



Company: Noble Energy
Lease/Well: Doering 28/16
API: 05-123-17233
Rig Name: Production/Lightning
State/County: Colorado/Weld
Latitude: 40.453, Longitude: -104.775
GRID North is 0.470 Degrees East of True North
VS-Azi: 0.000 Degrees



FIELD COPY ONLY (NOT DEFINITIVE)

Depth Reference : Ground Level

DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: msgyro_run01-01_ed_mrg.ut

Minimum Curvature Method

Report Date/Time: 2/28/2013 / 11:06

Vaughn Energy Services
Henderson Co.
303-853-4976
Robert Hooper

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	0.165	235.310	100.000	-0.082	-0.118	-0.082	0.144	235.310	0.165
200.000	0.110	101.080	200.000	-0.182	-0.141	-0.182	0.230	217.867	0.254
300.000	0.153	55.073	299.999	-0.124	0.063	-0.124	0.139	153.107	0.110
400.000	0.171	15.949	399.999	0.096	0.214	0.096	0.234	65.742	0.110
500.000	0.012	7.825	499.999	0.250	0.256	0.250	0.358	45.626	0.159
600.000	0.088	307.851	599.999	0.308	0.197	0.308	0.366	32.549	0.083
700.000	0.225	301.055	699.999	0.457	-0.032	0.457	0.458	355.992	0.138
800.000	0.129	245.022	799.998	0.511	-0.302	0.511	0.593	329.385	0.187
900.000	0.144	299.490	899.998	0.525	-0.514	0.525	0.735	315.624	0.126
1000.000	0.078	311.307	999.998	0.632	-0.675	0.632	0.925	313.134	0.070
1100.000	0.156	234.962	1099.997	0.599	-0.838	0.599	1.030	305.562	0.157
1200.000	0.349	221.789	1199.996	0.293	-1.153	0.293	1.189	284.281	0.200
1300.000	0.071	115.630	1299.996	0.040	-1.300	0.040	1.301	271.741	0.375
1400.000	0.332	204.308	1399.995	-0.251	-1.364	-0.251	1.387	259.563	0.338
1500.000	0.218	276.010	1499.994	-0.495	-1.673	-0.495	1.745	253.503	0.335
1600.000	0.485	202.044	1599.993	-0.868	-2.022	-0.868	2.200	246.765	0.474
1700.000	0.282	181.675	1699.991	-1.506	-2.188	-1.506	2.656	235.459	0.242
1800.000	0.154	210.485	1799.990	-1.867	-2.263	-1.867	2.934	230.476	0.164
1900.000	0.433	293.791	1899.989	-1.830	-2.677	-1.830	3.242	235.639	0.442
2000.000	0.654	324.743	1999.984	-1.212	-3.352	-1.212	3.564	250.124	0.360
2100.000	0.810	324.062	2099.976	-0.173	-4.096	-0.173	4.100	267.576	0.157
2200.000	0.797	319.783	2199.966	0.930	-4.960	0.930	5.047	280.624	0.061
2300.000	0.740	321.341	2299.957	1.966	-5.813	1.966	6.137	288.688	0.061
2400.000	0.446	301.652	2399.952	2.675	-6.548	2.675	7.073	292.221	0.354
2500.000	0.394	296.106	2499.949	3.030	-7.188	3.030	7.800	292.860	0.066
2600.000	0.452	301.403	2599.947	3.387	-7.832	3.387	8.533	293.384	0.070
2700.000	0.523	306.233	2699.943	3.862	-8.537	3.862	9.370	294.341	0.082
2800.000	0.496	295.149	2799.939	4.316	-9.297	4.316	10.250	294.901	0.102
2900.000	0.763	295.702	2899.933	4.788	-10.289	4.788	11.349	294.957	0.267
3000.000	0.766	292.265	2999.924	5.330	-11.507	5.330	12.682	294.854	0.046
3100.000	0.829	296.501	3099.914	5.906	-12.773	5.906	14.073	294.816	0.086
3200.000	1.372	319.537	3199.896	7.140	-14.198	7.140	15.892	296.698	0.690
3300.000	1.490	326.546	3299.865	9.135	-15.691	9.135	18.157	300.208	0.211
3400.000	1.282	313.180	3399.836	10.986	-17.224	10.986	20.429	302.531	0.383

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	1.279	322.615	3499.811	12.638	-18.717	12.638	22.584	304.028	0.211
3600.000	1.006	340.339	3599.791	14.352	-19.690	14.352	24.365	306.088	0.443
3700.000	1.407	346.912	3699.769	16.375	-20.264	16.375	26.053	308.941	0.424
3800.000	1.296	336.502	3799.741	18.608	-20.993	18.608	28.053	311.554	0.269
3900.000	1.277	340.183	3899.716	20.694	-21.822	20.694	30.074	313.481	0.085
4000.000	1.244	348.603	3999.692	22.807	-22.414	22.807	31.977	315.498	0.188
4100.000	1.161	12.009	4099.670	24.862	-22.418	24.862	33.477	317.960	0.495
4200.000	1.347	14.829	4199.646	26.990	-21.906	26.990	34.761	320.935	0.196
4300.000	1.347	14.491	4299.619	29.264	-21.311	29.264	36.201	323.936	0.008
4400.000	1.433	14.516	4399.589	31.612	-20.704	31.612	37.789	326.778	0.086
4500.000	1.635	13.837	4499.553	34.208	-20.049	34.208	39.650	329.625	0.202
4600.000	1.563	4.792	4599.515	36.952	-19.594	36.952	41.825	332.065	0.262
4700.000	1.653	5.117	4699.475	39.748	-19.352	39.748	44.208	334.041	0.090
4800.000	1.757	3.193	4799.431	42.715	-19.138	42.715	46.807	335.866	0.118
4900.000	1.540	3.270	4899.390	45.588	-18.975	45.588	49.379	337.401	0.217
5000.000	1.417	354.121	4999.356	48.160	-19.025	48.160	51.781	338.443	0.266
5100.000	1.339	344.441	5099.328	50.515	-19.466	50.515	54.136	338.926	0.245
5200.000	1.611	331.966	5199.295	52.882	-20.440	52.882	56.695	338.868	0.419
5300.000	1.408	328.222	5299.260	55.167	-21.748	55.167	59.299	338.485	0.226
5400.000	1.798	307.411	5399.221	57.165	-23.640	57.165	61.860	337.532	0.694
5500.000	2.140	303.191	5499.162	59.140	-26.449	59.140	64.785	335.905	0.372
5600.000	2.112	302.831	5599.093	61.161	-29.560	61.161	67.930	334.205	0.031
5700.000	2.025	312.820	5699.029	63.361	-32.404	63.361	71.167	332.914	0.370
5800.000	2.177	313.409	5798.961	65.868	-35.081	65.868	74.627	331.960	0.154
5900.000	1.659	322.280	5898.905	68.318	-37.347	68.318	77.860	331.337	0.596
6000.000	1.769	328.899	5998.860	70.785	-39.030	70.785	80.832	331.128	0.227
6100.000	1.314	328.494	6098.824	73.085	-40.427	73.085	83.521	331.051	0.455
6200.000	1.312	326.353	6198.798	75.016	-41.660	75.016	85.808	330.954	0.049
6300.000	1.489	322.519	6298.768	77.000	-43.085	77.000	88.234	330.771	0.201
6400.000	1.766	291.773	6398.729	78.602	-45.307	78.602	90.725	330.041	0.903
6500.000	2.041	294.765	6498.674	79.920	-48.354	79.920	93.409	328.825	0.292
6600.000	2.385	305.863	6598.600	81.884	-51.657	81.884	96.817	327.754	0.548
6700.000	2.396	315.993	6698.513	84.606	-54.795	84.606	100.800	327.071	0.422
6800.000	2.047	313.125	6798.438	87.331	-57.551	87.331	104.588	326.615	0.366
6900.000	1.912	306.786	6898.378	89.551	-60.190	89.551	107.899	326.094	0.257
7000.000	1.501	318.090	6998.334	91.524	-62.401	91.524	110.773	325.714	0.529
7100.000	1.441	316.334	7098.301	93.409	-64.144	93.409	113.313	325.522	0.075
HORIZONTAL DISPLACEMENT IS 113.313 FEET AT 325.522 DEGREES									