



Company: Noble Energy
 Lease/Well: Spike State GWS C/ 24-13
 Location: S-24 T-4N R-64W
 Rig Name: Production
 State/County: Colorado / Weld
 Latitude: 40.292, Longitude: -104.506
 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_mrg.ut

Minimum Curvature Method

Report Date/Time: 8/3/2011 / 13:31

VAUGHN ENERGY SERVICES

HENDERSON, COLORADO

866-835-8333

JAY HINMAN

05-123-15813

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	0.386	337.866	99.999	0.312	-0.127	0.312	0.337	337.866	0.386
200.000	0.157	8.694	199.998	0.759	-0.233	0.759	0.794	342.943	0.264
300.000	0.087	176.493	299.998	0.819	-0.208	0.819	0.845	345.777	0.243
400.000	0.078	66.717	399.998	0.770	-0.141	0.770	0.783	349.654	0.135
500.000	0.083	263.116	499.998	0.788	-0.150	0.788	0.802	349.237	0.159
600.000	0.115	307.024	599.998	0.840	-0.302	0.840	0.893	340.241	0.080
700.000	0.062	17.618	699.998	0.952	-0.366	0.952	1.020	338.978	0.111
800.000	0.020	99.128	799.998	1.001	-0.333	1.001	1.054	341.615	0.062
900.000	0.083	236.329	899.998	0.958	-0.376	0.958	1.029	338.578	0.098
1000.000	0.103	22.006	999.998	1.001	-0.402	1.001	1.079	338.110	0.178
1100.000	0.520	356.317	1099.996	1.537	-0.398	1.537	1.588	345.498	0.429
1200.000	0.604	327.498	1199.991	2.434	-0.710	2.434	2.536	343.740	0.291
1300.000	0.630	308.723	1299.986	3.223	-1.422	3.223	3.523	336.187	0.203
1400.000	0.577	300.055	1399.980	3.819	-2.287	3.819	4.452	329.083	0.105
1500.000	0.711	15.145	1499.975	4.671	-2.561	4.671	5.327	331.261	0.792
1600.000	0.886	4.801	1599.966	6.040	-2.334	6.040	6.476	338.870	0.226
1700.000	1.064	349.758	1699.951	7.725	-2.435	7.725	8.099	342.505	0.311
1800.000	1.364	311.200	1799.930	9.423	-3.496	9.423	10.050	339.646	0.850
1900.000	1.465	307.437	1899.900	10.984	-5.406	10.984	12.242	333.795	0.137
2000.000	1.337	339.353	1999.871	12.852	-6.832	12.852	14.555	332.006	0.780
2100.000	1.562	310.066	2099.841	14.821	-8.286	14.821	16.980	330.791	0.764
2200.000	1.258	320.945	2199.810	16.550	-10.021	16.550	19.347	328.807	0.404
2300.000	1.550	303.934	2299.781	18.158	-11.835	18.158	21.674	326.905	0.506
2400.000	1.480	293.851	2399.746	19.435	-14.138	19.435	24.034	323.966	0.275
2500.000	1.570	291.702	2499.711	20.464	-16.592	20.464	26.345	320.965	0.107
2600.000	1.543	280.892	2599.674	21.225	-19.187	21.225	28.612	317.887	0.294
2700.000	1.706	287.391	2699.634	21.924	-21.930	21.924	31.010	314.993	0.245
2800.000	2.112	284.438	2799.578	22.829	-25.135	22.829	33.954	312.248	0.418

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
2900.000	2.130	282.956	2899.510	23.705	-28.731	23.705	37.247	309.525	0.058
3000.000	1.900	281.663	2999.448	24.457	-32.165	24.457	40.407	307.248	0.235
3100.000	1.845	294.359	3099.395	25.456	-35.254	25.456	43.484	305.831	0.417
3200.000	1.721	321.619	3199.348	27.297	-37.653	27.297	46.507	305.940	0.849
3300.000	1.997	309.461	3299.296	29.581	-39.931	29.581	49.695	306.532	0.480
3400.000	1.872	310.159	3399.239	31.742	-42.525	31.742	53.065	306.739	0.128
3500.000	2.466	320.327	3499.167	34.452	-45.147	34.452	56.790	307.348	0.706
3600.000	2.314	334.434	3599.081	37.929	-47.392	37.929	60.701	308.672	0.606
3700.000	2.541	330.157	3698.991	41.673	-49.366	41.673	64.604	310.170	0.290
3800.000	2.275	344.174	3798.904	45.505	-51.010	45.505	68.358	311.736	0.644
3900.000	2.278	346.252	3898.825	49.345	-52.024	49.345	71.704	313.486	0.083
4000.000	2.323	352.075	3998.744	53.283	-52.776	53.283	74.996	315.274	0.238
4100.000	2.480	346.081	4098.656	57.390	-53.575	57.390	78.511	316.969	0.296
4200.000	2.203	359.222	4198.574	61.412	-54.122	61.412	81.857	318.611	0.602
4300.000	2.377	13.249	4298.494	65.353	-53.673	65.353	84.568	320.605	0.585
4400.000	2.260	1.758	4398.413	69.342	-53.137	69.342	87.360	322.537	0.479
4500.000	1.759	10.821	4498.352	72.820	-52.788	72.820	89.941	324.061	0.591
4600.000	1.460	22.484	4598.312	75.505	-52.013	75.505	91.686	325.438	0.442
4700.000	0.580	14.491	4698.296	77.172	-51.399	77.172	92.722	326.335	0.889
4800.000	0.320	347.570	4798.292	77.935	-51.332	77.935	93.321	326.629	0.329
4900.000	0.435	344.487	4898.290	78.573	-51.494	78.573	93.943	326.761	0.117
5000.000	0.187	347.635	4998.289	79.099	-51.630	79.099	94.458	326.866	0.248
5100.000	0.343	329.257	5098.288	79.516	-51.818	79.516	94.910	326.909	0.175
5200.000	0.240	309.661	5198.286	79.907	-52.133	79.907	95.409	326.879	0.141
5300.000	0.984	315.684	5298.280	80.655	-52.894	80.655	96.452	326.743	0.745
5400.000	0.804	342.015	5398.268	81.937	-53.710	81.937	97.971	326.755	0.443
5500.000	1.240	0.032	5498.252	83.686	-53.926	83.686	99.556	327.203	0.536
5600.000	0.252	3.625	5598.243	84.988	-53.912	84.988	100.645	327.611	0.988
5700.000	1.297	358.624	5698.232	86.339	-53.925	86.339	101.796	328.012	1.046
5800.000	0.772	10.870	5798.215	88.133	-53.825	88.133	103.269	328.586	0.566
5900.000	1.926	14.849	5898.186	90.419	-53.267	90.419	104.943	329.497	1.157
6000.000	1.254	0.953	5998.147	93.138	-52.819	93.138	107.072	330.442	0.770
6100.000	1.298	354.270	6098.123	95.359	-52.913	95.359	109.056	330.975	0.155
6200.000	0.625	340.940	6198.108	97.001	-53.204	97.001	110.634	331.255	0.704
6300.000	0.986	326.019	6298.098	98.230	-53.863	98.230	112.028	331.262	0.414
6400.000	0.865	316.088	6398.085	99.487	-54.868	99.487	113.614	331.123	0.200
6500.000	0.926	319.904	6498.073	100.649	-55.912	100.649	115.136	330.947	0.085
6600.000	1.013	321.580	6598.059	101.959	-56.981	101.959	116.801	330.801	0.091
HORIZONTAL DISPLACEMENT IS 116.801 FEET AT 330.801 DEGREES									