

Company: Noble Energy

Lease/Well: Miller P / 27-4 JI

API: 05-123-20159

Rig Name: Production / Lightning Wireline

State/County: Colorado / Weld

Latitude: 40.202, Longitude: -104.884

GRID North is 0.400 Degrees East of True North

VS-Azi: 0.000 Degrees



FIELD COPY ONLY (NOT DEFINITIVE)

Depth Reference : RKB = Ground Level

DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: msgyro\_run01-01\_ed.ut

Minimum Curvature Method

Report Date/Time: 3/6/2012 / 19:20

Vaughn Energy Services

Henderson Colorado

866-835-8333

Norman Cowan

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	****
100.000	0.284	350.123	100.000	0.244	-0.042	0.244	0.248	350.123	0.284
200.000	0.405	302.397	199.998	0.678	-0.384	0.678	0.779	330.480	0.300
300.000	0.410	286.309	299.995	0.968	-1.026	0.968	1.411	313.322	0.114
400.000	0.717	295.194	399.991	1.335	-1.936	1.335	2.351	304.583	0.317
500.000	0.943	290.784	499.980	1.893	-3.271	1.893	3.779	300.056	0.235
600.000	0.865	288.747	599.968	2.427	-4.755	2.427	5.339	297.044	0.085
700.000	0.916	287.854	699.955	2.915	-6.230	2.915	6.879	295.073	0.053
800.000	1.198	305.742	799.939	3.771	-7.840	3.771	8.699	295.686	0.431
900.000	1.016	306.967	899.920	4.914	-9.396	4.914	10.604	297.610	0.183
1000.000	0.984	307.801	999.905	5.974	-10.783	5.974	12.327	298.986	0.035
1100.000	1.259	309.305	1099.885	7.196	-12.312	7.196	14.260	300.305	0.277
1200.000	1.297	305.137	1199.861	8.543	-14.087	8.543	16.475	301.235	0.100
1300.000	1.325	303.257	1299.834	9.828	-15.979	9.828	18.759	301.594	0.051
1400.000	1.291	306.171	1399.808	11.127	-17.855	11.127	21.038	301.931	0.075
1500.000	1.355	304.139	1499.782	12.455	-19.743	12.455	23.343	302.247	0.080
1600.000	1.278	305.592	1599.755	13.768	-21.629	13.768	25.639	302.480	0.084
1700.000	1.078	300.124	1699.734	14.889	-23.349	14.889	27.692	302.525	0.229
1800.000	1.079	304.477	1799.716	15.894	-24.939	15.894	29.574	302.511	0.082
1900.000	1.124	304.551	1899.698	16.984	-26.523	16.984	31.495	302.633	0.045
2000.000	1.171	313.151	1999.678	18.239	-28.077	18.239	33.481	303.008	0.178
2100.000	1.214	306.544	2099.656	19.569	-29.673	19.569	35.545	303.404	0.144
2200.000	1.251	326.640	2199.634	21.111	-31.124	21.111	37.608	304.148	0.432
2300.000	0.991	330.321	2299.614	22.774	-32.153	22.774	39.401	305.310	0.269
2400.000	0.371	1.275	2399.607	23.849	-32.574	23.849	40.372	306.210	0.700
2500.000	0.542	17.370	2499.604	24.624	-32.426	24.624	40.716	307.213	0.213
2600.000	0.409	13.103	2599.601	25.424	-32.203	25.424	41.030	308.290	0.137
2700.000	0.358	1.310	2699.598	26.084	-32.115	26.084	41.373	309.083	0.094
2800.000	0.361	303.792	2799.597	26.571	-32.370	26.571	41.879	309.381	0.346
2900.000	0.600	305.482	2899.593	27.050	-33.058	27.050	42.715	309.292	0.240
3000.000	0.561	269.745	2999.588	27.352	-33.975	27.352	43.617	308.837	0.358
3100.000	1.261	284.256	3099.575	27.621	-35.531	27.621	45.004	307.861	0.731
3200.000	1.187	291.073	3199.552	28.265	-37.564	28.265	47.010	306.959	0.163
3300.000	1.312	297.646	3299.529	29.169	-39.545	29.169	49.139	306.412	0.190
3400.000	1.354	308.044	3399.502	30.428	-41.490	30.428	51.452	306.256	0.245

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N-S FT	+E-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
3500.000	1.345	314.840	3499.474	31.984	-43.253	31.984	53.795	306.481	0.160
3600.000	1.328	329.897	3599.447	33.814	-44.667	33.814	56.023	307.127	0.351
3700.000	1.491	335.622	3699.417	36.002	-45.785	36.002	58.244	308.179	0.215
3800.000	1.459	337.565	3799.384	38.363	-46.808	38.363	60.520	309.338	0.060
3900.000	1.465	337.500	3899.351	40.720	-47.783	40.720	62.780	310.438	0.006
4000.000	1.012	334.742	3999.328	42.700	-48.649	42.700	64.730	311.274	0.456
4100.000	0.718	1.817	4099.316	44.125	-49.006	44.125	65.944	312.000	0.496
4200.000	0.678	5.832	4199.309	45.340	-48.926	45.340	66.704	312.822	0.063
4300.000	0.709	338.454	4299.302	46.504	-49.093	46.504	67.622	313.449	0.330
4400.000	0.829	329.331	4399.293	47.701	-49.689	47.701	68.880	313.831	0.171
4500.000	0.726	304.741	4499.284	48.684	-50.578	48.684	70.202	313.907	0.346
4600.000	0.804	295.581	4599.275	49.348	-51.731	49.348	71.494	313.649	0.145
4700.000	0.878	307.112	4699.264	50.113	-52.975	50.113	72.922	313.410	0.184
4800.000	1.006	292.963	4799.251	50.918	-54.394	50.918	74.507	313.109	0.265
4900.000	0.966	308.320	4899.236	51.783	-55.864	51.783	76.173	312.829	0.266
5000.000	0.915	338.226	4999.224	53.047	-56.822	53.047	77.735	313.033	0.488
5100.000	0.890	310.352	5099.212	54.292	-57.710	54.292	79.234	313.252	0.435
5200.000	0.889	326.300	5199.200	55.440	-58.732	55.440	80.765	313.348	0.247
5300.000	0.962	320.220	5299.187	56.730	-59.700	56.730	82.355	313.539	0.123
5400.000	1.522	311.998	5399.163	58.265	-61.224	58.265	84.517	313.581	0.586
5500.000	1.640	322.496	5499.125	60.289	-63.082	60.289	87.259	313.703	0.312
5600.000	1.766	312.056	5599.081	62.456	-65.098	62.456	90.213	313.814	0.334
5700.000	1.890	310.712	5699.030	64.563	-67.491	64.563	93.400	313.730	0.131
5800.000	1.555	308.944	5798.985	66.492	-69.797	66.492	96.399	313.611	0.339
5900.000	1.379	305.886	5898.952	68.050	-71.827	68.050	98.944	313.453	0.193
6000.000	1.509	310.764	5998.920	69.616	-73.800	69.616	101.453	313.329	0.179
6100.000	1.572	300.873	6098.884	71.179	-75.974	71.179	104.108	313.134	0.273
6200.000	1.984	305.834	6198.836	72.896	-78.554	72.896	107.166	312.860	0.439
6300.000	2.406	290.836	6298.763	74.656	-81.919	74.656	110.834	312.344	0.709
6400.000	2.340	296.226	6398.678	76.305	-85.712	76.305	114.756	311.677	0.233
6500.000	2.515	294.519	6498.588	78.118	-89.540	78.118	118.827	311.102	0.189
6600.000	2.903	285.959	6598.476	79.725	-93.972	79.725	123.234	310.311	0.560
6700.000	3.068	294.716	6698.341	81.540	-98.838	81.540	128.131	309.522	0.484
6800.000	2.770	299.041	6798.211	83.832	-103.381	83.832	133.099	309.039	0.371
6900.000	2.043	304.139	6898.123	86.005	-106.968	86.005	137.255	308.800	0.757
7000.000	2.015	298.596	6998.060	87.847	-109.987	87.847	140.763	308.614	0.198
7100.000	2.759	303.617	7097.973	90.021	-113.535	90.021	144.893	308.410	0.772
7200.000	2.668	312.255	7197.861	92.918	-117.262	92.918	149.613	308.393	0.419
7300.000	2.962	320.556	7297.741	96.478	-120.626	96.478	154.462	308.653	0.502
7400.000	3.292	314.951	7397.592	100.501	-124.299	100.501	159.846	308.957	0.449
7500.000	4.030	313.612	7497.387	104.953	-128.875	104.953	166.204	309.159	0.743

HORIZONTAL DISPLACEMENT IS  
166.204 FEET AT 309.159 DEGREES