

Company: Noble Energy

Lease/Well: Rothe/1

API: 05-123-11633

Rig Name: Production

State/County: Colorado/Weld County, CO.

Latitude: 40.340, Longitude: -104.510

GRID North is 0.640 Degrees East of True North

VS-Azi: 0.000 Degrees

**FIELD COPY ONLY (NOT DEFINITIVE)****DRILLOG MS GYRO SURVEY CALCULATIONS**

Filename: msgyro_run01-01_ed.ut

Minimum Curvature Method

Report Date/Time: 8/11/2011 / 02:43

Vaughn Energy Services

Henderson Colorado

866-835-8333

Depth Reference = Ground Level

Nick Campbell

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	0.413	168.361	99.999	-0.353	0.073	-0.353	0.361	168.361	0.413
200.000	0.603	187.484	199.995	-1.229	0.077	-1.229	1.231	176.415	0.252
300.000	0.851	186.657	299.987	-2.488	-0.078	-2.488	2.490	181.788	0.248
400.000	1.103	199.355	399.973	-4.134	-0.483	-4.134	4.162	186.661	0.331
500.000	1.442	197.311	499.948	-6.244	-1.176	-6.244	6.353	190.669	0.341
600.000	1.196	191.057	599.921	-8.469	-1.751	-8.469	8.648	191.680	0.284
700.000	1.218	177.926	699.899	-10.556	-1.912	-10.556	10.728	190.269	0.277
800.000	1.282	196.079	799.876	-12.693	-2.184	-12.693	12.880	189.762	0.399
900.000	1.157	182.788	899.853	-14.777	-2.543	-14.777	14.994	189.763	0.308
1000.000	1.473	180.107	999.827	-17.071	-2.594	-17.071	17.267	188.641	0.322
1100.000	1.495	201.370	1099.794	-19.571	-3.072	-19.571	19.810	188.921	0.548
1200.000	1.421	212.243	1199.762	-21.834	-4.209	-21.834	22.236	190.910	0.286
1300.000	1.129	219.962	1299.737	-23.638	-5.503	-23.638	24.270	193.105	0.338
1400.000	1.065	207.171	1399.719	-25.220	-6.560	-25.220	26.059	194.581	0.253
1500.000	1.148	223.216	1499.701	-26.777	-7.671	-26.777	27.854	195.985	0.319
1600.000	0.649	246.878	1599.688	-27.729	-8.877	-27.729	29.116	197.752	0.611
1700.000	0.756	230.227	1699.681	-28.374	-9.906	-28.374	30.053	199.245	0.229
1800.000	0.614	235.817	1799.674	-29.097	-10.856	-29.097	31.057	200.461	0.157
1900.000	1.017	246.497	1899.663	-29.752	-12.114	-29.752	32.124	202.154	0.429
2000.000	0.629	249.026	1999.653	-30.303	-13.440	-30.303	33.150	203.919	0.389
2100.000	0.986	217.968	2099.643	-31.178	-14.482	-31.178	34.377	204.916	0.552
2200.000	0.915	214.460	2199.629	-32.514	-15.464	-32.514	36.004	205.435	0.091
2300.000	0.991	214.686	2299.616	-33.884	-16.408	-33.884	37.647	205.838	0.076
2400.000	0.814	227.207	2399.603	-35.077	-17.421	-35.077	39.165	206.411	0.264
2500.000	0.718	250.476	2499.595	-35.769	-18.533	-35.769	40.285	207.390	0.323
2600.000	1.103	274.931	2599.582	-35.896	-20.082	-35.896	41.132	209.225	0.539
2700.000	1.026	281.194	2699.565	-35.639	-21.919	-35.639	41.841	211.593	0.139
2800.000	0.447	279.254	2799.556	-35.403	-23.182	-35.403	42.318	213.217	0.579
2900.000	0.426	283.476	2899.553	-35.254	-23.929	-35.254	42.608	214.167	0.038
3000.000	0.717	260.849	2999.548	-35.266	-24.909	-35.266	43.176	215.233	0.363

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
3100.000	0.570	273.779	3099.542	-35.333	-26.023	-35.333	43.882	216.371	0.206
3200.000	0.689	281.449	3199.536	-35.181	-27.108	-35.181	44.413	217.615	0.146
3300.000	1.063	278.173	3299.524	-34.930	-28.615	-34.930	45.154	219.325	0.377
3400.000	1.669	300.505	3399.496	-34.059	-30.788	-34.059	45.912	222.112	0.796
3500.000	2.653	299.928	3499.424	-32.165	-34.048	-32.165	46.839	226.629	0.984
3600.000	3.073	305.503	3599.299	-29.454	-38.236	-29.454	48.265	232.393	0.504
3700.000	3.101	312.063	3699.154	-26.084	-42.427	-26.084	49.804	238.416	0.354
3800.000	3.669	305.998	3798.979	-22.391	-47.024	-22.391	52.083	244.538	0.671
3900.000	3.487	308.539	3898.784	-18.616	-51.991	-18.616	55.223	250.299	0.242
4000.000	3.496	313.288	3998.599	-14.631	-56.589	-14.631	58.450	255.504	0.289
4100.000	4.000	322.507	4098.386	-9.773	-60.931	-9.773	61.710	260.888	0.784
4200.000	4.046	312.681	4198.141	-4.615	-65.647	-4.615	65.809	265.979	0.690
4300.000	3.611	317.865	4297.918	0.112	-70.353	0.112	70.353	270.091	0.555
4400.000	3.968	321.313	4397.699	5.147	-74.627	5.147	74.805	273.946	0.423
4500.000	4.186	317.748	4497.446	10.549	-79.244	10.549	79.943	277.583	0.334
4600.000	4.494	322.772	4597.160	16.369	-84.068	16.369	85.646	281.019	0.489
4700.000	4.420	330.663	4696.858	22.848	-88.326	22.848	91.233	284.503	0.617
4800.000	3.586	333.515	4796.613	29.006	-91.608	29.006	96.091	287.570	0.858
4900.000	3.158	346.564	4896.442	34.485	-93.643	34.485	99.791	290.217	0.876
5000.000	3.179	342.657	4996.289	39.811	-95.110	39.811	103.105	292.713	0.217
5100.000	3.424	344.539	5096.123	45.336	-96.732	45.336	106.829	295.111	0.268
5200.000	3.303	349.295	5195.951	51.045	-98.064	51.045	110.554	297.498	0.304
5300.000	3.617	346.881	5295.768	56.948	-99.315	56.948	114.483	299.830	0.345
5400.000	3.445	351.887	5395.579	62.994	-100.454	62.994	118.572	302.091	0.353
5500.000	3.329	337.056	5495.406	68.642	-102.010	68.642	122.955	303.936	0.881
5600.000	3.783	329.966	5595.214	74.172	-104.794	74.172	128.387	305.290	0.631
5700.000	3.436	343.815	5695.017	79.906	-107.280	79.906	133.768	306.680	0.936
5800.000	2.421	15.847	5794.892	84.816	-107.539	84.816	136.961	308.263	1.887
5900.000	1.976	28.119	5894.818	88.368	-106.149	88.368	138.118	309.777	0.646
6000.000	1.373	29.719	5994.775	90.929	-104.743	90.929	138.705	310.962	0.605
6100.000	0.704	72.796	6094.759	92.151	-103.562	92.151	138.625	311.663	0.984
6200.000	0.608	34.808	6194.753	92.768	-102.673	92.768	138.375	312.099	0.437
6300.000	0.440	134.557	6294.751	92.935	-102.097	92.935	138.060	312.310	0.808
6400.000	0.682	253.376	6394.748	92.495	-102.394	92.495	137.985	312.092	0.973
6500.000	1.053	275.035	6494.737	92.405	-103.879	92.405	139.031	311.655	0.489
6600.000	0.856	288.002	6594.723	92.717	-105.505	92.717	140.455	311.309	0.291
6700.000	0.268	274.390	6694.718	92.965	-106.448	92.965	141.328	311.132	0.599
<div> <div>HORIZONTAL DISPLACEMENT IS</div> <div>141.328 FEET AT 311.132 DEGREES</div> </div>									