



A Schlumberger Company

RESISTIVITY
GAMMA-RAY
CONDUCTIVITY

1" = 100'
FEET MD

COMPANY : ANADARKO PETROLEUM CORPORATION
WELL : VONDERLAGE FED 28N-W31HZ
FIELD : DJ WATTENBERG
COUNTY : WELD
STATE : CO
COUNTRY : USA
API No. : 05-123-36017

COMPANY : ANADARKO PETROLEUM CORPORATION
WELL : VONDERLAGE FED 28N-W31HZ
FIELD : DJ WATTENBERG
COUNTY : WELD
STATE : CO
COUNTRY : USA
API WELL No. : 05-123-36017

WELL LOCATION

LAT:40°10'31"N LON:104°49'23"W
X:3,189,135 Y:1,307,442 NAD83
SEC:31 TWP:3N RANGE:66W

OTHER SERVICES

DIRECTIONAL
ROP

DEPTH REF. : ROTARY TABLE
ELEVATION : 13.00 ft (ROTARY TABLE - GROUND LEVEL)
ALTITUDE : 4856.00 ft (GROUND LEVEL - MEAN SEA LEVEL)

BOREHOLE RECORD

DEVIATION RECORD

HOLE SIZE in	FROM ft	TO ft	INCLINATION deg	FROM ft	TO ft
8 3/4	0	7621	00 - 20	0	2904
6 1/8	7621	11611	20 - 00	2904	6596
			00 - 90	6596	7679
			90+/-05	7679	11611

CASING RECORD

CASING SIZE in	FROM ft	TO ft
7	0	7621

DRILLING Co.: ENSIGN DRILLING COMPANY
RIG : 123
LMD UNIT No.: TRAILER DISTRICT : CASPER
SPUD DATE : 06-AUG-13
LMD START DATE : 11-AUG-13 DEPTH : 7638 ft
LMD END DATE : 14-AUG-13 DEPTH : 11611 ft
TOTAL DEPTH : 11611 ft

RUN DATA

RUN NUMBER	1				
START DATE	10-AUG-13				
START TIME	21:00				
END DATE	14-AUG-13				
END TIME					
DEPTH IN ft	7638				
DEPTH OUT ft	11611				
LOG TOP ft	11577				
LOG BOTTOM ft	7621				
HOLE SIZE in	6 1/8				
MUD DATA @ ft	9468				
MUD TYPE	WATER BASED				
DENSITY lb/gal	9.10				
VISCOSITY s/qt	35				
pH	8.9				
FLUID LOSS cm3/30	6.5				
SALINITY ppm					
Rm ohmm @ deg F	0.730 @ 80				
Rmf ohmm @ deg F	0.650 @ 76				

MAX REC TEMP deg F	227					
Rm @ MAX TEMP ohmm	0.264					
LWD ENGINEER #1	R.BAGBY					
LWD ENGINEER #2	J.FLOCK					
LWD ENGINEER #3	S.KINGREY					

REMARKS

ANADARKO PETROLEUM COMPANY AFE #: 2067269.DRL.

PATHFINDER JOB #: 13CAS0211.

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.

THIRD PARTY DEPTH TRACKER SERVICES PROVIDED BY PASON.

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

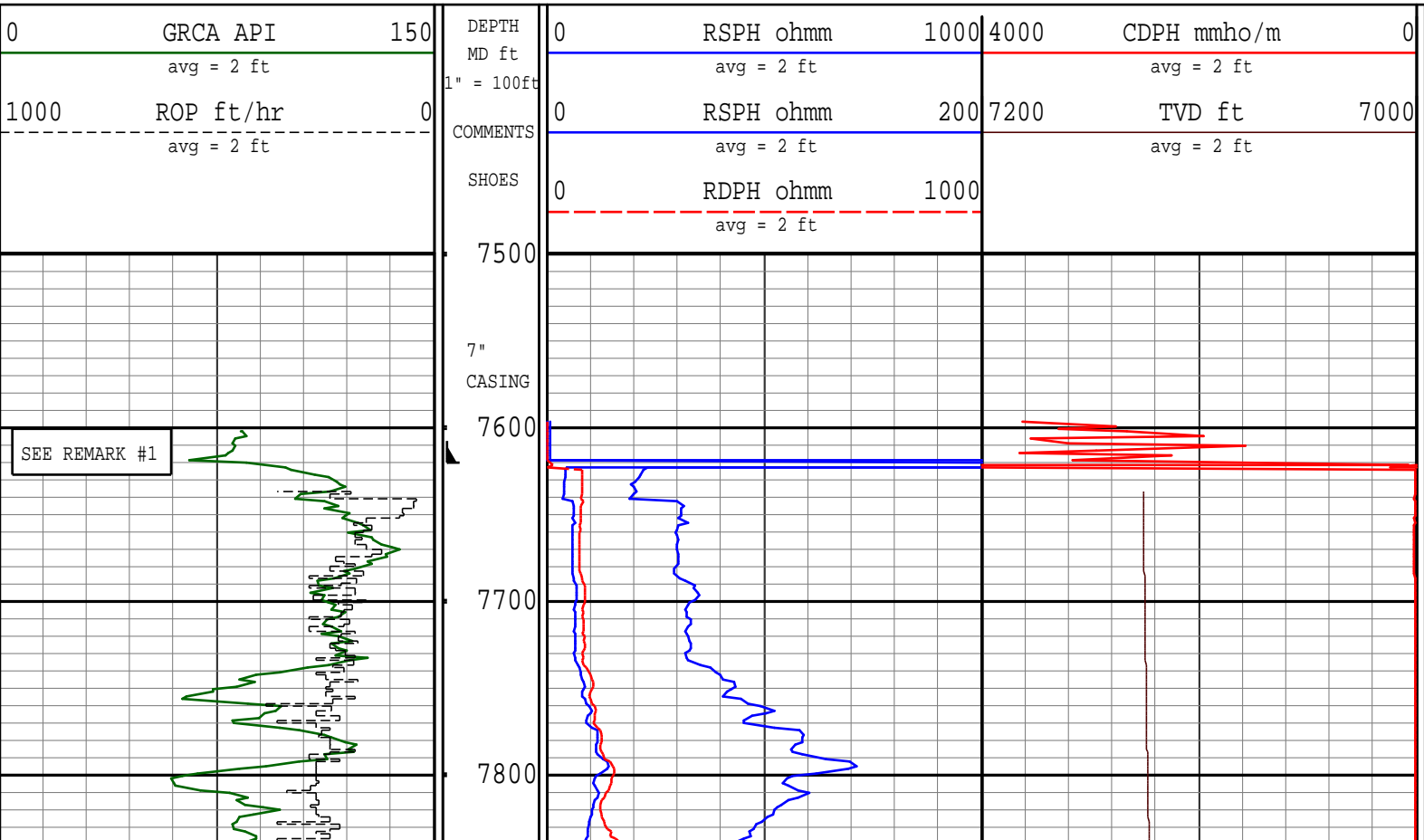
REMARK #1: GAMMA-RAY AND RESISTIVITY LOGGED THROUGH CASING FROM 7621'-7630'MD (7125'TVD).

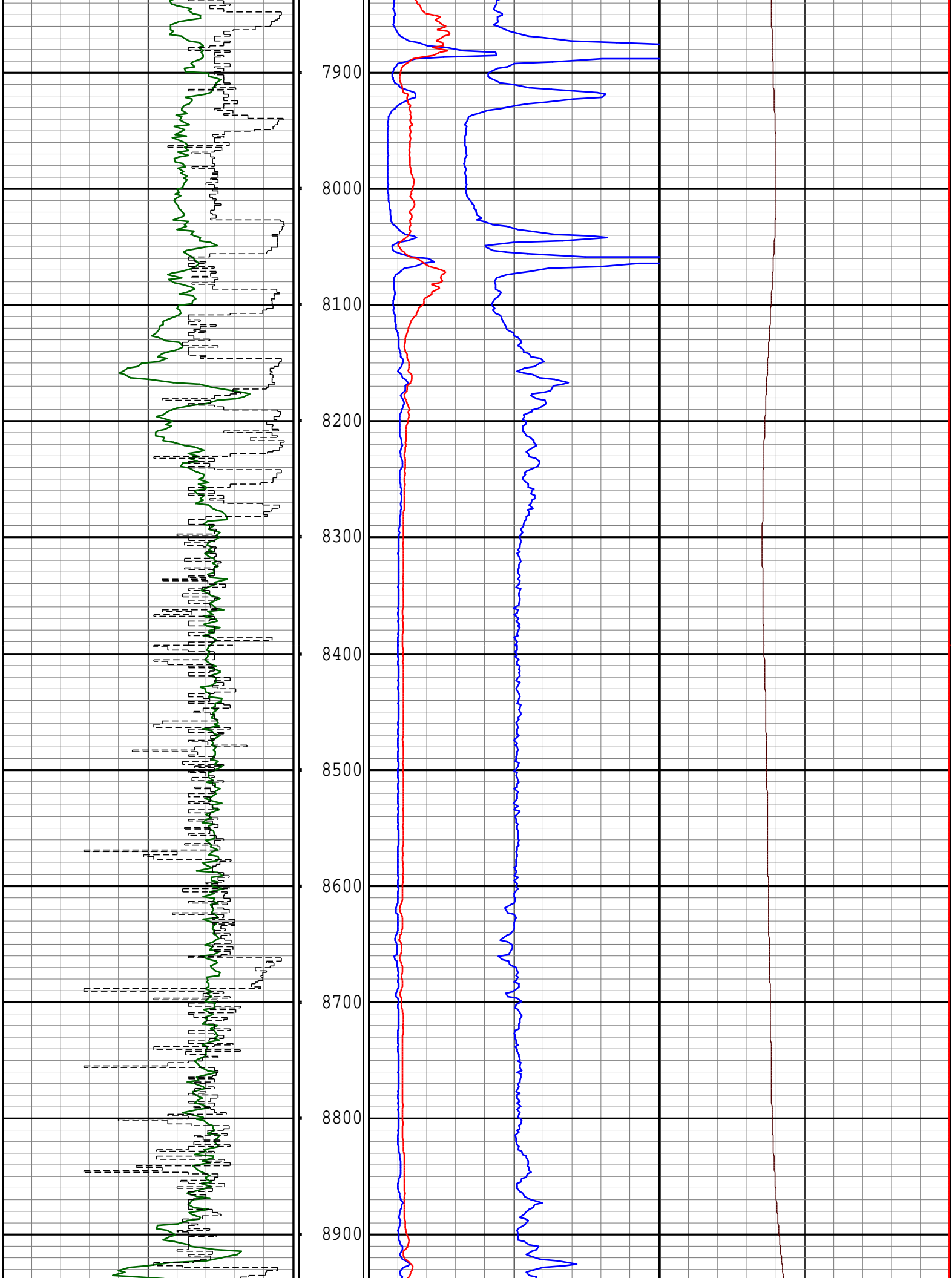
NOTICE - All interpretations are opinions based on inferences from electrical or other measurements and we do not guarantee the accuracy or correctness of any interpretations. We shall not, except in the case of gross or willful negligence on our part, be liable or responsible for loss, costs, damages 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.

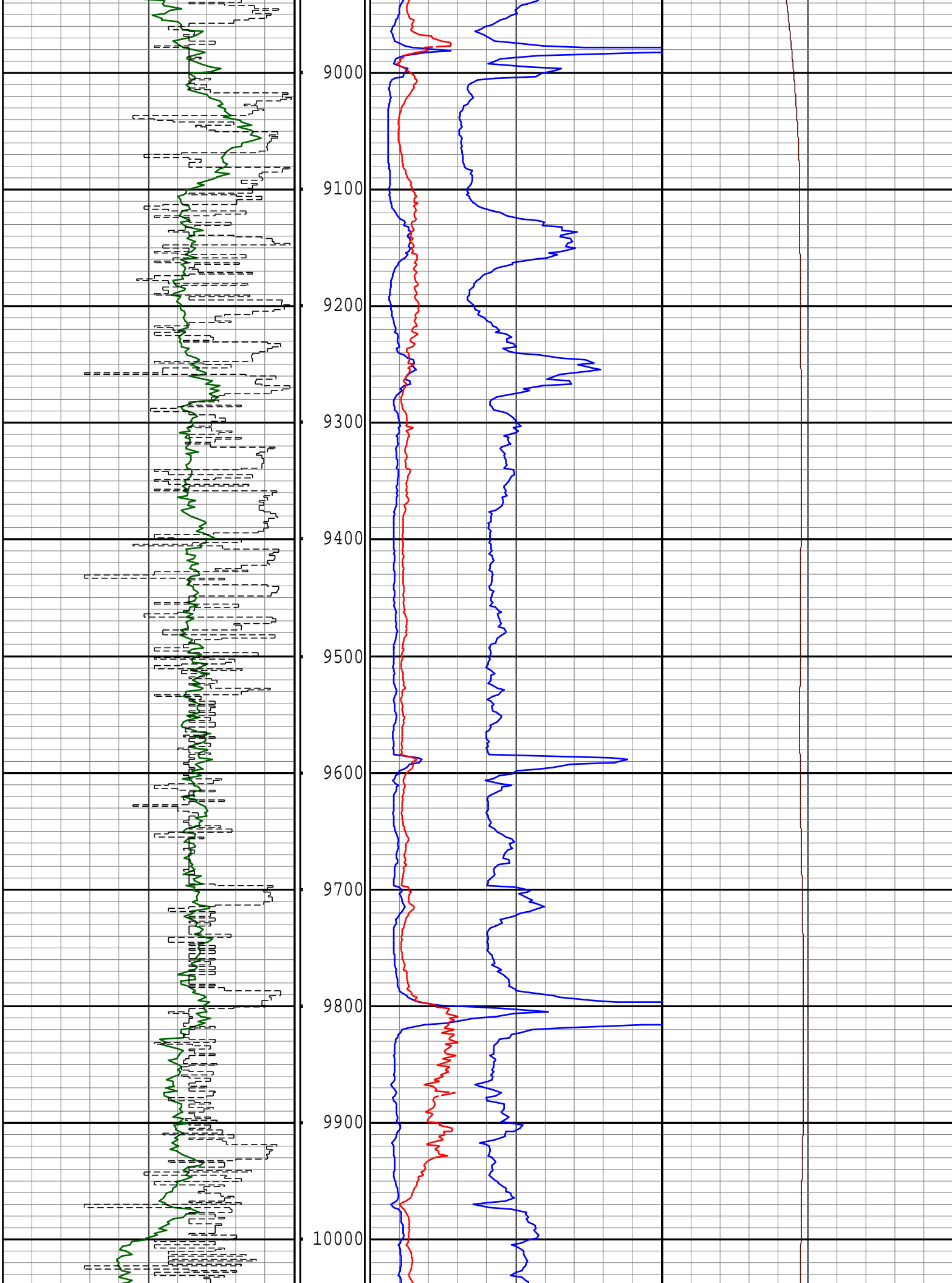
PATHFINDER - A Schlumberger Company

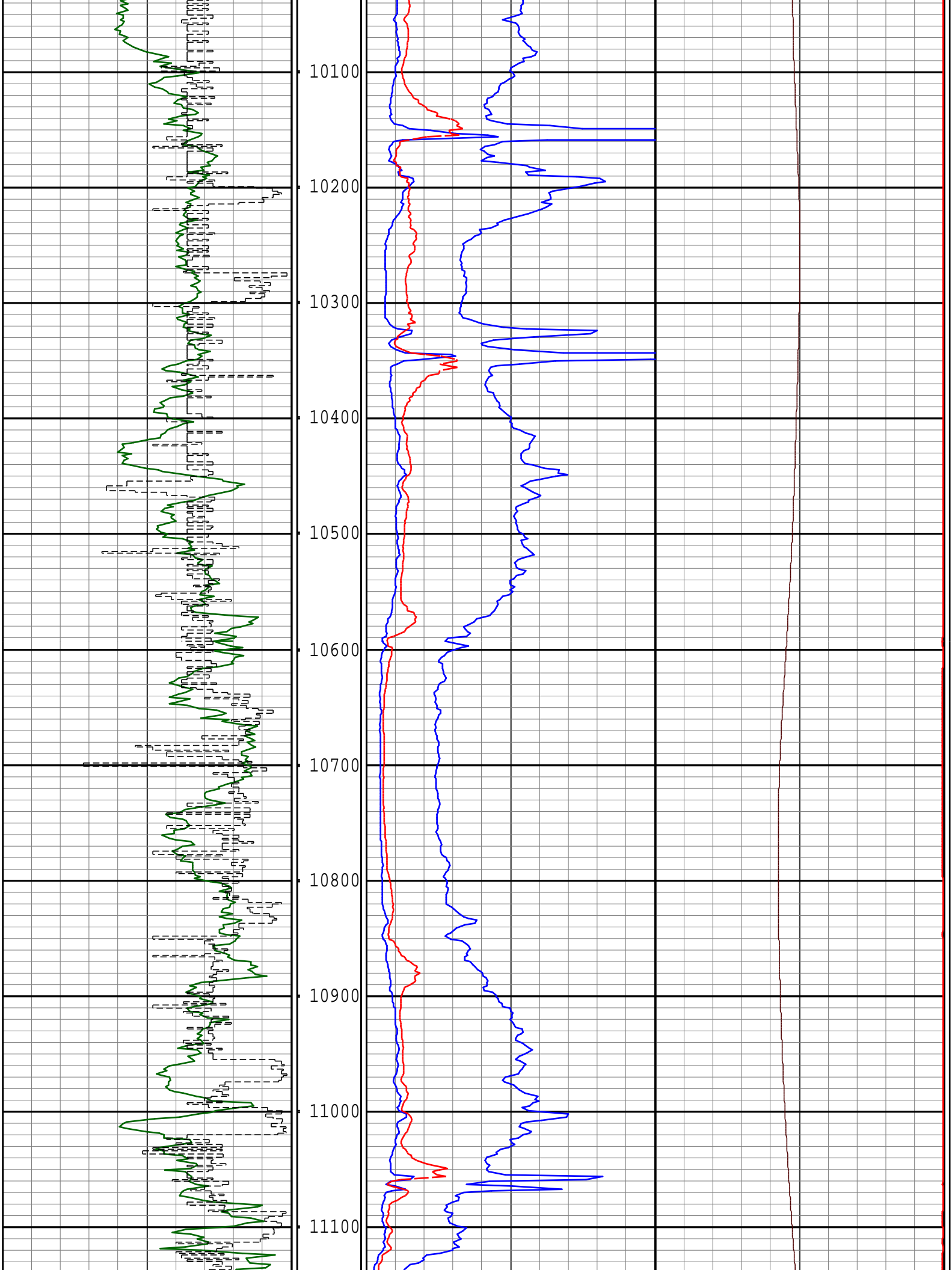
Version No : RX5 V6.04D Release 13Dec2012

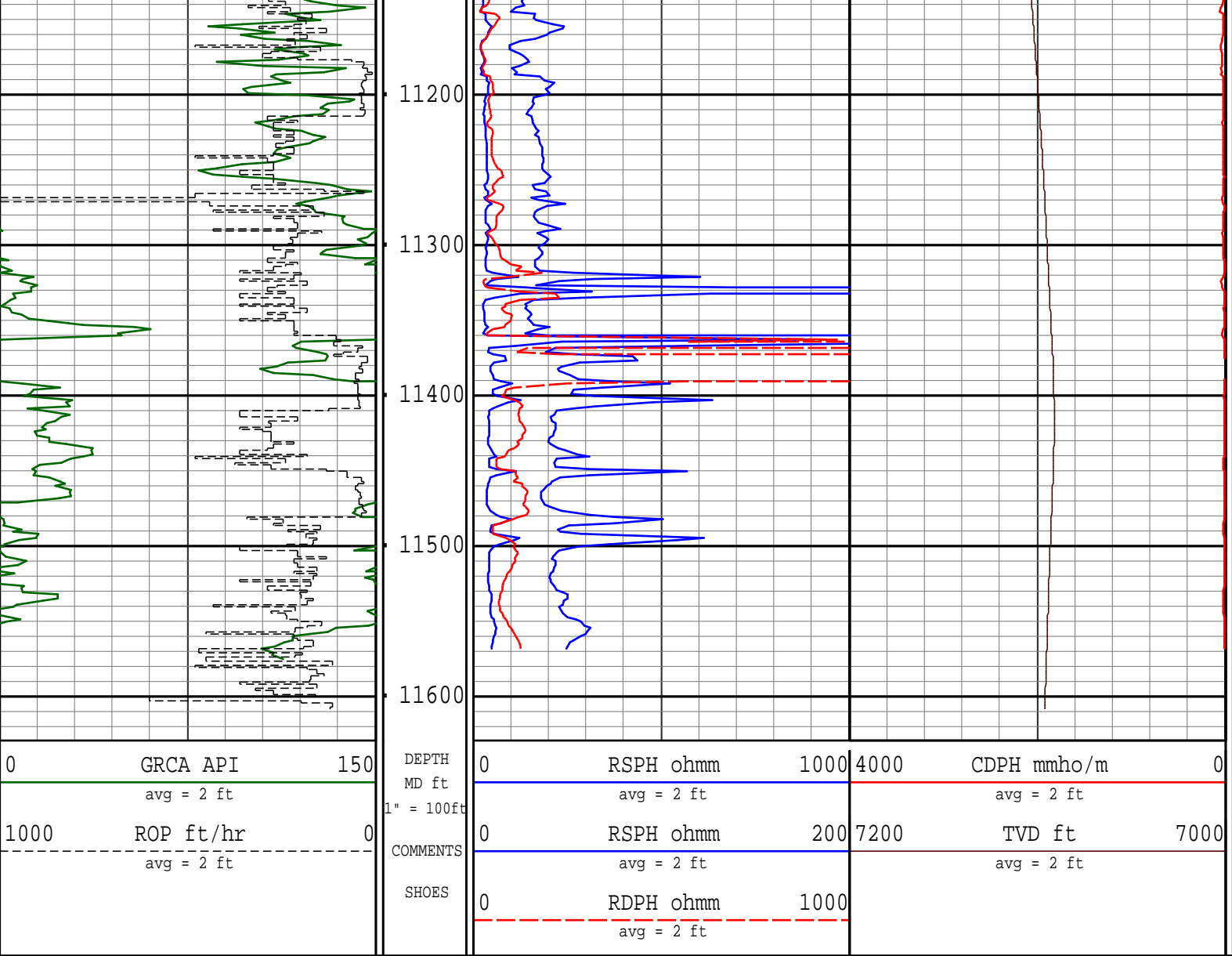
Plot Time : 14-Aug-2013 03:05











Survey Report

Vertical Section Plane: 5.86°	Total Correction: 0.44° East to Grid
Calculation Method: Minimum Curvature	Survey Reference: Wellhead
North Aligned to: Grid North	Well: VONDERLAGE FED 28N-W31HZ
RT: 13' ROTARY TABLE TO GROUND LEVEL	FIELD: DJ 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 CATHEDRAL MWD SURVEYS.											
784.00	0.88	67.61	784.00	0.00	4.60	4.20 N	4.10 E	5.87	44.31	0.00	
885.00	1.00	79.20	884.99	101.00	5.22	4.66 N	5.68 E	7.35	50.64	0.22	
978.00	2.60	125.30	977.94	93.00	4.41	3.59 N	8.20 E	8.95	66.34	2.19	
1072.00	6.20	133.20	1071.65	94.00	0.28	1.11 S	13.64 E	13.69	94.67	3.88	
1165.00	5.20	154.50	1164.20	93.00	-6.36	8.36 S	19.12 E	20.87	113.61	2.50	
1259.00	7.10	146.70	1257.66	94.00	-14.50	17.06 S	24.14 E	29.56	125.24	2.20	
1352.00	9.10	134.90	1349.73	93.00	-23.59	27.05 S	32.51 E	42.30	129.77	2.79	
1446.00	11.00	130.40	1442.28	94.00	-33.36	38.12 S	44.61 E	58.67	130.51	2.19	
1539.00	12.20	123.70	1533.39	93.00	-42.98	49.32 S	59.54 E	77.31	129.64	1.94	
1633.00	13.20	125.30	1625.09	94.00	-52.90	61.03 S	76.56 E	97.91	128.56	1.13	
1726.00	13.50	118.70	1715.58	93.00	-62.33	72.38 S	94.75 E	119.23	127.38	1.67	
1820.00	14.60	117.70	1806.77	94.00	-71.00	83.16 S	114.87 E	141.81	125.90	1.20	
1914.00	15.60	118.70	1897.52	94.00	-80.31	94.74 S	136.44 E	166.11	124.77	1.10	
2004.00	16.00	121.30	1984.12	90.00	-90.34	106.99 S	157.66 E	190.53	124.16	0.90	
2093.00	18.60	124.70	2069.09	89.00	-102.45	121.45 S	179.81 E	216.98	124.04	3.13	
2183.00	17.30	125.30	2154.71	90.00	-115.95	137.35 S	202.53 E	244.71	124.14	1.46	
2274.00	17.10	125.20	2241.64	91.00	-129.16	152.88 S	224.51 E	271.62	124.25	0.22	
2364.00	17.60	129.00	2327.54	90.00	-143.08	169.07 S	245.90 E	298.41	124.51	1.38	
2454.00	17.10	122.30	2413.46	90.00	-156.41	184.71 S	267.66 E	325.20	124.61	2.29	
2544.00	17.60	126.00	2499.36	90.00	-169.14	199.78 S	289.85 E	352.03	124.58	1.35	
2634.00	18.50	122.50	2584.94	90.00	-182.37	215.45 S	312.90 E	379.90	124.55	1.56	
2724.00	19.80	123.60	2669.95	90.00	-195.87	231.55 S	337.64 E	409.41	124.44	1.50	

2814.00	18.60	123.30	2754.95	90.00	-209.58	247.87 S	362.33 E	439.01	124.38	1.34	
2904.00	20.10	129.30	2839.87	90.00	-224.72	265.55 S	386.30 E	468.77	124.51	2.76	
2994.00	18.90	134.30	2924.71	90.00	-242.31	285.53 S	408.70 E	498.56	124.94	2.28	
3084.00	15.80	137.80	3010.61	90.00	-259.56	304.79 S	427.37 E	524.92	125.50	3.63	
3174.00	14.90	136.30	3097.40	90.00	-275.26	322.23 S	443.60 E	548.28	125.99	1.09	
3264.00	13.10	134.40	3184.72	90.00	-289.12	337.73 S	458.88 E	569.77	126.35	2.06	
3354.00	10.80	132.40	3272.76	90.00	-300.50	350.56 S	472.39 E	588.26	126.58	2.60	
3445.00	9.10	127.40	3362.39	91.00	-309.34	360.68 S	484.41 E	603.94	126.67	2.09	
3534.00	8.80	127.20	3450.31	89.00	-316.56	369.07 S	495.42 E	617.78	126.68	0.34	
3625.00	8.30	130.30	3540.30	91.00	-323.89	377.53 S	505.98 E	631.30	126.73	0.75	
3715.00	8.70	128.40	3629.31	90.00	-331.23	385.96 S	516.27 E	644.59	126.78	0.54	
3805.00	8.00	130.10	3718.36	90.00	-338.41	394.22 S	526.39 E	657.64	126.83	0.82	
3895.00	6.60	128.70	3807.62	90.00	-344.74	401.49 S	535.22 E	669.07	126.87	1.57	
3985.00	5.80	119.00	3897.10	90.00	-349.34	406.92 S	543.23 E	678.74	126.84	1.46	
4075.00	6.40	131.30	3986.59	90.00	-354.03	412.44 S	550.98 E	688.25	126.82	1.59	
4165.00	5.50	131.20	4076.11	90.00	-359.44	418.59 S	557.99 E	697.55	126.88	1.00	
4255.00	4.00	120.50	4165.80	90.00	-363.24	423.03 S	563.94 E	704.97	126.87	1.93	
4345.00	2.50	147.20	4255.66	90.00	-366.08	426.27 S	567.71 E	709.93	126.90	2.33	
4435.00	1.90	148.90	4345.59	90.00	-368.81	429.20 S	569.54 E	713.16	127.00	0.67	
4525.00	1.70	146.50	4435.54	90.00	-371.03	431.59 S	571.05 E	715.80	127.08	0.24	
4616.00	1.30	138.10	4526.51	91.00	-372.77	433.48 S	572.49 E	718.09	127.13	0.50	
4706.00	0.90	159.20	4616.50	90.00	-374.09	434.90 S	573.42 E	719.69	127.18	0.63	
4886.00	1.30	257.50	4796.48	180.00	-375.99	436.67 S	571.93 E	719.57	127.36	0.94	
5156.00	1.50	152.00	5066.43	270.00	-379.89	440.45 S	570.60 E	720.82	127.66	0.83	
5426.00	1.00	269.40	5336.39	270.00	-383.09	443.60 S	569.90 E	722.19	127.90	0.80	
5696.00	0.60	288.20	5606.37	270.00	-383.05	443.18 S	566.20 E	719.02	128.05	0.17	
5966.00	0.50	305.70	5876.35	270.00	-382.17	442.05 S	563.90 E	716.51	128.09	0.07	
6236.00	0.40	292.70	6146.35	270.00	-381.31	441.00 S	562.07 E	714.43	128.12	0.05	
6506.00	0.90	286.90	6416.33	270.00	-380.63	440.02 S	559.18 E	711.54	128.20	0.19	
6596.00	1.60	282.10	6506.31	90.00	-380.36	439.55 S	557.27 E	709.76	128.26	0.79	
6641.00	4.00	337.90	6551.26	45.00	-378.90	437.96 S	556.07 E	707.83	128.22	7.49	
6686.00	8.40	351.60	6595.98	45.00	-374.33	433.25 S	555.00 E	704.08	127.98	10.25	
6731.00	13.10	353.40	6640.18	45.00	-366.16	424.93 S	553.93 E	698.14	127.49	10.47	
6776.00	17.60	352.70	6683.57	45.00	-354.55	413.11 S	552.48 E	689.85	126.79	10.01	
6821.00	22.20	355.60	6725.87	45.00	-339.55	397.88 S	550.96 E	679.61	125.84	10.45	
6866.00	25.00	1.10	6767.11	45.00	-321.70	379.89 S	550.49 E	668.85	124.61	7.91	
6911.00	27.60	5.70	6807.45	45.00	-301.80	360.00 S	551.71 E	658.78	123.13	7.34	
6956.00	30.20	6.40	6846.84	45.00	-280.05	338.38 S	554.01 E	649.17	121.42	5.83	
7001.00	34.40	3.60	6884.87	45.00	-256.02	314.43 S	556.07 E	638.81	119.49	9.91	
7046.00	40.10	3.90	6920.68	45.00	-228.81	287.27 S	557.85 E	627.47	117.25	12.67	
7091.00	47.00	2.30	6953.27	45.00	-197.86	256.33 S	559.50 E	615.42	114.61	15.53	
7136.00	52.70	1.60	6982.28	45.00	-163.56	221.96 S	560.66 E	603.00	111.60	12.72	
7181.00	58.70	0.00	7007.62	45.00	-126.55	184.81 S	561.16 E	590.81	108.23	13.65	
7226.00	63.50	358.00	7029.37	45.00	-87.46	145.44 S	560.46 E	579.02	104.55	11.35	
7271.00	66.20	357.80	7048.49	45.00	-47.12	104.74 S	558.96 E	568.69	100.61	6.01	
7316.00	69.10	357.70	7065.60	45.00	-5.92	63.15 S	557.33 E	560.90	96.46	6.45	
7361.00	71.50	358.00	7080.77	45.00	36.03	20.82 S	555.74 E	556.13	92.15	5.37	
7406.00	73.80	358.00	7094.19	45.00	78.58	22.11 N	554.24 E	554.68	87.72	5.11	

Survey Report											
Vertical Section Plane: 5.86°						Total Correction: 0.44° East to Grid					
Calculation Method: Minimum Curvature						Survey Reference: Wellhead					
North Aligned to: Grid North						Well: VONDERLAGE FED 28N-W31HZ					
RT: 13' ROTARY TABLE TO GROUND LEVEL						FIELD: DJ 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)
7451.00	76.80	358.70	7105.60	45.00	121.72	65.61 N	552.99 E	556.87	83.23	6.83	
7496.00	80.30	359.90	7114.54	45.00	165.53	109.70 N	552.46 E	563.24	78.77	8.20	
7541.00	83.90	359.40	7120.72	45.00	209.84	154.27 N	552.18 E	573.33	74.39	8.08	
TIED-IN TO CATHEDRAL MWD SURVEYS AT 7581'MD.											
7581.00	87.70	359.50	7123.65		249.47	194.15 N	551.80 E	584.96	70.62		
THE FOLLOWING ARE PATHFINDER MWD SURVEYS.											
7679.00	90.66	352.21	7125.05	98.00	345.90	291.81 N	544.72 E	617.96	61.82	8.03	187.76
7769.00	90.75	351.58	7123.95	90.00	433.23	380.90 N	532.03 E	654.33	54.40	0.71	191.38
7859.00	91.10	350.84	7122.49	90.00	520.29	469.83 N	518.28 E	699.54	47.81	0.91	191.38
7949.00	92.07	351.08	7120.00	90.00	607.23	558.68 N	504.15 E	752.52	42.06	1.11	191.38
8038.00	87.58	353.32	7120.28	89.00	693.69	646.83 N	492.07 E	812.72	37.26	5.64	184.15
8128.00	87.41	354.79	7124.21	90.00	781.70	736.25 N	482.76 E	880.41	33.25	1.64	184.15
8218.00	88.29	0.17	7127.59	90.00	870.64	826.07 N	478.81 E	954.80	30.10	6.05	184.15
8308.00	90.04	2.77	7128.90	90.00	960.35	916.02 N	481.12 E	1034.68	27.71	3.48	187.76
8398.00	91.45	2.94	7127.73	90.00	1050.22	1005.90 N	485.60 E	1116.98	25.77	1.58	194.99
8488.00	90.75	3.80	7126.00	90.00	1140.12	1095.72 N	490.89 E	1200.66	24.13	1.23	198.61
8576.00	90.40	5.07	7125.12	88.00	1228.08	1183.45 N	497.69 E	1283.85	22.81	1.50	202.22
8666.00	91.01	3.74	7124.01	90.00	1318.04	1273.18 N	504.60 E	1369.53	21.62	1.63	202.22
8756.00	90.40	359.44	7122.90	90.00	1407.77	1363.12 N	507.10 E	1454.39	20.41	4.83	205.83
8847.00	92.59	356.50	7120.53	91.00	1497.86	1454.01 N	503.88 E	1538.85	19.11	4.03	205.83
8937.00	95.14	355.92	7114.46	90.00	1586.38	1543.60 N	497.94 E	1621.93	17.88	2.91	202.22
9027.00	93.30	354.57	7107.84	90.00	1674.59	1633.05 N	490.50 E	1705.12	16.72	2.53	198.61
9117.00	90.04	356.25	7105.22	90.00	1763.05	1722.70 N	483.31 E	1789.22	15.67	4.07	202.22
9207.00	90.48	355.64	7104.81	90.00	1851.70	1812.48 N	476.94 E	1874.18	14.74	0.84	202.22
9297.00	90.13	356.35	7104.33	90.00	1940.37	1902.25 N	470.66 E	1959.61	13.90	0.88	202.22
9387.00	89.78	358.91	7104.40	90.00	2029.43	1992.17 N	466.94 E	2046.16	13.19	2.87	202.22

9477.00	89.60	4.44	7104.89	90.00	2119.16	2082.09 N	469.56 E	2134.39	12.71	6.15	205.83
9567.00	90.04	4.38	7105.17	90.00	2209.13	2171.83 N	476.49 E	2223.48	12.37	0.49	205.83
9657.00	91.01	3.81	7104.35	90.00	2299.08	2261.59 N	482.91 E	2312.58	12.05	1.25	205.83
9747.00	90.57	3.72	7103.11	90.00	2389.01	2351.39 N	488.82 E	2401.66	11.74	0.50	209.45
9837.00	90.04	2.18	7102.63	90.00	2478.89	2441.27 N	493.45 E	2490.64	11.43	1.81	213.06
9927.00	88.90	359.93	7103.46	90.00	2568.56	2531.24 N	495.11 E	2579.21	11.07	2.80	213.06
10017.00	89.69	358.31	7104.57	90.00	2657.93	2621.22 N	493.73 E	2667.31	10.67	2.00	216.68
10107.00	91.89	357.66	7103.33	90.00	2747.07	2711.15 N	490.56 E	2755.17	10.26	2.55	216.68
10197.00	91.80	356.76	7100.43	90.00	2836.00	2800.99 N	486.19 E	2842.88	9.85	1.00	213.06
10287.00	89.16	357.99	7099.67	90.00	2925.00	2890.89 N	482.06 E	2930.80	9.47	3.24	216.68
10377.00	88.55	358.16	7101.47	90.00	3014.15	2980.82 N	479.04 E	3019.07	9.13	0.70	220.29
10467.00	88.46	357.26	7103.82	90.00	3103.21	3070.71 N	475.45 E	3107.30	8.80	1.00	223.91
10557.00	87.41	355.57	7107.06	90.00	3191.93	3160.48 N	469.82 E	3195.21	8.46	2.21	227.52
10647.00	87.05	356.82	7111.41	90.00	3280.54	3250.17 N	463.86 E	3283.10	8.12	1.44	223.91
10737.00	89.16	356.70	7114.39	90.00	3369.36	3339.97 N	458.77 E	3371.33	7.82	2.35	227.52
10827.00	90.75	356.93	7114.46	90.00	3458.24	3429.83 N	453.77 E	3459.72	7.54	1.78	227.52
10919.00	91.45	355.14	7112.69	92.00	3548.87	3521.59 N	447.41 E	3549.90	7.24	2.09	223.91
11009.00	92.51	357.28	7109.58	90.00	3637.53	3611.33 N	441.47 E	3638.22	6.97	2.65	223.91
11099.00	93.21	358.15	7105.09	90.00	3726.51	3701.15 N	437.88 E	3726.96	6.75	1.24	227.52
11189.00	93.30	359.44	7099.98	90.00	3815.68	3790.98 N	435.99 E	3815.97	6.56	1.43	227.52
11279.00	92.33	358.94	7095.56	90.00	3904.97	3880.86 N	434.72 E	3905.13	6.39	1.21	231.13
11369.00	92.33	358.17	7091.90	90.00	3994.16	3970.76 N	432.46 E	3994.24	6.22	0.85	231.13
11459.00	88.02	356.25	7091.63	90.00	4083.11	4060.62 N	428.08 E	4083.13	6.02	5.24	223.91
11526.00	88.46	355.16	7093.69	67.00	4149.03	4127.40 N	423.06 E	4149.03	5.85	1.75	227.52
STRAIGHT LINE PROJECTION TO BIT DEPTH AT 11611'MD.											
11611.00	88.46	355.16	7095.97	85.00	4232.52	4212.07 N	415.89 E	4232.55	5.64	0.00	

EQUIPMENT DATA						
RUN NUMBER	1					
RES DTA	4573					
RES MANDREL	R47M573T					
RES SIZE in	4 3/4					
RES VERIFIER						
API BLANKET	0013					
HDS-1M DTA						
HDS-1M MANDREL						
HDS-1M SIZE in						
DNSS DTA						
DNSS MANDREL						
DNSS SIZE in						
DENSITY SOURCE NO.						
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							
6 1/8" PDC BIT	0.80						
1.5° MUD MOTOR	28.61						
SAWR (GR/RES)	20.33						
SABS (BATTERY)	19.98						

5 3/4" NM STAB	1.13						
HDS-1L (DIR/GR)	28.75						
CROSSOVER SUB	1.90						
GHOST REAMER	7.35						
40 X 4" DP	1800.00						
AGITATOR	22.35						
50 X 4" DP	2250.00						
40 X 4"HWDP	1870.02						
=====							
TOTAL BHA LENGTH	6051.22						
SENSOR OFFSETS:							
DIRECTIONAL	82.80						
HDS-1L GAMMA-RAY	74.72						
RESISTIVITY	39.78						
AWR GAMMA-RAY	33.08						
AWR INCLINATION	32.68						



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RESISTIVITY
GAMMA-RAY
CONDUCTIVITY

1" = 100'
FEET MD