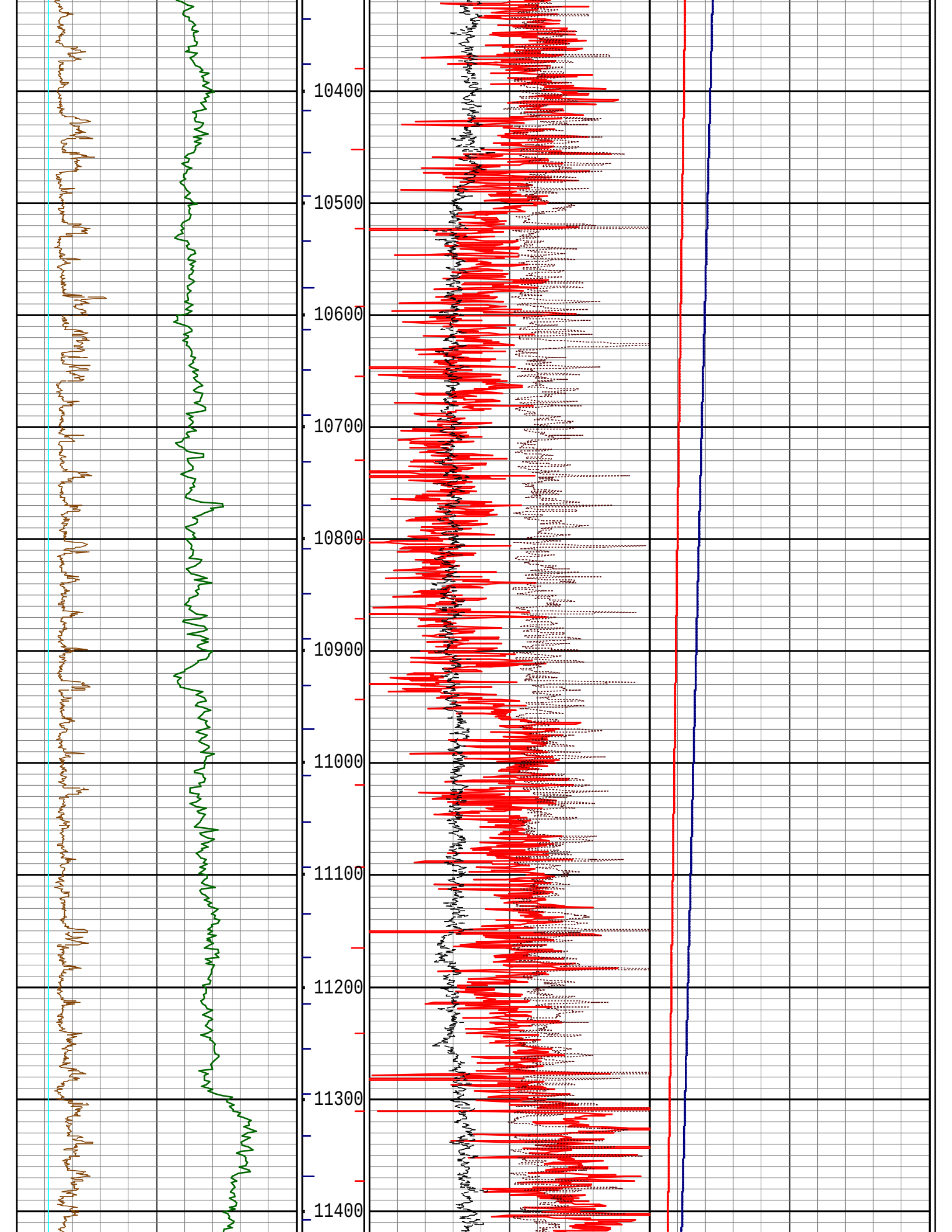
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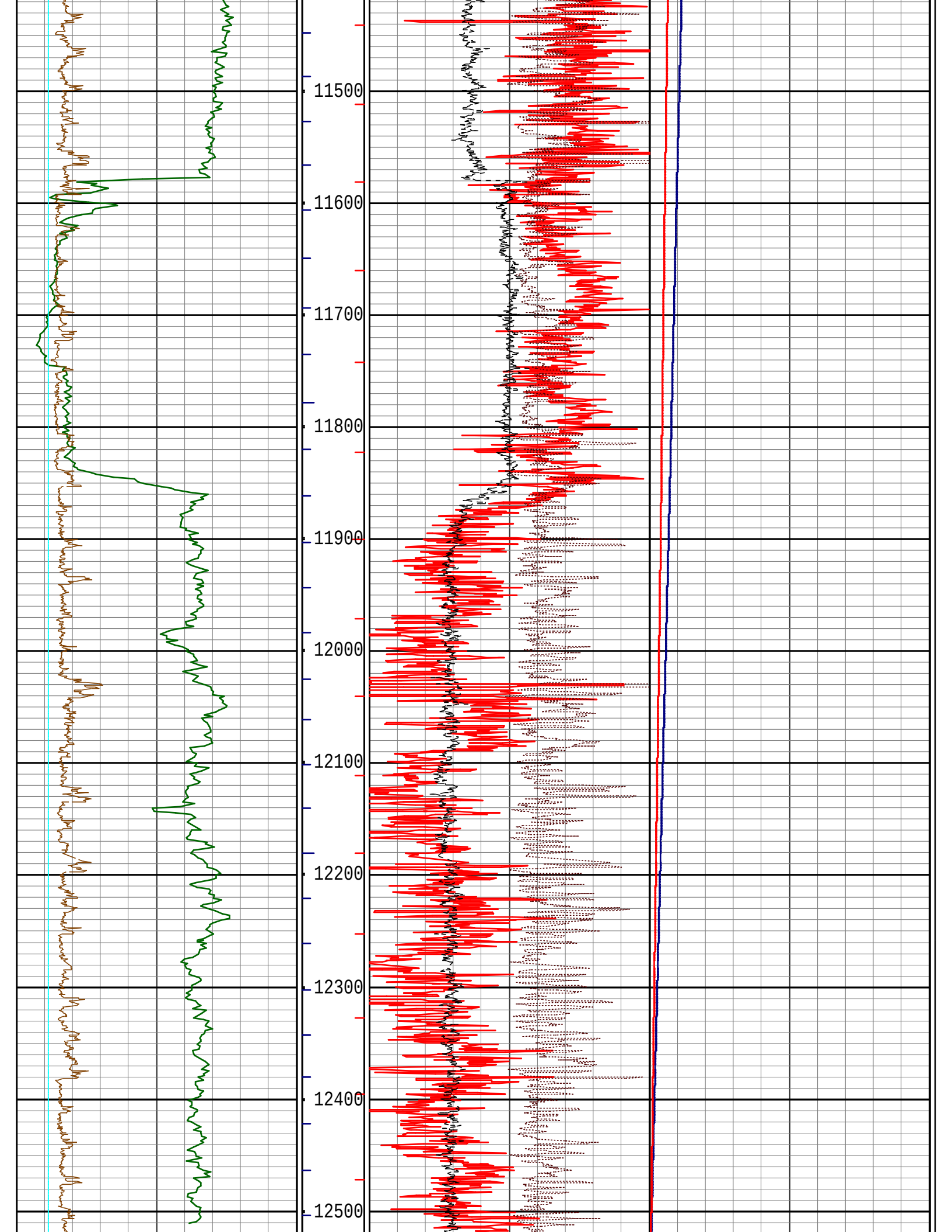
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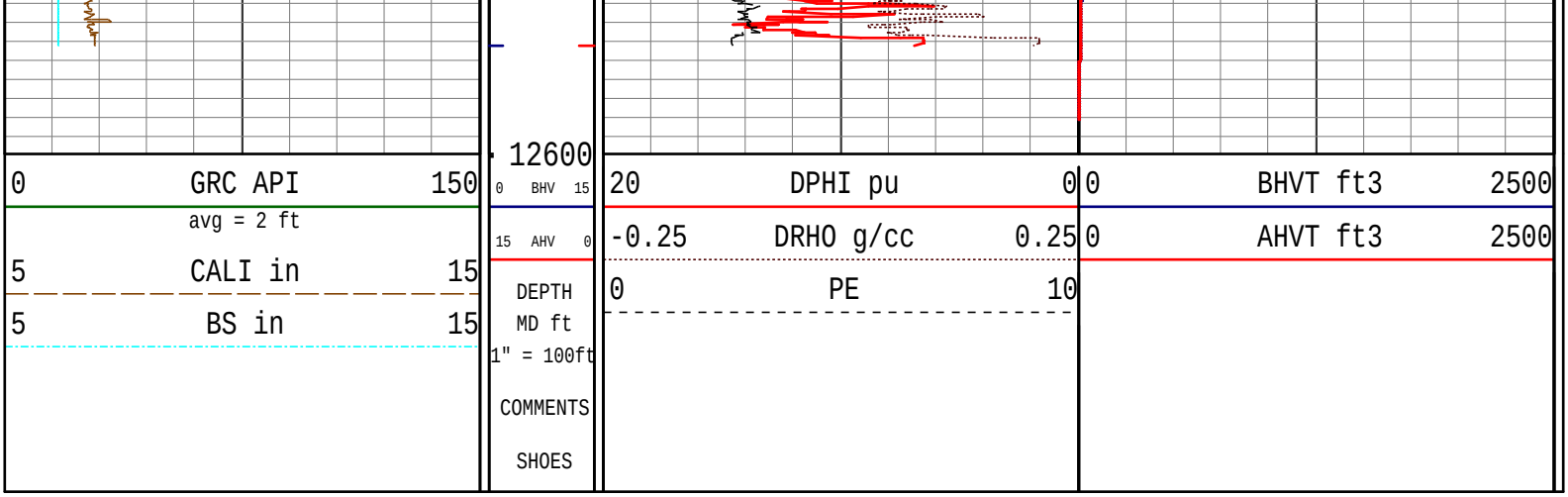

Survey Report

Vertical Section Plane: 8.58°	Total Correction: 8.46° East to True
Calculation Method: Minimum Curvature	Survey Reference: Wellhead
North Aligned to: True North	Well: SHARP 24-3-11HC ST1
RKB: 25' KELLY BUSHINGS TO GROUND LEVEL	FIELD: WATTENBERG

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)
THE FOLLOWING ARE ENSIGN DIRECTIONAL MWD SURVEYS.											
111.00	0.20	235.80	111.00	0.00	-0.13	0.11 S	0.16 W	0.19	237.06	0.00	
202.00	0.50	236.30	202.00	91.00	-0.50	0.42 S	0.62 W	0.75	236.39	0.33	
328.00	0.20	195.20	328.00	126.00	-1.09	0.93 S	1.14 W	1.47	230.71	0.30	
485.00	0.50	214.10	484.99	157.00	-1.98	1.76 S	1.60 W	2.38	222.13	0.20	
608.00	0.50	290.60	607.99	123.00	-2.35	2.02 S	2.40 W	3.14	229.90	0.50	
701.00	0.80	245.40	700.99	93.00	-2.63	2.15 S	3.37 W	4.00	237.49	0.61	
794.00	0.40	292.20	793.98	93.00	-2.90	2.29 S	4.26 W	4.84	241.69	0.65	
920.00	0.80	298.50	919.97	126.00	-2.50	1.71 S	5.44 W	5.70	252.56	0.32	
1042.00	1.20	296.40	1041.95	122.00	-1.82	0.73 S	7.33 W	7.37	264.28	0.33	
1166.00	0.50	286.20	1165.94	124.00	-1.35	0.01 S	9.02 W	9.02	269.96	0.57	
1210.00	0.50	201.70	1209.94	44.00	-1.51	0.13 S	9.27 W	9.27	269.19	1.53	
1256.00	1.20	169.50	1255.93	46.00	-2.16	0.79 S	9.26 W	9.29	265.12	1.78	
1349.00	4.80	160.90	1348.79	93.00	-6.53	5.43 S	7.81 W	9.51	235.19	3.89	
1441.00	7.10	154.90	1440.29	92.00	-14.67	14.21 S	4.13 W	14.80	196.22	2.59	
1533.00	10.00	146.80	1531.26	92.00	-25.36	26.05 S	2.65 E	26.18	174.18	3.41	
1625.00	9.70	122.20	1621.95	92.00	-34.43	36.87 S	13.59 E	39.29	159.77	4.55	
1719.00	9.80	125.00	1714.59	94.00	-41.16	45.68 S	26.84 E	52.98	149.56	0.52	
1812.00	9.60	124.10	1806.26	93.00	-48.02	54.56 S	39.75 E	67.51	143.93	0.27	
1906.00	8.90	122.90	1899.04	94.00	-54.40	62.91 S	52.35 E	81.84	140.24	0.77	
2001.00	8.20	125.00	1992.98	95.00	-60.44	70.79 S	64.07 E	95.47	137.85	0.81	
2095.00	7.60	113.20	2086.09	94.00	-64.99	77.08 S	75.27 E	107.74	135.68	1.84	
2189.00	9.70	120.60	2179.02	94.00	-69.53	83.56 S	87.80 E	121.21	133.58	2.52	
2283.00	8.30	113.90	2271.86	94.00	-74.29	90.34 S	100.82 E	135.38	131.86	1.86	
2377.00	9.30	114.10	2364.76	94.00	-78.11	96.19 S	113.96 E	149.13	130.17	1.06	
2471.00	8.40	124.10	2457.64	94.00	-83.10	103.14 S	126.58 E	163.28	129.18	1.89	
2565.00	9.70	123.80	2550.47	94.00	-89.44	111.40 S	138.84 E	178.01	128.74	1.38	
2658.00	9.10	127.00	2642.22	93.00	-96.28	120.18 S	151.23 E	193.17	128.47	0.86	
2752.00	8.30	120.80	2735.14	94.00	-102.38	128.13 S	162.99 E	207.33	128.17	1.31	
2845.00	9.80	123.30	2826.98	93.00	-108.23	135.91 S	175.38 E	221.88	127.78	1.67	
2939.00	9.80	125.00	2919.61	94.00	-115.13	144.89 S	188.62 E	237.84	127.53	0.31	
3033.00	8.60	117.30	3012.40	94.00	-120.95	152.71 S	201.41 E	252.76	127.17	1.83	
3126.00	9.40	122.40	3104.26	93.00	-126.25	159.97 S	214.01 E	267.18	126.78	1.21	
3220.00	9.20	117.80	3197.02	94.00	-131.82	167.58 S	227.13 E	282.27	126.42	0.82	
3313.00	10.60	113.20	3288.64	93.00	-136.43	174.42 S	241.57 E	297.96	125.83	1.73	
3407.00	10.20	120.60	3381.10	94.00	-141.73	182.06 S	256.69 E	314.70	125.35	1.48	
3501.00	9.40	116.10	3473.73	94.00	-147.16	189.68 S	270.74 E	330.58	125.01	1.18	
3595.00	5.90	118.50	3566.88	94.00	-151.12	195.36 S	281.89 E	342.97	124.72	3.74	
3689.00	7.20	125.40	3660.26	94.00	-155.43	201.08 S	290.93 E	353.66	124.65	1.61	
3783.00	8.60	134.20	3753.37	94.00	-162.18	209.39 S	300.78 E	366.49	124.84	1.96	
3877.00	10.30	137.70	3846.09	94.00	-171.57	220.51 S	311.47 E	381.63	125.30	1.91	
3972.00	9.10	134.20	3939.73	95.00	-181.31	232.03 S	322.57 E	397.35	125.73	1.41	
4067.00	8.50	136.30	4033.62	95.00	-189.98	242.34 S	332.81 E	411.69	126.06	0.72	
4161.00	10.80	133.30	4126.28	94.00	-199.25	253.41 S	344.02 E	427.28	126.38	2.50	
4255.00	9.80	128.70	4218.77	94.00	-208.28	264.45 S	356.67 E	444.01	126.55	1.38	
4350.00	9.00	125.00	4312.49	95.00	-215.64	273.77 S	369.07 E	459.52	126.57	1.05	
4444.00	9.80	125.90	4405.23	94.00	-222.58	282.67 S	381.57 E	474.87	126.53	0.86	
4539.00	8.50	125.20	4499.02	95.00	-229.44	291.46 S	393.86 E	489.98	126.50	1.37	
4634.00	9.50	131.50	4592.85	95.00	-236.85	300.71 S	405.47 E	504.81	126.56	1.48	
4728.00	8.80	123.60	4685.65	94.00	-244.11	309.82 S	417.27 E	519.72	126.59	1.53	
4821.00	10.40	131.90	4777.35	93.00	-251.73	319.37 S	429.44 E	535.18	126.64	2.27	
4916.00	9.20	123.40	4870.97	95.00	-259.62	329.28 S	442.17 E	551.30	126.67	1.98	
5010.00	10.70	123.30	4963.55	94.00	-266.43	338.20 S	455.73 E	567.52	126.58	1.60	
5104.00	12.10	122.90	5055.70	94.00	-274.14	348.35 S	471.30 E	586.06	126.47	1.49	
5197.00	11.30	119.60	5146.77	93.00	-281.42	358.14 S	487.41 E	604.84	126.31	1.12	

5291.00	12.10	127.30	5238.82	94.00	-289.46	368.66 S	503.25 E	623.84	126.22	1.87	
5385.00	10.90	123.80	5330.93	94.00	-297.98	379.58 S	518.48 E	642.57	126.21	1.48	
5480.00	12.20	129.80	5424.01	95.00	-307.01	391.00 S	533.65 E	661.56	126.23	1.86	
5574.00	11.30	125.20	5516.04	94.00	-316.28	402.67 S	548.81 E	680.69	126.27	1.38	
5668.00	10.50	122.60	5608.34	94.00	-323.90	412.59 S	563.55 E	698.44	126.21	1.00	
5763.00	9.90	118.30	5701.84	95.00	-330.18	421.13 S	578.04 E	715.17	126.08	1.02	
5857.00	10.60	116.10	5794.34	94.00	-335.51	428.76 S	592.91 E	731.70	125.87	0.85	
5951.00	8.70	122.90	5887.01	94.00	-341.04	436.43 S	606.65 E	747.32	125.73	2.35	
6045.00	9.70	128.00	5979.80	94.00	-347.85	445.16 S	618.86 E	762.34	125.73	1.37	
6139.00	9.50	123.30	6072.49	94.00	-354.99	454.30 S	631.58 E	778.00	125.73	0.86	
6234.00	9.20	125.60	6166.23	95.00	-361.72	463.02 S	644.31 E	793.43	125.70	0.50	
6328.00	7.40	130.30	6259.24	94.00	-368.31	471.31 S	655.04 E	806.98	125.74	2.05	
6421.00	6.40	139.40	6351.57	93.00	-374.85	479.12 S	662.98 E	817.99	125.85	1.59	
6516.00	5.60	128.20	6446.05	95.00	-380.60	486.01 S	670.07 E	827.77	125.95	1.49	
6610.00	4.70	125.90	6539.67	94.00	-384.64	491.11 S	676.79 E	836.20	125.97	0.98	
6705.00	4.20	133.80	6634.38	95.00	-388.43	495.80 S	682.46 E	843.54	126.00	0.83	

Survey Report

Vertical Section Plane: 8.58°	Total Correction: 8.46° East to True
Calculation Method: Minimum Curvature	Survey Reference: Wellhead
North Aligned to: True North	Well: SHARP 24-3-11HC ST1
RKB: 25' KELLY BUSHINGS TO GROUND LEVEL	FIELD: WATTENBERG

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)
6799.00	4.10	127.30	6728.14	94.00	-392.03	500.21 S	687.61 E	850.31	126.03	0.51	
6893.00	2.70	117.30	6821.97	94.00	-394.36	503.27 S	692.25 E	855.86	126.02	1.61	
6988.00	3.30	51.90	6916.86	95.00	-393.09	502.61 S	696.40 E	858.82	125.82	3.45	
7020.00	2.60	64.60	6948.82	32.00	-392.01	501.73 S	697.78 E	859.43	125.72	2.98	
7051.00	2.50	55.80	6979.79	31.00	-391.16	501.04 S	698.97 E	860.00	125.63	1.30	
7083.00	4.00	25.90	7011.74	32.00	-389.62	499.65 S	700.04 E	860.06	125.52	6.92	
7114.00	7.30	6.20	7042.59	31.00	-386.62	496.72 S	700.72 E	858.92	125.33	12.20	
7146.00	10.60	3.70	7074.19	32.00	-381.65	491.76 S	701.13 E	856.39	125.04	10.38	
7177.00	13.40	9.00	7104.51	31.00	-375.22	485.36 S	701.88 E	853.35	124.66	9.70	
7209.00	15.40	13.90	7135.51	32.00	-367.28	477.57 S	703.48 E	850.27	124.17	7.31	
7240.00	16.90	15.00	7165.28	31.00	-358.70	469.23 S	705.63 E	847.40	123.62	4.94	
7271.00	17.00	14.80	7194.94	31.00	-349.72	460.49 S	707.96 E	844.54	123.04	0.37	
7303.00	16.60	9.40	7225.57	32.00	-340.50	451.46 S	709.90 E	841.29	122.45	5.03	
7334.00	17.20	3.90	7255.24	31.00	-331.50	442.52 S	710.93 E	837.40	121.90	5.51	
7366.00	18.70	359.30	7285.68	32.00	-321.72	432.67 S	711.19 E	832.46	121.31	6.45	
7397.00	20.50	357.80	7314.88	31.00	-311.48	422.27 S	710.92 E	826.88	120.71	6.03	
7429.00	23.50	358.80	7344.55	32.00	-299.69	410.29 S	710.57 E	820.52	120.00	9.45	
7460.00	25.90	359.20	7372.71	31.00	-286.92	397.34 S	710.35 E	813.93	119.22	7.76	
7492.00	28.20	358.60	7401.21	32.00	-272.57	382.79 S	710.07 E	806.68	118.33	7.24	
7523.00	31.40	359.50	7428.11	31.00	-257.38	367.39 S	709.82 E	799.26	117.37	10.42	
7555.00	34.10	0.70	7455.02	32.00	-240.26	350.08 S	709.86 E	791.49	116.25	8.68	
7586.00	35.50	2.00	7480.47	31.00	-222.71	332.39 S	710.28 E	784.21	115.08	5.11	
7617.00	37.80	1.30	7505.34	31.00	-204.34	313.90 S	710.81 E	777.03	113.83	7.54	
7648.00	40.80	359.50	7529.33	31.00	-184.91	294.27 S	710.93 E	769.43	112.49	10.35	
7680.00	43.40	358.10	7553.07	32.00	-163.77	272.82 S	710.48 E	761.06	111.01	8.64	
7711.00	46.60	357.60	7574.99	31.00	-142.24	250.92 S	709.65 E	752.71	109.47	10.39	
7743.00	48.90	357.20	7596.50	32.00	-119.00	227.26 S	708.58 E	744.13	107.78	7.25	
7774.00	52.40	356.90	7616.16	31.00	-95.52	203.32 S	707.34 E	735.98	106.04	11.31	
7806.00	57.20	355.60	7634.60	32.00	-69.99	177.24 S	705.62 E	727.54	104.10	15.36	
7837.00	60.50	356.00	7650.63	31.00	-44.12	150.79 S	703.68 E	719.66	102.09	10.70	
7868.00	63.00	356.20	7665.30	31.00	-17.46	123.54 S	701.82 E	712.62	99.98	8.08	
7899.00	64.00	356.70	7679.13	31.00	9.67	95.85 S	700.11 E	706.64	97.80	3.53	
7930.00	64.20	356.00	7692.67	31.00	36.92	68.02 S	698.33 E	701.64	95.56	2.13	
7962.00	65.60	355.80	7706.25	32.00	65.19	39.12 S	696.26 E	697.36	93.22	4.41	
7993.00	66.80	356.70	7718.76	31.00	92.90	10.82 S	694.41 E	694.49	90.89	4.69	
8024.00	67.40	357.40	7730.82	31.00	120.88	17.70 N	692.94 E	693.16	88.54	2.84	
8056.00	67.90	357.40	7742.99	32.00	149.92	47.27 N	691.59 E	693.21	86.09	1.56	
8087.00	70.30	357.20	7754.05	31.00	178.31	76.19 N	690.23 E	694.42	83.70	7.77	
8119.00	73.50	356.90	7763.99	32.00	208.11	106.56 N	688.66 E	696.86	81.20	10.04	
8151.00	76.80	357.40	7772.19	32.00	238.43	137.45 N	687.13 E	700.74	78.69	10.42	
8182.00	80.30	359.20	7778.34	31.00	268.32	167.82 N	686.23 E	706.45	76.26	12.64	
TIED INTO ENSIGN DIRECTIONAL MWD SURVEY AT 8208'MD.											
8208.00	84.10	0.40	7781.87		293.77	193.57 N	686.14 E	712.92	74.25		
THE FOLLOWING ARE PATHFINDER MWD SURVEYS.											
8281.00	89.16	1.99	7786.16	73.00	366.01	266.40 N	687.66 E	737.46	68.82	7.26	176.92
8312.00	89.43	2.09	7786.54	31.00	396.81	297.38 N	688.77 E	750.22	66.65	0.93	169.69
8344.00	89.60	2.47	7786.81	32.00	428.61	329.35 N	690.04 E	764.61	64.48	1.30	173.31
8375.00	89.69	2.47	7787.00	31.00	459.44	360.32 N	691.37 E	779.64	62.47	0.29	169.69
8406.00	90.04	3.10	7787.08	31.00	490.28	391.29 N	692.88 E	795.73	60.55	2.32	173.31
8437.00	90.66	2.59	7786.89	31.00	521.12	422.25 N	694.42 E	812.72	58.70	2.59	173.31
8469.00	90.48	4.11	7786.57	32.00	552.99	454.19 N	696.29 E	831.33	56.88	4.78	173.31
8500.00	91.63	3.09	7786.00	31.00	583.86	485.12 N	698.24 E	850.22	55.21	4.96	169.69
8531.00	91.54	3.45	7785.14	31.00	614.72	516.06 N	700.00 E	869.67	53.60	1.20	169.69
8562.00	92.95	2.46	7783.93	31.00	645.54	546.99 N	701.60 E	889.63	52.06	5.56	166.08
8594.00	93.30	2.92	7782.18	32.00	677.33	578.91 N	703.10 E	910.76	50.53	1.80	173.31
8625.00	93.39	2.32	7780.37	31.00	708.11	609.83 N	704.51 E	931.79	49.12	1.95	173.31
ST01 DEPARTS ORIGINAL WELLBORE AT 8638'MD (778'TVD).											
8638.00	91.80	3.45	7779.79	13.00	721.03	622.80 N	705.17 E	940.82	48.55	15.00	173.31

8654.00	90.57	3.20	7779.45	16.00	736.96	638.77 N	706.10 E	952.15	47.87	7.84	173.31
8685.00	88.55	5.99	7779.69	31.00	767.88	669.66 N	708.58 E	974.95	46.62	11.11	173.31
8716.00	87.67	6.70	7780.72	31.00	798.84	700.45 N	712.00 E	998.79	45.47	3.65	173.31
8748.00	87.85	6.66	7781.97	32.00	830.80	732.21 N	715.72 E	1023.91	44.35	0.58	173.31
8779.00	89.08	6.56	7782.80	31.00	861.77	762.99 N	719.29 E	1048.59	43.31	3.98	176.92
8811.00	89.16	5.06	7783.29	32.00	893.72	794.82 N	722.53 E	1074.15	42.27	4.69	176.92
8843.00	89.60	3.65	7783.63	32.00	925.63	826.73 N	724.96 E	1099.57	41.25	4.62	184.15
8874.00	90.13	0.74	7783.71	31.00	956.44	857.70 N	726.14 E	1123.81	40.25	9.54	180.54
8905.00	91.89	359.68	7783.16	31.00	987.10	888.70 N	726.26 E	1147.71	39.26	6.63	180.54
8937.00	92.77	359.82	7781.86	32.00	1018.70	920.67 N	726.12 E	1172.55	38.26	2.78	180.54
8968.00	93.21	359.74	7780.24	31.00	1049.29	951.63 N	726.00 E	1196.94	37.34	1.44	180.54
9000.00	93.12	1.33	7778.48	32.00	1080.92	983.58 N	726.30 E	1222.67	36.44	4.97	180.54
9031.00	92.24	2.44	7777.03	31.00	1111.68	1014.52 N	727.32 E	1248.30	35.64	4.57	184.15

Survey Report

Vertical Section Plane: 8.58°	Total Correction: 8.46° East to True
Calculation Method: Minimum Curvature	Survey Reference: Wellhead
North Aligned to: True North	Well: SHARP 24-3-11HC ST1
RKB: 25' KELLY BUSHINGS TO GROUND LEVEL	FIELD: WATTENBERG

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)
9062.00	92.24	2.16	7775.81	31.00	1142.47	1045.48 N	728.56 E	1274.29	34.87	0.90	184.15
9093.00	92.33	2.38	7774.58	31.00	1173.26	1076.43 N	729.79 E	1300.49	34.14	0.77	184.15
9125.00	90.84	2.08	7773.69	32.00	1205.05	1108.39 N	731.03 E	1327.76	33.41	4.75	184.15
9156.00	90.13	2.90	7773.43	31.00	1235.87	1139.36 N	732.38 E	1354.44	32.73	3.50	187.76
9188.00	89.69	2.35	7773.48	32.00	1267.70	1171.33 N	733.84 E	1382.22	32.07	2.20	187.76
9219.00	89.52	1.64	7773.70	31.00	1298.49	1202.31 N	734.92 E	1409.13	31.44	2.36	187.76
9250.00	89.60	2.02	7773.93	31.00	1329.28	1233.29 N	735.91 E	1436.16	30.82	1.25	187.76
9282.00	90.31	1.71	7773.96	32.00	1361.06	1265.27 N	736.95 E	1464.24	30.22	2.42	187.76
9313.00	90.40	1.59	7773.77	31.00	1391.83	1296.26 N	737.85 E	1491.54	29.65	0.48	187.76
9344.00	90.40	1.85	7773.55	31.00	1422.61	1327.24 N	738.78 E	1519.00	29.10	0.84	187.76
9376.00	90.40	0.98	7773.33	32.00	1454.36	1359.23 N	739.57 E	1547.41	28.55	2.72	187.76
9407.00	90.22	0.07	7773.16	31.00	1485.05	1390.23 N	739.85 E	1574.84	28.02	2.99	187.76
9439.00	90.13	359.55	7773.06	32.00	1516.68	1422.23 N	739.75 E	1603.11	27.48	1.65	187.76
9470.00	90.13	359.14	7772.99	31.00	1547.27	1453.23 N	739.39 E	1630.51	26.97	1.32	187.76
9501.00	90.04	359.57	7772.94	31.00	1577.87	1484.23 N	739.04 E	1658.04	26.47	1.42	187.76
9532.00	89.78	359.39	7772.99	31.00	1608.48	1515.22 N	738.76 E	1685.73	25.99	1.02	187.76
9564.00	89.87	358.60	7773.09	32.00	1640.04	1547.22 N	738.20 E	1714.30	25.51	2.49	187.76
9595.00	90.04	358.33	7773.12	31.00	1670.55	1578.21 N	737.37 E	1741.97	25.04	1.03	191.38
9627.00	90.48	358.71	7772.97	32.00	1702.06	1610.20 N	736.54 E	1770.66	24.58	1.82	191.38
9658.00	90.75	358.78	7772.64	31.00	1732.60	1641.19 N	735.86 E	1798.61	24.15	0.90	191.38
9690.00	90.75	359.22	7772.22	32.00	1764.15	1673.18 N	735.31 E	1827.62	23.72	1.37	187.76
9721.00	90.66	358.96	7771.84	31.00	1794.73	1704.17 N	734.81 E	1855.84	23.32	0.89	191.38
9753.00	90.66	358.81	7771.47	32.00	1826.27	1736.16 N	734.19 E	1885.02	22.92	0.47	191.38
9784.00	90.48	358.25	7771.16	31.00	1856.79	1767.15 N	733.40 E	1913.29	22.54	1.90	191.38
9815.00	90.57	358.06	7770.88	31.00	1887.28	1798.14 N	732.40 E	1941.57	22.16	0.68	191.38
9846.00	90.84	358.46	7770.49	31.00	1917.77	1829.12 N	731.46 E	1969.95	21.80	1.56	191.38
9878.00	91.10	358.13	7769.95	32.00	1949.26	1861.10 N	730.50 E	1999.33	21.43	1.31	191.38
9909.00	91.36	358.16	7769.29	31.00	1979.74	1892.08 N	729.50 E	2027.84	21.08	0.84	191.38
9941.00	91.36	357.31	7768.53	32.00	2011.16	1924.04 N	728.24 E	2057.25	20.73	2.66	191.38
9972.00	91.36	357.03	7767.79	31.00	2041.53	1955.00 N	726.71 E	2085.69	20.39	0.90	194.99
10004.00	91.01	356.86	7767.13	32.00	2072.87	1986.94 N	725.00 E	2115.08	20.05	1.22	194.99
10035.00	90.48	357.32	7766.73	31.00	2103.25	2017.90 N	723.43 E	2143.66	19.72	2.26	194.99
10067.00	90.31	356.46	7766.51	32.00	2134.58	2049.85 N	721.69 E	2173.19	19.40	2.74	194.99
10098.00	90.04	356.88	7766.41	31.00	2164.91	2080.80 N	719.89 E	2201.81	19.08	1.61	194.99
10129.00	90.22	356.02	7766.34	31.00	2195.22	2111.74 N	717.97 E	2230.45	18.78	2.83	194.99
10161.00	90.22	356.43	7766.22	32.00	2226.48	2143.67 N	715.86 E	2260.04	18.47	1.28	194.99
10193.00	90.13	356.56	7766.12	32.00	2257.77	2175.61 N	713.91 E	2289.75	18.17	0.49	194.99
10224.00	90.22	356.08	7766.03	31.00	2288.06	2206.55 N	711.92 E	2318.55	17.88	1.58	194.99
10255.00	90.13	356.14	7765.93	31.00	2318.33	2237.47 N	709.82 E	2347.37	17.60	0.35	194.99
10287.00	89.87	356.10	7765.93	32.00	2349.58	2269.40 N	707.65 E	2377.17	17.32	0.82	194.99
10319.00	89.96	356.70	7765.98	32.00	2380.86	2301.34 N	705.64 E	2407.09	17.05	1.90	194.99
10350.00	89.87	355.80	7766.03	31.00	2411.14	2332.27 N	703.61 E	2436.10	16.79	2.92	194.99
10381.00	90.22	355.85	7766.00	31.00	2441.38	2363.19 N	701.36 E	2465.07	16.53	1.14	194.99
10413.00	89.87	355.37	7765.98	32.00	2472.56	2395.09 N	698.91 E	2494.98	16.27	1.86	194.99
10444.00	89.60	356.83	7766.12	31.00	2502.83	2426.02 N	696.80 E	2524.11	16.03	4.79	194.99
10476.00	88.99	357.81	7766.51	32.00	2534.21	2457.98 N	695.30 E	2554.43	15.79	3.61	194.99
10508.00	89.08	357.40	7767.05	32.00	2565.62	2489.95 N	693.97 E	2584.85	15.57	1.31	194.99
10540.00	89.16	356.91	7767.54	32.00	2596.98	2521.91 N	692.38 E	2615.23	15.35	1.55	194.99
10571.00	89.16	356.86	7768.00	31.00	2627.33	2552.86 N	690.69 E	2644.64	15.14	0.16	194.99
10602.00	89.08	358.17	7768.47	31.00	2657.75	2583.82 N	689.35 E	2674.20	14.94	4.23	194.99
10634.00	89.25	359.91	7768.94	32.00	2689.31	2615.82 N	688.81 E	2704.99	14.75	5.46	194.99
10665.00	90.13	1.52	7769.11	31.00	2720.01	2646.81 N	689.20 E	2735.07	14.60	5.92	198.61
10697.00	90.13	0.95	7769.04	32.00	2751.75	2678.80 N	689.89 E	2766.21	14.44	1.78	194.99
10728.00	90.04	0.84	7768.99	31.00	2782.47	2709.80 N	690.37 E	2796.36	14.29	0.46	198.61
10760.00	90.31	0.80	7768.89	32.00	2814.18	2741.80 N	690.83 E	2827.49	14.14	0.85	198.61
10791.00	90.66	0.85	7768.63	31.00	2844.89	2772.79 N	691.28 E	2857.66	14.00	1.14	198.61
10823.00	91.19	0.84	7768.11	32.00	2876.60	2804.78 N	691.75 E	2888.83	13.85	1.66	198.61
10854.00	91.36	0.53	7767.42	31.00	2907.30	2835.77 N	692.12 E	2919.01	13.72	1.14	198.61
10886.00	91.45	0.82	7766.64	32.00	2938.98	2867.76 N	692.50 E	2950.19	13.58	0.95	202.22
10917.00	91.19	0.22	7765.92	31.00	2969.67	2898.75 N	692.78 E	2980.39	13.44	2.11	202.22
10948.00	90.92	0.23	7765.35	31.00	3000.33	2929.75 N	692.90 E	3010.57	13.31	0.87	202.22

10980.00	90.84	0.21	7764.86	32.00	3031.99	2961.74 N	693.02 E	3041.74	13.17	0.26	202.22
11011.00	90.66	358.94	7764.46	31.00	3062.60	2992.74 N	692.79 E	3071.88	13.03	4.14	202.22
11043.00	90.04	358.96	7764.26	32.00	3094.15	3024.73 N	692.21 E	3102.93	12.89	1.94	202.22
11074.00	89.16	358.11	7764.48	31.00	3124.68	3055.72 N	691.41 E	3132.97	12.75	3.95	205.83
11106.00	88.55	358.41	7765.12	32.00	3156.15	3087.70 N	690.44 E	3163.95	12.60	2.12	198.61
11137.00	88.37	358.14	7765.95	31.00	3186.64	3118.68 N	689.51 E	3193.99	12.47	1.05	202.22
11168.00	89.08	358.08	7766.64	31.00	3217.12	3149.65 N	688.49 E	3224.02	12.33	2.30	205.83
11199.00	89.34	358.13	7767.07	31.00	3247.60	3180.63 N	687.46 E	3254.08	12.20	0.85	205.83
11231.00	89.25	358.32	7767.46	32.00	3279.07	3212.61 N	686.47 E	3285.14	12.06	0.66	202.22
11262.00	89.08	357.77	7767.91	31.00	3309.55	3243.59 N	685.41 E	3315.22	11.93	1.86	202.22

Survey Report

Vertical Section Plane: 8.58°	Total Correction: 8.46° East to True
Calculation Method: Minimum Curvature	Survey Reference: Wellhead
North Aligned to: True North	Well: SHARP 24-3-11HC ST1
RKB: 25' KELLY BUSHINGS TO GROUND LEVEL	FIELD: WATTENBERG

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)
11294.00	89.43	357.63	7768.33	32.00	3340.97	3275.56 N	684.13 E	3346.24	11.80	1.18	202.22
11325.00	89.96	358.36	7768.49	31.00	3371.44	3306.54 N	683.05 E	3376.36	11.67	2.91	202.22
11357.00	90.31	358.91	7768.42	32.00	3402.96	3338.53 N	682.28 E	3407.54	11.55	2.04	205.83
11388.00	90.22	359.93	7768.27	31.00	3433.56	3369.53 N	681.97 E	3437.85	11.44	3.30	202.22
11420.00	90.04	359.52	7768.20	32.00	3465.18	3401.53 N	681.82 E	3469.19	11.33	1.40	205.83
11451.00	90.40	359.88	7768.08	31.00	3495.81	3432.53 N	681.65 E	3499.56	11.23	1.64	205.83
11483.00	90.66	359.77	7767.79	32.00	3527.44	3464.53 N	681.56 E	3530.93	11.13	0.88	205.83
11515.00	90.57	359.54	7767.44	32.00	3559.05	3496.53 N	681.36 E	3562.30	11.03	0.77	202.22
11546.00	90.48	358.97	7767.16	31.00	3589.64	3527.52 N	680.96 E	3592.65	10.93	1.86	205.83
11578.00	90.57	359.63	7766.87	32.00	3621.22	3559.52 N	680.57 E	3624.00	10.82	2.08	205.83
11609.00	90.92	359.15	7766.46	31.00	3651.82	3590.51 N	680.24 E	3654.38	10.73	1.92	205.83
11640.00	91.45	359.16	7765.82	31.00	3682.39	3621.50 N	679.78 E	3684.75	10.63	1.71	209.45
11672.00	92.07	359.18	7764.84	32.00	3713.94	3653.48 N	679.32 E	3716.10	10.53	1.94	205.83
11703.00	92.42	358.73	7763.62	31.00	3744.49	3684.46 N	678.75 E	3746.46	10.44	1.84	205.83
11735.00	91.54	358.79	7762.52	32.00	3776.00	3716.43 N	678.06 E	3777.78	10.34	2.76	205.83
11766.00	91.89	358.93	7761.59	31.00	3806.54	3747.41 N	677.45 E	3808.15	10.25	1.22	205.83
11798.00	92.51	359.00	7760.36	32.00	3838.06	3779.38 N	676.87 E	3839.51	10.15	1.95	205.83
11829.00	91.01	359.13	7759.41	31.00	3868.62	3810.36 N	676.36 E	3869.92	10.07	4.86	205.83
11860.00	88.64	358.53	7759.51	31.00	3899.17	3841.35 N	675.73 E	3900.33	9.98	7.89	205.83
11892.00	88.29	358.72	7760.36	32.00	3930.68	3873.33 N	674.96 E	3931.70	9.89	1.25	205.83
11924.00	88.29	358.14	7761.32	32.00	3962.16	3905.30 N	674.09 E	3963.05	9.79	1.81	205.83
11955.00	88.55	358.85	7762.17	31.00	3992.67	3936.28 N	673.27 E	3993.45	9.71	2.44	205.83
11987.00	88.64	358.52	7762.96	32.00	4024.19	3968.26 N	672.54 E	4024.85	9.62	1.07	205.83
12019.00	88.99	358.70	7763.62	32.00	4055.70	4000.25 N	671.76 E	4056.26	9.53	1.23	209.45
12050.00	89.16	359.23	7764.12	31.00	4086.26	4031.24 N	671.20 E	4086.73	9.45	1.80	209.45
12082.00	88.99	359.26	7764.64	32.00	4117.83	4063.23 N	670.78 E	4118.23	9.37	0.54	205.83
12113.00	88.99	358.92	7765.18	31.00	4148.40	4094.22 N	670.29 E	4148.73	9.30	1.10	205.83
12144.00	89.43	358.83	7765.61	31.00	4178.96	4125.21 N	669.68 E	4179.22	9.22	1.45	205.83
12176.00	89.52	359.87	7765.90	32.00	4210.54	4157.21 N	669.32 E	4210.75	9.15	3.26	202.22
12207.00	90.13	0.07	7766.00	31.00	4241.19	4188.21 N	669.30 E	4241.35	9.08	2.07	205.83
12239.00	90.31	1.36	7765.88	32.00	4272.89	4220.21 N	669.70 E	4273.01	9.02	4.07	205.83
12270.00	90.48	1.66	7765.66	31.00	4303.65	4251.19 N	670.52 E	4303.75	8.96	1.11	205.83
12302.00	90.66	1.60	7765.34	32.00	4335.42	4283.18 N	671.43 E	4335.49	8.91	0.59	213.06
12334.00	91.54	1.80	7764.73	32.00	4367.18	4315.16 N	672.38 E	4367.23	8.86	2.82	209.45
12365.00	91.80	2.58	7763.82	31.00	4397.97	4346.12 N	673.56 E	4398.01	8.81	2.65	209.45
12396.00	91.80	2.27	7762.85	31.00	4428.78	4377.08 N	674.87 E	4428.80	8.76	1.00	205.83
12428.00	91.71	2.32	7761.87	32.00	4460.57	4409.04 N	676.15 E	4460.58	8.72	0.32	209.45
12459.00	91.63	2.55	7760.97	31.00	4491.38	4440.00 N	677.47 E	4491.39	8.68	0.79	209.45
12491.00	91.54	2.52	7760.08	32.00	4523.19	4471.96 N	678.88 E	4523.19	8.63	0.30	209.45
12504.00	91.71	2.51	7759.71	13.00	4536.11	4484.94 N	679.45 E	4536.11	8.61	1.31	209.45
STRAIGHT LINE PROJECTION TO BIT DEPTH AT 12582'MD.											
12582.00	91.71	2.51	7757.39	78.00	4613.64	4562.83 N	682.87 E	4613.64	8.51	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
RMAL	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	DENSTIY CORRECTION PLUS	SDPE	STANDARD DEVIATION PE COMPUTATION
EDPH	DENSITY POROSITY-EVR PROCESSED	SDRH	STANDARD DEVIATION DENSITY
ENPH	NEUTRON POROSTIY-EVR PROCESSED	SOA	UNWEIGHTED DENSITY STANDOFF
ERHO	BULK DENSITY-EVR PROCESSED	TBDN	TIME BEHIND DNSC
NDOL	NEUTRON POROSTIY (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 EXPOSIRE TIME	SHS1	MAX SHEAR SEMBLANCE , UPPER XMITR
SO	ACOUSTIC TOOL STANDOFF	SHS2	MAX SHEAR SEMBLANCE , LOWER XMITR
SOFF	STANDOFF	SLS1	SHEAR SEMBLANCE MIN CUTOFF , UPPER XMITR
DTCU	DELTA T COMP , UPPER XMITR-FIELD PROCESSED	SLS2	SHEAR SEMBLANCE MIN CUTOFF , LOWER XMITR
DTCL	DELTA T COMP , LOWER XMITR-FIELD PROCESSED	WFT1	WAVEFORM XMITR1 , ALL 4 RCVRS (NON-PARSED)
DTP1	DELTA T COMP , UPPER XMITR-POST PROCESSED	WFT2	WAVEFORM XMITR2 , ALL 4 RCVRS (NON-PARSED)
DTP2	DELTA T COMP , LOWER XMITR-POST PROCESSED	W11C	PARSED WAVEFORM , XMITR 1 , RCVR 1
DTS1	DELTA T SHEAR , UPPER XMITR-POST PROCESSED	W12C	PARSED WAVEFORM , XMITR 1 , RCVR 2
DTS2	DELTA T SHEAR , LOWER XMITR-POST PROCESSED	W13C	PARSED WAVEFORM , XMITR 1 , RCVR 3
SEM1	SEMBLANCE , UPPER XMITR-POST PROCESSED	W14C	PARSED WAVEFORM , XMITR 1 , RCVR 4
SEM2	SEMBLANCE , LOWER XMITR-POST PROCESSED	W21C	PARSED WAVEFORM , XMITR 2 , RCVR 1
SMX1	MAX COMP SEMBLANCE , UPPER XMITR	W22C	PARSED WAVEFORM , XMITR 2 , RCVR 2
SMX2	MAX COMP SEMBLANCE , LOWER XMITR	W23C	PARSED WAVEFORM , XMITR 2 , RCVR 3
SMN1	COMP SEMBLANCE MIN CUTOFF , UPPER XMITR	W24C	PARSED WAVEFORM , XMITR 2 , RCVR 4
SMN2	COMP SEMBLANCE MIN CUTOFF , LOWER XMITR		

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	NBGRC	NEAR BIT GAMMA CALIBRATED
NBSINC	NEAR BIT STATIC INCLINATION	NBTMP	NEAR BIT TEMERATURE
NBGR	NEAR BIT GAMMA RAW	NBIFET	NEAR BIT FORMATION EXPOSURE TIME

EQUIPMENT DATA

RUN NUMBER	1	2	3			
RES DTA						
RES MANDREL						
RES SIZE in						
RES VERIFIER						
API BLANKET						

HDS-1M DTA						
HDS-1M MANDREL						
HDS-1M SIZE in						
DNSC DTA	47091	47089	47089			
DNSC MANDREL	N47M091D	N47M089D	N47M089D			
DNSC SIZE in	4 3/4	4 3/4	4 3/4			
DENSITY SOURCE NO.	5145GW	5145GW	5145GW			
NEUTRON SOURCE NO.						
CLSS DTA						
CLSS MANDREL						
CLSS SIZE in						
DPM DTA						
DPM SIZE in						
DFT DTA						
DFT MANDREL						
DFT SIZE in						
PZIG UXM DTA						
PZIG LXM DTA						
PZIG SIZE in						

BOTTOM HOLE ASSEMBLY RECORD

RUN 1	ft	RUN 2	ft	RUN 3	ft		
6 1/8" PDC BIT	1.00	6 1/8" PDC BIT	1.00	6 1/8" PDC BIT	1.00		
1.0° MUD MOTOR	28.33	1.0° MUD MOTOR	28.33	1.0° MUD MOTOR	28.20		
ISDNSC (DEN/INC)	19.61	ISDNSC (DEN/INC)	18.77	ISDNSC (DEN/INC)	18.77		
ABS (BATTERY)	15.35	ABS (BATTERY)	15.04	ABS (BATTERY)	15.04		
XO	1.00	XO	1.00	XO	1.00		
HDS-1L (DIR/GAM)	28.78	HDS-1L (DIR/GAM)	28.78	HDS-1L (DIR/GAM)	28.78		
NMDC	31.17	NMDC	31.17	NMDC	31.17		
NMDC	31.10	NMDC	31.10	NMDC	31.10		
FILTER SUB	3.06	FILTER SUB	3.06	FILTER SUB	3.06		
DP X 1	31.37	DP X 1	31.37	DP X 1	31.37		
REAMER	7.38	REAMER	7.38	REAMER	7.38		
DP X 1	31.37	DP X 1	31.37	DP X 1	31.37		
REAMER	7.37	REAMER	7.37	REAMER	7.37		
DP X 171	5364.75	DP X 171	5364.75	DP X 171	5364.75		
HWDP X 57	1766.41	HWDP X 57	1766.41	HWDP X 57	1766.41		
==========		==========		==========			
TOTAL BHA:	7368.05	TOTAL BHA:	7366.90	TOTAL BHA:	7366.77		
SENSOR OFFSETS:		SENSOR OFFSETS:		SENSOR OFFSETS:			
DIRECTIONAL	75.81	DIRECTIONAL	75.66	DIRECTIONAL	75.53		
GAMMA	67.73	GAMMA	67.58	GAMMA	67.45		
CALIPER	39.52	CALIPER	39.48	CALIPER	39.35		
DENSITY	37.92	DENSITY	37.87	DENSITY	37.74		
IMG INCLINATION	34.60	IMG INCLINATION	34.55	IMG INCLINATION	34.42		

PATHFINDER

A Schlumberger Company

1" = 100'
FEET MD